55TH ISOCARP
WORLD PLANNING
CONGRESS

Beyond the Metropolis

JAKARTA - BOGOR, INDONESIA
9 -13 SEPTEMBER 2019

Proceedings

ISOCARP
Knowledge for Better Cities

Proceedings of the
55th ISOCARP World Planning Congress 2019

55th ISOCARP World Planning Congress
'Beyond the Metropolis'
Jakarta/Bogor, Indonesia
9-13 September 2019

Editors: Martina Juvara and Slawomir Ledwon

Produced and published by ISOCARP

ISBN: 9789075524628

International Society of City and Regional Planners
https://isocarp.org/

Introduction

Martina Juvara
General Rapporteur

"With urbanisation continuing at pace, megacities offer a different model of urban development, which is no longer the unexpected by-product of fastgrowing countries: it is a beacon to be followed for some, and for others, simply dehumanizing. The Congress will be a unique opportunity to explore what megacities can do for humanity and how we can make sure we move towards a better and fairer future: for children, for the environment and for our own identities of citizens in a globalising world. Around 250 presentations, debates, training sessions and inspirational speeches: a great way to start sharing knowledge for a better future."

Our aim with the 55th ISOCARP World Planning Congress is to investigate the future and explore the opportunities offered by cities without limits: what makes them successful and why they are so appealing and to whom. We want to focus on their supposed inevitability but also on the possible alternatives for achieving global influence without the mega-scale.

This is our target for this year: exploring 'planning beyond limits'. This does not mean that the work of last year at Bodø is being put behind our backs: sustainability, resilience and the role of cities in our changing planet is at the forefront of everyone's thinking this year too. Jakarta provides the perfect context: It is the second largest agglomeration in the world (over 30 million), one of the biggest plastic waste generators (up to 2,400 tons daily) and the fastest sinking city (up to 15cm a year, with almost half the city below sea level already). Such a mega challenge, that the Government has decided to relocate its national capital functions. In addition, almost 40% of Indonesian citizens are dissatisfied with the living quality of their cities.

Environmental challenges, well-being and citizen quality of life and the role of cities are only some of the themes explored by the Congress this year. No better place to discuss them than Jakarta, a no better place to open to the whole world and gain a truly global perspective about what's happening and what different experts are thinking from all parts of the world.

On the one hand, the global role of megacities and how scale is becoming power: what are the dynamics that lead to the emergence of megacities? Are they necessary to achieve global influence or are there alternatives? Can cities without limits be planned, nurtured and grown as a way to promote a positive future for a country and for the planet?

On the other hand, we will also explore the strategies, considered or maybe tried out, to promote liveability, well-being, exemplary sustainability, innovation and responsive governance. If megacities develop into powerful regions, they also play an unprecedented role in shaping the social, economic and environmental evolution of our planet: megacities have the chance to lead the world and change the fate of global challenges such as climate change, security, innovation, financing and digitalisation. They can provide the test-bed and the drive to experiment with new technologies and proactive governance that respond to all scales, from global to local, and to all people from international leaders to children and the migrant poor.

It will be a very busy week: comfortable shoes and fat notepad in hand – as hundreds of researchers, professionals, government officials and international agencies will congregate in Jakarta to share knowledge and learn from each other.

It will be an opportunity to hear about the progress of the Sustainable Development Goals directly from UNHabitat, discuss the future of democratic and participatory planning, learn how to embed children friendly policies into planning and share experience about governance from all parts of the world. The role of heritage in our future identity and the challenges of water management will be explored across cultures, and different governance and resource frameworks.

The Congress will provide a true platform to share ideas and best practice across the globe: from Jakarta, Samarang, Wuhan and other cities in China, the work being done in cities of India, Africa, Australia, Europe and America. With several technical visits, panel discussions, debates and round tables, we expect no less than future orientated thinking and limitless horizons.

All this, like being among friends! It would be a great mistake not to be there, with us.

Track 1

Limitless cities and urban futures

Planning for scale



CONGRESS TEAM

Peter Newman
(Australia)
Luo Wenjing
(China)
Stephen Goldie
(United Arab Emirates)

LOCAL EXPERTS

Budi Situmorang
Khairul Rizal

Through holistic exploration, this track will provide an opportunity to discuss why megacities are emerging, how they are influencing the world (positively and otherwise) and how planners can think ahead about their future. Megacities and city-regions are challenging the notion of the traditional city and even the metropolis. Larger and more powerful than countries, they become global nodes of migration, trade, knowledge exchange and innovation that seem to be limitless. Are megacities unstoppable and the fastest way to a prosperous future?

The track also explores the needs and impacts of megacities, from infrastructure to food and waste, and the range of strategies needed, imagined or already being explored, to make them lead the way towards efficiencies of scale and innovative resource management. Are they part of a global interconnected network that can lead planetary change or a threat to life on Earth?

How best to plan for an efficient, liveable and regenerative megacity? What lessons can already be learned from the leaders in this journey?

Sessions

Session 1.1
Understanding Megacities: Scales (1/2)
How can one understand the growth of megacities? Are megacities limitless? This session discusses the scales of megacities as well as the method of controlling the growth boundary of megacities.

Session 1.2
Understanding Megacities: Linkages and Structures (1/2)
How can one understand megacities as a whole and as individual parts? This session explores the structures of megacities including linkages, relationships, disparities, synergies and connections.

Session 1.3
Understanding Megacities: Scales (2/2)
How can one understand the growth of megacities? Are megacities limitless? This session discusses the scales of megacities as well as the method of controlling the growth boundary of megacities.

Session 1.4
Understanding Megacities: Linkages and Structures (2/2)
How can one understand megacities as a whole and as individual parts? This session explores the structures of megacities including linkages, relationships, disparities, synergies and connections.

Session 1.5 (Special Session)
How to Plan Ahead: Wuhan Metropolis Experiences
This session specifically focuses on Chinese megacity planning using the case study of Wuhan, located in Central China. With a population of more than 11 million and an area of more than 8,000 square kilometres, it aims to become a sustainable, efficient and liveable megacity.

Session 1.6
Planning for Megacities: Sustainability
How can one plan for a sustainable megacity? This session focuses on resource consumption, resource utilisation, and environmental preservation in planning strategies of megacities.

Session 1.7
Planning for Megacities: Efficiency
How can one plan for an efficient megacity? This session focuses on improving the efficiency of megacities, especially in the areas of transit-oriented development, smart cities and the like.

photo: Mariana Gil/WRI Brasil Cidades Sustentáveis, Flickr

Session 1: Understanding Megacities: Scales (1/2) 1.1

10 September (Tuesday), 9:00 - 11:00

TRACK KEYNOTE

Pedro B. Ortiz

Metropolitan Management: Expansion, Governance, and Finance

Metro-Urban expansion is challenging world development. Only 3 cities in world history have been one million-plus inhabitants. Now we have 500. These Metro-Cities produce 75% of world GDP. Many are expanding at a 5% annual rate. They double their size every 14 years. Lack of a methodology for expansion is producing an uncontrolled pattern, jeopardizing development and equity. Challenges and alternatives will be discussed.

TRACK KEYNOTE

Qing Lu, Liyan Xu, Xiao Peng, Zhen Cai

The Spectrum of Metropolitan Areas across the World, and Detection of Potential Metropolitan Areas with Chinese Characteristics

The paper proposes a spectrum of MAs with respect to their inner network and interactive structures based on metropolitan development experiences in the US, Japan, and China, and identifies 32 MAs in China with a unique three-circle structure: a core circle, a commuting circle, and a functional metropolitan circle.

Ali Alraouf

The Value of Less and Small: Transforming Metropolitan Doha into Connected, Human and Resilient Urban Settlements

The paper analyses different urban planning strategies and policies adopted to shift the focus from creating a mega city with an image which resonate with typical global cities to a more sustainable, resilient, knowledge-based and decentralised urbanity. It discusses the transformation of Doha from a metropolitan exploiting the oil and gas revenues to a multi-centered model of sustainable urbanism.

Prihadi Nugroho

Bringing creative Economy to Community Resilience towards better Urban Governance: The Case of Semarang City, Indonesia

Semarang City has been transforming from a port city to a multifunctioning city, creating fragmented physical urban transformation and separate formal and informal economy. This paper aims to examine how the recent urban transformation has been fueled by creative economy activities. Results show that kampong-based creative economy is beneficial to enhancing the informal economy and urban settlement development.

Session 2: Understanding Megacities: Linkages and Structures (1/2) 1.2

10 September (Tuesday), 11:30 - 13:00

TRACK KEYNOTE

Eunice Yorgri, Leng Hong

The Role of Urban Slums in the Evolution of Megacities; A case of Nima and Old Fadama, Accra, Ghana

Accra, Ghana's capital city is progressively morphing into a mega-city. The rate of transformation is largely attributed to the influx of poor unskilled rural migrants into the city and its periphery. This assertion is a result of the increasing number of migrant slums in the city. Therefore, two migrant communities are used to justify this assertion.

Anna Katrina Karaan

Negotiating Spaces of Exception: Metro Manila's Planned Unit Developments - The Case of Eastwood City

This qualitative case study uncovers how Planned Unit Developments (PUDs), a type of urban enclave increasingly common in Metro Manila, are negotiated into legitimised spaces of exception where private interests remain dominant yet largely accepted. In exploring relations of state-society-space, the study points towards more inclusive futures for PUDs through continuously sharing the power to negotiate to all.

Ivan Rwampungu, Mishima Nobuo

Evaluation of urban form of a mountainous city from the perspective of compactness characteristics

This study aims at analysing and understanding the urban form in Kigali, capital city of Rwanda. Two dimensions of spatial organisation and spatial distribution of population were measured to objectively evaluate physical compactness. Findings reflected trend of decrease in compact form with absence of sustainable concepts. Suggestive measures were provided for future consideration in sustainable urban development of the city.

Yixuan Peng, Gerhard Bruyns, Darren Nel

Chinese Megablock Urbanism: a Tool of limitless Urbanization in an Unprecedented Speed and Scale

By studying cases in the Pearl River Delta region of south China, the paper explains how megablock urbanism shapes Chinese cities and deliver insights in terms of their impact on urbanization, urban morphology and prevalent planning strategies. The paper argues for the cultivation of an urbanization practice that needs to become systematic in its sustainable focus and outcomes.

Session 3: Understanding Megacities: Scales (2/2) 1.3

10 September (Tuesday), 14:00 - 15:30

TRACK KEYNOTE

Dushko Bogunovich

How Big Is Auckland: Planning a City-Region for Resilience and Regeneration

The authors argue that Auckland, New Zealand's largest metropolitan area, should abandon its 'compact city' model due to weak evidence to support its liveability-sustainability agenda. Instead, planning should acknowledge decentralisation and polycentric metropolistation, and support a linear, metropolitan conurbation to achieve higher levels of resilience and regenerative in the face of climate change.

Swarna Bintay Kadir, Mohammed Hamidul Hasan

Megacity - Mega Challenges: A case of Dhaka City-Capital city of Bangladesh

Bangladesh's capital Dhaka is the 7th largest megacity of the world, and by 2030 it will be the fourth biggest city in the world with 28 million inhabitants. It is facing the combination of high pressure of housing, high population density, and rapid population growth, consequences in urban growth taking place in natural hazard-prone areas.

Manuela Negrila

The role of sprawl towards the megacity. Eastern-European sprawl, the case study of Bucharest, Romania

Cities nowadays are either growing at a never-before seen rate or shrinking due to technology, globalisation and increased mobility. Some of these changes are planned but, most are not, like urban sprawl. Seeing how the forces that drive this phenomenon are in their majority economic, how can planners integrate this chaotic element into a planned and structured megacity?

Chandan Mysore Chandrashekar, Bharath Haridas, Prakash PS. Aadithyaa Jayanthi SenthilNathan

Machine learning for building extraction and Integration of Particle swarm optimization with SLEUTH for Urban growth pattern visualisation for liveable cities

Unplanned irreversible urbanisation with increasing population in the administrative boundaries of existing and upcoming megacities have developed imbalance in the system. Sustainability as prime agenda, this research article aims to understand the urban pattern and its modelling using a novel PSO based SLEUTH. This also included extraction of individual building using SVM to understand regional dynamics and energy demand.

1.4 Session 4: Understanding Megacities: Linkages and Structures (2/2)

10 September (Tuesday), 16:00 - 17:30

Shuai Li

Space of flow including capital and information shape the megacity groups: based on the example of Chengdu-Chongqing city groups in China

With globalisation, “space of flow” like capital, information and talent are moving around the world, combining separate cities into influential urban groups. This research takes Chengdu-Chongqing urban agglomeration in China as an example to analyse the information and capital networks among its 27 cities, and to argue that the role of planning is to attract these flows and enhance competitiveness.

Huihui Nan, Qian Zhao

Comparative analysis of Beijing-Tianjin-Hebei urban agglomeration, Yangtze River Delta urban agglomeration, Guangdong, Hong Kong and Macau Bay Area based on gravity model

The purpose of the study is to compare China’s three major urban agglomerations based on their economy, government management and spatial structure, to determine regional potentialities and future development direction by using gravity model as a method.

William Zuo

Multi-scale Spatial Layout Structure System: Experiences of Shanghai Mega-city Spatial Planning

This paper focuses on the spatial planning system established by the Shanghai Masterplan 2035 to reduce the negative effects of overpopulation on the emerging Shanghai megacity region. Research on the detailed planning process and Shanghai experiences are valuable for megacities facing similar challenges.

Felicia Atmadja, Dushko Bogunovich

Shaping Compact Cities with TOD for Liveability, Sustainability and Affordability: A Comparative Assessment of Jakarta and Auckland

Auckland and Jakarta have chosen the TOD strategy, incorporating vertical housing, to slow down the sprawl. But citizens are concerned about the impacts of higher density development. We make a comparative assessment of TOD’s ability to achieve liveability, affordability, and sustainability (L-A-S) in two cities - Jakarta and Auckland- while using Singapore as a benchmark for both.

1.5 Session 5: (Special Session) How to Plan Ahead: Wuhan Metropolis Experiences

11 September (Wednesday), 11:30 - 13:00

Moderators: Wenjing Luo, Frank D’hondt

Wenjing Luo

The Corridor Strategies in the Megacity development: Case Study of the Optical Valley Knowledge

Based on the Optical Valley Knowledge Mega-Corridor, the paper illustrates the use of knowledge mega-corridors as a loop for innovation systems, a boom for knowledge economies, a bundle of infrastructure axis and a mutual force for environment conservations in developing livable and efficient megacities. The paper also present challenges to implement spatial strategies lying in policymaking at the local level.

Wenjing Luo

How to Define the Boundaries of Metropolitan Areas : Case Study of Wuhan, China

Based on analyzing the current development stage of Wuhan as well as its surrounding areas, this paper attempts to define the boundary of Wuhan metropolitan area in dimensions of its urbanization, geography, transit, economics, ecology, psychology and culture. The paper concludes that Wuhan’s methodology of defining its boundaries can be applied to other metropolitan areas.

Session 6: Planning for Megacities: Sustainability 1.6

11 September (Wednesday), 14:00 - 15:30

Silvia Croce

Urban parameters analysis and visualization. A Support to planning decisions for the definition of urban surface usages

This study presents a systematic framework to support planning decisions on the use of urban surfaces based on accurate and spatially explicit information. The method, which is tested in Bolzano (Italy), implies the assembly of a spatial database of significant morphological and environmental parameters that influence the distribution of surface uses in cities and affect the priorities for their definition.

Bo Bian

The application of micro-regeneration strategy in urban renewal in Lima, Peru

Current developing strategy shows little positive impact on dealing with urban problems in Lima, Peru. This paper analyzes current situation of a typical district in northern Lima. By introducing micro-regeneration strategy, which mainly includes urban catalysts, space design and corporate mechanism construction, this paper hopes to provide a new mode for the development of the city and similar practice.

Daniel Petrovics

Integrating Vertical Farming at Scale in Urban Food Planning - Practical Considerations for Planners

Vertical Farming has been promised to potentially reduce the climate impact of urban food systems. Nevertheless a holistic perspective assessing what elements urban planners should consider whilst integrating this technology into urban food planning in a sustainable manner is missing. A number of factors are discussed in detail among them operational arrangements, policy, market, social-cultural, and built contexts.

Latifah Latifah, Dayinta Pinasthika

Smart Growth Approach in Planning Bogor City Infrastructure

While Bogor's rapid growth, as a satellite city to Jakarta, see investment in new housing development rising, urban infrastructure provision remains limited. To address this problem, the Ministry of Public Works and Housing's smart growth approach has focused on designing public transport oriented, mixed-use and compact development, with emphasis on walkability, human scale planning, and public space in Bogor's center.

Session 7: Planning for Megacities: Efficiency 1.7

12 September (Thursday), 11:30 - 13:00

Vaishali Aggarwal

Smart Cities in India- Branded or Brain-dead?

The notion of 'smart cities' is increasingly visible in discourses on the future of cities. The paper seeks to answer if 'branding of technology' can be used as a tool to create a new identity for the mobility of Delhi or 'upgrade' the existing situation. How can the context of Delhi be decoded to describe the perceptions of the people?

Mariana Reis Santos

Does the implementation of Special Zones of Social Interest (ZEIS) encourage adequate housing in precarious settlements? The case of Sapé, São Paulo

This paper evaluates to what extent the implementation of ZEIS encourages land regularisation procedures and public investments in precarious settlements. It also analyses the quality of State interventions conducted within the zoning. By focusing on qualitative aspects, the paper aimed to establish whether ZEIS has been promoting decent housing conditions to the urban poor or reinforces precarious patterns of development.

Putrikinasih Santoso

Finding Housing Affordability in MRT Jakarta TOD Areas

This paper aims to posit an exercise on the implementation of TOD concept in a built existing environment including the challenges in implementing TOD concept in such areas and possibilities for redevelopment within those TOD areas. To exemplify, several case studies will be presented, including Dukuh Atas, Cipete, and Haji Nawi TOD areas

Track 2

Besides the megacity and other cities
Planning for balance


CONGRESS TEAM

Tathagata Chatterji
(India)
Fedor Kudryavtsev
(Russia)

LOCAL EXPERTS

Ari Krisna Tarigan
Adiwan Aritenang
Harya Setyaka Dillio

This track explores alternative themes beside and beyond the megacity: one explores the paths of cities that aspire to being influential, but also aim for balance and perhaps containment (to provide an alternative model where there is less pressure and life is more balanced).

The other looks at aspects of the regions around megacities: the hinterland and its rural towns, which play an essential role supporting and providing resources to the megacity, sometimes being left behind by the economics and policies of large urbanisation, and sometimes reaping the benefits of nearby growth, prosperity and innovation.

Are megacities the only option? What would be the future role of secondary or non-global cities? Can they only be subservient or irrelevant? How to strengthen economic roles of smaller cities as counter magnets – to generate more job opportunities closer to home and reduce population pressure on megacities? How does megacity expansion transform the countryside and their own hinterlands? How can megacities and peri-urban areas develop a synergetic and maybe positive relationship? How is rural development providing spaces and resources for city dwellers? Does it make sense to invest and modernise agriculture around a megacity and reinvent the rural into a new model?

Sessions:

Session 2.1
Beyond Megacities: Key Challenges and Alternatives
Discussions under Track 2 broadly explore two key areas – the contemporary urbanisation context under which the megacities, their scale economies and their regional linkages are embedded, and what the possible alternative spatial models are. These two broad themes then lead to more detailed explorations around seven sub-themes. This introductory session, involving keynote speakers from all the sub-themes would touch upon key challenges and alternatives in planning at a regional scale and lead to further deliberations under specific sub-topics.

Session 2.2
Megacities Backside: Peri-urban Interface
Peri-urban interfaces of dynamic metropolitan regions are spaces which are forever in a state of flux, where land use patterns and built forms frequently undergo rapid change, where urban and rural land livelihood and lifestyle patterns coexist, often within a person's everyday routine. Hereunder this sub-theme, we not only explore some of the complexities involved in peri-urban transformation, but also seek to understand how megacities and peri-urban areas can develop a synergetic and perhaps positive relationship.

Session 2.3
Metropolitan City and Its Shadow Regions
Megacities and global metropolitan regions often tend to cloud our imagination through the sheer magnitude of their scale, their glitz and glamour, and their deprivation and squalor. Needless to say, megacities dominate and overshadow their hinterlands. Here, we seek to shed light on such shadow regions. We ask what it means to be a shadow region. Can life be good in the shadow of the megacities? How does megacity expansion transform the countryside? What are the conflict points and how are they being negotiated?

Session 2.4
Urban Expansion and Food Supply: Megacities Resiliency

Rapid expansion of urban footprints-often in unplanned chaotic ways-are harming

photo: Atik Sulianami, Unsplash

our ecosystems and green covers; fertile agricultural lands are shrinking; wetlands and waterbodies are depleting. This sub-theme explores how we can manage urban expansions more sustainably. We shall discuss how to implement global sustainability goals through local processes. What are the linkages between peri-urban agriculture and urban sustainability goals? Does it make sense to invest and modernise agriculture around a megacity and reinvent the rural into a new synergetic model?

Session 2.5
Managing Megacities and Hinterlands Relations - Planning at a Regional Scale
Megacity – hinterland relations are often seen as one-way traffic, where market advantages of agglomeration economies dictate flows of population and material resources. Here we question how we can bring greater balance through innovative regional planning strategies. How do we strengthen economic roles of smaller cities as counter magnets – to generate more job opportunities for rural migrants closer to their home and reduce population pressure on megacities?

Session 2.6
Alternative Models of Spatial Development: Neither Urban nor Rural?
Here we discuss settlement typologies beyond urban-rural binaries. We try to understand what the possible alternative models of spatial development are, and which ones are neither urban nor rural. How to strengthen rural economies, culture and lifestyle, in this age of rapid urbanisation? How do newly planned cities impact existing rural settlements? How are land and environmental conflicts being mediated?

Session 2.7
Beyond Megacities: Role of Mega Infrastructure in Hinterland Development
Mega logistics hubs, such as special economic zones, container terminals, and ports; and network infrastructure, such as railway corridors and highways anchor global supply chains in megacities. But how do such mega-infrastructure projects shape regional settlement patterns and backward linkages? How do they shape industrialisation and urbanisation processes?

Session 2.8
The future of urbanisation: decentralization of functions, dispersal of urban form?
Discussions under the theme would revolve around various alternative possibilities regarding mega-urban regions – What are national level planning strategies regarding spatial concentration or dispersal? Is it still necessary for capital and other core administrative and economic functions to be co-located in a single urban centres? Or is it possible to envision that constellation or a network of different small towns connected by smart technologies will surpass megacities of today? And why do countries still need centralized cities as it was thousand years ago despite the all-around digital maze of our times?

Session 1: Beyond Megacities: Key Challenges and Alternatives 2.1

10 September (Tuesday), 9:00 - 11:00

TRACK KEYNOTE

Jean-Claude Bolay, Eleonore Labattut

Sustainable development, planning and alleviation of poverty

Many small and medium-sized cities in the global South can be considered as poor cities and are home to half of the world's urban populations. Through case studies from Burkina Faso, Brazil, Argentina and Vietnam, this paper brings attention to these intermediary cities and argues that revitalising urban planning from these perspectives is imperative.

TRACK KEYNOTE

Ratoola Kundu

The Informal Syndicate Raj:Emerging urban governance challenges in newly incorporated villages of Bidhan Nagar Municipal Corporation, West Bengal

This paper investigates the complex governance and livelihood transformations following the State-driven merger of an existing township with the surrounding unplanned and severely underserviced village and urban areas. Understanding the frictions over access to urban services and resources between erstwhile rural-urban jurisdictions reveal the hybrid forms of institutional governance, which characterises the peripheries of cities of the Global South.

TRACK KEYNOTE

Teresa Marat-Mendes, Joao Borges

The role of food on re-imagining the sustainable city: from the neighbourhood to the region.

In search of a new socio-ecological metabolic perspective, this paper presents the preliminary findings of a research project, which aims to identify urban planning policies to support sustainable transitions towards low-carbon cities at the regional and neighbourhood scales. The results call for a stronger integration of the food system within urban planning and new theorising of the city in sustainable transition.

TRACK KEYNOTE

Stephen Goldie

Two Thousand New, Million-Person Cities by 2050 - We Can Do It!

From North Africa to the Western Pacific the world requires cities for an additional 3 billion urban residents in the next thirty years. Equal to 3000 new, one-million person cities, 2000 of them in Third-World countries with little urban planning capability. It is feasible, at an average annual cost of US$1.3 trillion, but we have to start now!

Session 2: Megacities Backside: Peri-urban Interface 2.2

10 September (Tuesday), 11:30 - 13:00

TRACK KEYNOTE

Esther Vlaswinkel, Minze Walvius

The City of the Future - a new paradigm, a new vocabulary

Planning 'The City of the Future' requires a new way of thinking and therefore a new vocabulary. This new conceptual framework which has been explored in the city edge of Utrecht, shows how transitions in mobility, energy, climate can be integrated in the cityscape of the future.

Zhao Chen, Chunxiao Huang

The Weak-sided Urban Fringe and the Flexible Planning Approaches: case study of Yuhuatai District, Nanjing

An uneven development of urban fringe caused the diverse of the strong-sided fringe and the weak-sided one. The weak-sided urban fringe in China is characterised with mega-project driven urbanisation mode, unbalanced infrastructure supply, the fragmented governance etc. A flexible planning methodology could be adopted including the repair of embedded structure and the action-oriented organic regeneration.

Dani Muttaqin, Soelaeman Soemawinata, Adhamaski Pangeran

Township Development by Private Sector: Lesson Learned from Jakarta Megapolitan Area

This paper describes the history and process of Township Development in Jakarta Area since the 1980s, its location and distribution, challenges and opportunities and how private sector can become vital stakeholder in minimising negative impact of urbanisation.

Soumya S Warrier

The Anti-city

Cities like Gurgaon are witness to the rise of an era of privately planned "anti-cities" that serve a select few. With an intense cauldron of activities and transformations wrapping India, how does the profession of architecture and urban design, as capacity holders, evaluate and streamline the growth of the contemporary urban landscapes of our cities?

Mirza Permana

Settlement Development Analysis of Malang City Peri Urban Area and Its Conformity with the Regional Spatial Plan

The development of Malang City, Indonesia, has consequently led to an upturn of new residential, trade and industrial centres in the suburbs area. The paper presents a research, which aims at determining the characteristics of settlements in peri-urban area; analysing conformity to the regional spatial plan (RTRW), and establishing development direction.

Sohini Maiti, Satyajit Mal

Defining the RUrban - a case of Hyderabad

It is time to redefine both Rural and Urban through a sustainable future for the secondary cities - the Rurban dream of planners and designers. To conserve the rural soul while having the urban facilities is the aim but if that is a viable possibility is the subject of discussion.

2.3 Session 3: Metropolitan City and Its Shadow Regions

10 September (Tuesday), 14:00 - 15:30

TRACK KEYNOTE

Liang He

From one-way to interactivity: difficulties and strategies in the planning of adjacent areas of metropolis

This planning study combines the author's planning practice, focusing on the adjacent area of Shanghai and Zhejiang. Analysing the functional coordination and infrastructure convergence in regional coordination from the microscopic perspective. Key issues such as administrative barriers, some planning strategies are carried out.Based on this plan, the three major difficulties in regional cross-border coordination planning are as proposed.

Tianzhu Liu, Jingsheng LI

Out-migrate Elites as Rural-Urban Link: an Innovative Pathway Toward Rural Development Around Metropolis

This paper questions what the role the Out-migrate Elites (OMEs) play in rural development. Participatory research method was employed to conduct the research. The binary nature that OMEs have was concluded: their social relations with the village are the motivation of their participation in rural affairs, while their urban life experience contributes to the significant resources that the village requires.

Ivana Angelova

Building moratorium as a future instrument for tackling unsustainable urban growth

To regulate the undesirable urban growth, a local government may impose a moratorium on the issuance of building permits. Meanwhile, authorities will often conduct urban surveys based on which a new satisfactory urban plan and/or updated building regulations will emerge. This research looks at a few cases using this tool, focusing on the moratorium in Skopje, North Macedonia.

Erie Sadewo, Delik Hudalah, Ibnu Syabri, Pradono Pradono

Deciding Where to Live in The Suburb: Linking Utility-Maximization and Residential Mobility in Polycentric Urban Region Context

This paper questions the extent to which residential mobility between peripheral municipalities is linked to utility-maximisation, in polycentric urban region context. The results could only validate the importance of housing cost in polycentric setting. Residential mobility within suburban areas does not seem to be motivated by lower housing or transportation cost, nor to be near to major employment districts.

Dianhong Zhao, Ding Shi

A Study on the Approach of Sustainable Development on Traditional Cultural Landscapes Surrounding Metropolitan Shanghai

This study focuses on the methodology of effectively utilising cultural landscape resources and promoting further harmonious development of urban-rural relations in Shanghai. By classifying the cultural landscapes, the paper puts forward the mode of protection and sustainable development of cultural landscape resources, thus providing a basis for heritage protection, urban and rural planning and tourism planning within Shanghai.

Yanqun Li, Hong Geng, Erpeng Shi

Response path adapted to the unbalanced shrinkage of small towns in metropolitan areas: A case study of Wuhan in China

By taking Wuhan city as an example, this paper comprehensively measures the external characteristics of "unbalanced shrinkage" of small towns in metropolitan areas, and explores the formation mechanism of "balanced shrinkage", and puts forward the adaptive response path, so as to promote the healthy urbanisation of metropolitan areas.

2.4 Session 4: Urban Expansion and Food Supply: Megacities Resiliency

10 September (Tuesday), 16:00 - 17:30

Thomas Weith, Meike Fienitz

Just Schwerin - Balanced urban-rural development?

The transdisciplinary study analyses current challenges, conflicts and approaches to solutions regarding an integrative urban-rural development, using the case of the German city Schwerin and its surroundings. The focus is on the question as to how far solutions for conflicts between city, surroundings, and rural areas can be.

Jason Hilgefort

Rural Revolution, leveraging emerging infrastructures

There is a global issue facing the rural, from Italy, USA, to SEAsia, that has left them behind rapidly expanding urban centers. Within Asia model is emerging. In key

areas, new infrastructures are being leveraged to allow for new opportunities for countryside places within the larger constellation networks of cities.

Antonella Contin, Sandy Jiyoon Kim

How to Grap the Power of the Place: The TELLme Project and Metro-dology

As a response to contemporary metropolitanisation processes, the ongoing TELLme Erasmus+ project attempts to define a holistic methodology, the Metro-dology; structure a training lab where academia and practitioners can discuss the issues, principles, and gaps of the metropolitan area; and develop mapping tools to comprehend the metropolitan complexity and support the training.

Yi Li

Analysis of the Correlation between the Establishment of Rural Land Share Cooperatives around Shanghai and the Government & Villager Satisfaction - A Case Study of Jinxi Town, Kunshan City

Cooperatives have become an important buffer for migrant workers in Shanghai's surrounding villages, increasing the employment rate, providing green agricultural products, inheriting agricultural technologies and activating local communities. Cooperatives can promote the large-scale operation for agricultural land. It is suitable for areas with deep industrialisation and urbanisation. Cooperatives need to be improved in equity distribution and agricultural production.

QiuYi Jiang, Guoquan Zhang, Xiaoyi Wen

Exploration and practice of formulating strategic planning for rural revitalisation in the Shanghai metropolitan area - take the rural revitalisation of Jinxi town in Kunshan as an example

At present, China's rural revitalisation research mainly focuses on rural theory and lacks rural research from a regional perspective. Taking Jinxi Town in Jiangnan as an example, this paper analyses the relationship between regional development and measurement and demonstration through big data relative comparison, which is expected to provide new ideas for rural revitalisation in metropolitan areas.

Zhengyin Lu, Xiaoyi Wen

The Shrinkage and revitalisation of villages in metropolitan area of mega cities

Water system and water-related activities are weakening during the rapid development of mega cities. Taking two Asian cities and their surrounding villages as examples, water's connectivity and productivity can be crucial for villages and its balance with big cities.

Session 5: Managing Megacities and Hinterlands Relations: Planning at a Regional Scale 2.5

11 September (Wednesday), 11:30 - 13:00

Dianhong Zhao

Construction and empirical study of evaluation index system of rural revitalisation in China's metropolitan areas from the perspective of social ecosystem - taking villages and towns around Shanghai as examples

This paper looks at the rural revitalisation of 20 villages around Shanghai, China, to test the feasibility and application value of the evaluation index system based on social ecosystem perspective, and to suggest the direction of policy intervention.

Huimin Qi

Analysis on Integration Path of Urban and Rural Industries Based on Economic Data Model - A Case Study of Overall Strategy Planning of Taiyuan Rural Revitalisation

In the background of ongoing urbanisation in China and prominent, dualistic, contradiction between urban and rural areas, rural revitalisation is extremely urgent. Currently, common problems concerning industry, ecology and humanities exist in rural areas. This paper attempts to figure out the causes of differences in industrial development in rural areas on the basis of macro data analysis and industrial spatial distribution.

Tathagata Chatterji

Balanced Regional Development through District Planning - A comparative analysis of Indian and South African planning frameworks

This paper compares approaches towards balanced regional development through district planning in India and South Africa to draw policy lessons. The comparative analysis of two major transitional economies shows potential of district planning to achieve balanced regional development. It also underscores the need for the regional planning mechanism to combine features of top-down strategic approach and bottom-up participatory approach.

Xue Jiang, Tianyu Zhao

Whole-region Tourism Greenway Network Organization Mechanism Based on Gravity Model Flow Measurement

Greenway plays an important role in the integration and connection of urban and rural environment with the continuous expansion of metropolis. This research is based on the gravitational model flow measurement to constitute potential greenway network structure with comprehensive factors formed by the minimum cost path method, which improves the scientific of greenway network evaluation and organisation.

Session 6: Alternative Models of Spatial Development: Neither Urban nor Rural? +Panel Discussion 2.6

11 September (Wednesday), 14:00 - 15:30

Bin Li, Weihong Guo, Yuqing Zhang

Rural revitalisation of Batang village in Guangdong province under the background of balancing urban and rural development

Balancing urban and rural development by rural revitalisation is happening current in China. With the lack of infrastructure, unbalanced economic development, dilapidated living environment and insufficient sharing between urban and rural areas, this paper based on ReBAM theory, field survey and literature review to solve these problems in an example of Batang village from living, production, ecology and governance aspect.

Ye Liu, Xiaoyi Wen

Planning Practice in Areas Beyond Megacities under the Rural Revitalisation Strategy in China: Case Study of the New Jijiadun Village - A Concept of "Co-Creation Community for Rural Life"

This paper describes an emerging pattern of rural life in areas around Shanghai, under the background of the Chinese Rural Revitalisation Strategy. It focuses on how these planners have broken the boundaries between the urban and rural areas, taking the city dwellers back to the rural and natural life while bringing vitality to the rural areas.

Bakti Setiawan, Sita Rahmani

Global-Local Dynamics in Urbanisation: The transformation of the desa-kota in Bali and the roles of Adat institutions

This paper shows and argues that in the dynamics process of urbanisation in Bali, Indonesia, local actors and forces have play significant roles in the production of urban spaces. It argues that the existing centralised - Indonesia, formal/legal, urban policy and planning system does not fit with the existing dynamics of local-cultural variations of urbanisation.

2.7 Session 7: Beyond Megacities: Role of Mega Infrastructure in Hinterland Development

12 September (Thursday), 11:30 - 13:00

Roni Susman, Thomas Weith

Factors Influencing Land Use Conflicts in Parimban Seaport Indonesia

Our study from Patimban Indonesia explores the influencing factors of large scale land transformation for seaport development resulting in land use conflicts and options for governance in the future.

Haixuan Zhu, Sai Liu, Xiaoyu Jia

Urbanisation Mechanism Study under the Dynamics of State Capitalism: A Case Study of the Far East with the Construction of the Siberian Railway in the Early 20th Century

Due to special geopolitics in China at the end of the 19th century, focus on the construction of port and railway, become the government's top priority. This induced capital competition among China, Japan, and Russia, formed the export-orineted urbanisation mechanism, and laid the hub-railway network - hinterland cities structure, which rapidly promoted the modern urbanisation process in Northeast China.

Muhammed Ziya Pakoz, Ahmet Bas, Fatih Eren

An Analysys of the Changing Role of Istanbul as a Megacity in the World

This paper focuses on the city of Istanbul and aims to discuss the changing position of the city within the globalised world in terms of economic, social and cultural interactions, and to follow the changes in the hinterland relations and the spatial structure of the city in time.

Dwitantri Rezkiandini Lestari, Latifah Latifah

Anticipation Strategy for Urban Conurbation in Semarang - Surabaya Corridor

Semarang-Surabaya corridor is the backbone for economic growth of Central Java and East Java. Semarang-Surabaya corridor development is expected to create positive externalities, such as creating spillovers in urban areas along the corridor. Besides creating positive externalities, the development of semarang-surabaya corridor is expected to create uncontrolled urban conurbation, as it happened in Jakarta - Cikampek corridor.

2.8 Session 8: TheFuture of Urbanisation: Decentralization of Functions, Dispersal of Urban Form?

12 September (Thursday), 14:00 - 15:30

Paramita Rahayu, Fadjar Mardiansjah, Deden Rukmana

Urban Population Growth and the Growth of Towns and Cities in Indonesia: the challenge of non-statutory town development

This study examines the emergence of new tendencies in the current Indonesian urbanisation process that face the development of non-statutory towns in many urbanised Kabupaten (non-urban districts). These towns also bring significant challenges in urban future in Indonesia since they play significant roles in the future urbanisation process still they lack capacities in managing urban development.

Pietro Elisei, Elena Batunova, Miruna Draghia

The CRISALIDE Project: When innovative planning processes re-balance urban development and create new quality of life using the opportunities provided by the rise of the digital city.

CRISALIDE, a collaborative project involving EU and Russian researchers, is experimenting with the creation of a digital innovative platform aimed at facilitating the renewal and regeneration of brownfields in Rostov on Don. By creating a user-friendly tool, this project supports strategic, smart and integrated urban management to promote stable growth and effective processes of innovation based on participatory planning.

Derry O'Connell

The Smaller Town as Component of an Urban Settlement Cluster

The development of fast sustainable transport has introduced the concept of complementary settlement clusters as an alternative to the large city. Recent research in a number of towns in Ireland examines how the typical small town is adjusting to this.

David Green, Sulaiman Al Rashad, Paul Knight, Nicole Cammelli

A 21st Century National Ordinance

This paper explains the theoretical foundations of the National Ordinance in Kuwait and provide a series of case studies across scales that describe the operational aspects of the Ordinance for both spatial structuring for new and existing development, and projecting and tracking sectoral development. It also discusses the universality of this system and its application in the USA and the UK.

Track 3

Liveable places and healthy cities

Planning for people


CONGRESS TEAM

Jens Aerts
(Belgium/ USA)
Mahak Agrawal
(India)

LOCAL EXPERTS

Aji Pamungkas
Irwan Prasetyo

Migration, unplanned urbanisation and urban inequities affect the well-being of city dwellers on an individual and collective scale across the world. Cities expand more rapidly than can be sustained by infrastructure and services, and the cost of living is rising far more rapidly than wages. Lack of basic services affect a sizeable part of the population. In addition, the physical urban environment introduces new types of vulnerabilities that require a systematic approach through urban planning: obesity, mental diseases and the decrease of play and physical activity, multiple forms of exposure to pollutions and unsafe public spaces. These challenges come with a high cost for the weakest but also for the community, leading to high public health costs, social unrest, fragmentation, urban violence and terrorism, ethnic tensions and more.

Planning for and with people is at the core of creating a viable future: Improving the quality of life together, planning safe spaces and clean infrastructure, promoting child-responsive and multi-generational environments. Engaging communities in the process of planning will spark innovation, improve knowledge and decision making for the best solutions, accelerate change and ensure citizens adopt sustainable behaviours from early age on.

Is liveability a luxury or a human right? How can it be defined and measured? Can we plan for it? Are there universal principles or different ones depending on culture?

Sessions:

Session 3.1 (Special Session)
UNICEF Opening Session: Children and Cities, Planning for the Future
Discussions under track 3 highlight the complex relation between urban health issues, spatial inequity and environmental challenges. Especially in large and fragmented urban contexts, this requires a focus on equity and people-centred urban planning approaches, to ensure urban development and upgrading translates in healthy, safe and inclusive spaces. Analysing the evidence, successful initiatives, strategies and projects, this opening session, organised by UNICEF and supported by a panel of experts, will highlight priorities for action in order to build and plan healthy cities for children and their communities.

Session 3.2
Planning and Design for Collective Space and Transport for Children and Communities
Public space networks are the backbone of many planned cities and allow access to the city on various scales and in all its meanings: as a functional place to undertake a journey, but also to meet, play, learn and grow up to become a citizen, to build the community for all generations. If all children have access to public space, cities are successful for everyone. This session shows how crucial planning and placemaking approaches for collective spaces and safe mobility are for children and communities.

Session 3.3
Participatory Planning and Multi-generational Well-being
Community-led planning is more and more recognised as a sustainable approach to address urbanisation challenges, in absence of or as a complement and alternative to formal planning. Various examples show that participatory planning ensures inclusion in decision making and fosters community development on a neighbourhood level, as fundamental building stone of any size of city.

photo: Rahmatharman, Wikimedia

Session 3.4 (Special Session)
Planning Sustainable Urban Childhoods for the Youngest
Planning and designing a city to better meet the needs of babies, toddlers and the people who care for them is one of the best investments a city can make. Growing evidence from neuroscience, public health, education and economics makes it clear: Experience shapes the developing brain. One of the best ways to ensure good experiences is to support the people who care for babies and toddlers, beginning in pregnancy. City planners have a big role to play: If you could experience a city from 95cm – the height of a 3-year-old – what would you change?

Session 3.5
Sustainable Mobility and Streets for People
Despite the potential of urbanisation to reduce distances, increase density of activities and enhance walking, biking and mass transit, transportation planning seems to prioritise individual car use. This leads to clogged street spaces, traffic injuries and polluted air. This session explores sustainable urban mobility strategies that prioritise the well-being of people and looks for inclusive solutions for all (gender, ages).

Session 3.6
Data, Indicators and New Paradigms for Public Health
Data is key for sustainable urban planning: to collect it, to use it for decisions making, to evaluate initiatives and to monitor progress. There is quantitative and qualitative data, to be collected with new technologies, but also through social innovation, as this allows communities to engage and to share knowledge. This session explores the sense of open data, indicators, evaluations methods and mapping tools that foster community engagement, to support better planning of healthy and just cities.

Session 3.7
Public Space, Public Life
Public spaces are the core of cities. They can be formally planned, but the public life can be informal at the edges and make unexpected spaces more inclusive and welcoming for specific vulnerable groups such as migrants and women. This session explores the relation between urban form, liveability and values of public spaces and how the latter is also about the daily process of making meaningful places from neutral spaces.

Session 3.8
The Right to Housing and Livelihoods
Housing is more than four walls equipped with basic services of water, sanitation, drainage or electricity. Housing is a human right, strongly interlinked to livelihood, and a critical part in redressing the complex multi-dimensional challenges of poverty, inequalities, inequities and exclusion. The sub-track discusses and reflects upon lessons learnt from housing plans, schemes and projects in different parts of the world. It also explores varied perceptions to housing and livelihoods across various generations in diverse geographies and the feasibility of select tools and techniques that can tackle housing issues.

3.1 Session 1: (Special Session) UNICEF Opening Session: Children and Cities, Planning for the Future

10 September (Tuesday), 9:00 - 11:00

TRACK KEYNOTE

Jens Aerts, Thomas George

Panel Discussion on Children and Cities

The growth of safe and sustainable cities in East and Southeast Asia are inextricably linked to the well-being of the region's children. The panel session offers insight from panel experts on challenges for children in cities and how urban planning can be a support to ensure children get the urban childhood they deserve in accordance with UNICEF's recommendations.

Lynn Tang, Vivian Pun, Ririn Radiawati

Importance of air quality management for public health and development progress in Jakarta, Indonesia

This talk highlights approaches to combining strategic use of innovations in air pollution monitoring, emissions estimation and source apportionment modeling to inform near-term control measures for priority sources at a local and regional level in Jakarta.

3.2 Session 2: Planning and Design for Collective Space and Transport for Children and Communities

10 September (Tuesday), 11:30 - 13:00

TRACK KEYNOTE

Gregor Mews

Realising the potentials of a design-dividend towards a loveable urban future

Urban living in the early part of the 21st century has not been good for children and young people. The contribution shares valuable insights on challenges associated with the need for a paradigm shift that takes a design-dividend into consideration and enables better health outcomes in urban developments.

Dhea Andriani, Indarti Komala Dewi, Janthy Trilusianthy Hidayat

The Implementation of Children Friendly City in DKI Jakarta through Assesment of Child-Friendly Integrated Public Space (RPTRA). (Case Study: Kecamatan Kemayoran, Jakarta Pusat)

Child-Friendly Integrated Public Space is an integrated public space for several ages, functions as green open space, child development facilities, and community empowerment. DKI Jakarta built 6 RPTRA in Kemayoran subdisctrict. RPTRA characteristics depends on facilities, activities, location, and land area. Two RPTRA, namely Mutiara Sumur Batu and Harapan Mulya, have met the policy standards of DKI Jakarta government.

Ran Guo

Outdoor Public Space Activities Characteristics of Children and Their Inter-generational Parents and Design Strategies from the health perspective: a case study in Harbin, China

Taking care of children by their grandparents has become one of the most important forms in the current Chinese urban families. To design and build appropriate outdoor public space (OPS), this paper studies the connection between OPS, space comfort, facilities arrangement, the social attribute of children and their inter-generational parents and healthy activities.

Shuai Li

Children-friendly design of Urban public space: based on the study of Shanghai, China

With SP method,this paper found the factors in spatial traffic and social aspects influencing children's safe path in high-density urban environment. Among them, the path space factor and the path traffic factor have more significant influence. Recreation of places, dangerous places, and crossing the street without any help are the top three influential factors.

Session 3: Participatory planning and Multi-generational Well-being 3.3

10 September (Tuesday), 14:00 - 15:30

Xuhui Liu, Yu Yifan, Xin Sui

Neighborhood Environment and the Elderly's Subject Well-being

This paper analysed the relationship between neighbourhood built environment and the elderly's subjective well-being in Shanghai. The results show that under the control of socio-economic variables, neighbourhood built environment can significantly affect the subjective well-being of the elderly. Per capita green space area, road network density, location, and housing construction area are the significant environmental elements.

Mengqi Zhong, Yuanyi Shen, Yifan Yu

Association between Neighbourhood Built Environment and Body Mass Index among Chinese Adults: Hierarchical Linear Model

This paper examines the association of built environment and body mass index based on the data from 29 provinces in China. The paper concludes that living in walkable neighbourhoods is associated with more physical activity and lower overweight/obesity, while adults in higher-income neighbourhoods have lower BMI and higher mental condition. These findings have implications for urban planning which are presented.

Constant Cap

The Importance of Participation and Inclusion in Developing Livable and Affordable of Housing, Transport and Social Services in Kenya

The paper looks at the importance of proper communication, participation and inclusion in urban development. It lays some focus on how they have impacted the eventual outcomes of some of the recent housing and transport projects that various African Governments and Development Partners have undertaken as a response to the ever increasing challenges within urban centres.

Poeti Akbar Jurian Edelenbos

Temporal and Regular Place-making in Indonesian Kampung: Creating Urban Spaces that Enhance Local Empowerment

This study aims to examine the impact of place-making through 'regular' everyday life and 'temporal' art-cultural festivals on the local capacity of Indonesian kampung. In order to achieve a better quality of place-making, the enhancement of relational resources across age group is necessary. Challenges on the viability of place-making were noted as well.

Slawomir Ledwon

Health and the city: creating built form and planning for the physically active

This study explores the relation between the city, built form and citizens' physical activity, in order to maintain a healthy population. Taking running as the main case study, it shows the examples of best practices encouraging exercise in urban areas, while mitigating obstacles and introduces the runnability concept.

Session 4: (Special Session) Planning Sustainable Urban Childhoods for the Youngest 3.4

10 September (Tuesday), 16:00 - 17:30

Speaker: Rushda Majeed

Planning and designing a city to better meet the needs of babies, toddlers and the people who care for them is one of the best investments a city can make. Growing evidence from neuroscience, public health, education and economics makes it clear: experience shapes the developing brain. One of the best ways to ensure good experiences is to support the people who care for babies and toddlers, beginning in pregnancy. City planners have a big role to play. Clean air and water. Walkable neighbourhoods that cater for the basics a young family needs. Multi-generational public spaces close to home that allow small children to explore safely. Safe routes and reliable transport that make it easy for caregivers traveling with small children to get to healthcare, childcare and healthy food. Such urban amenities help lay a crucial foundation in the early years of life for good health and learning into adulthood. And they make cities better for people of all ages. Yet babies, toddlers and the people who care for them can be invisible to city leaders and planners as a group with specific needs. That's why the Bernard van Leer Foundation's Urban95 initiative supports cities worldwide to ask and answer a bold but simple question: if you could experience a city from 95cm—the height of a 3-year-old—what would you change?

This workshop will take participants through India's Infant, Toddler and Caregiver Friendly planning, policy and design guidelines developed for and at the request of India's Smart Cities Mission by a team convened by the Bernard van Leer Foundation's Urban95 initiative. The workshop will also feature presentations by the World Resources Institute (WRI), Indonesia on safe routes to schools for young children and their caregivers and the Institute of Transportation and Development Policy (ITDP), Indonesia on its kampung project to improve accessibility and provide public spaces in consultation with communities and with input from children and women. The workshop will be hosted by the Bernard van Leer Foundation.

3.5 Session 5: Sustainable Mobility and Streets for People

11 September (Wednesday), 11:30 - 13:00

Yang Ye

Residents -Perceptions of Walkability Attributes in Cold Region Chinese Cities: Reliability and Validity

This study tries to develop a model , NEWS-CRC , to reflect the characteristics of cold region Chinese city built environment in residential areas and people's behaviour mode, and prove the model could illustrate residents' perceptions of walkability attributes in cold region Chinese cities and could be use in other Chinese urban attributes studies related to walking.

Cheng Peng, Jingsheng Li

Research on the built of Healthy Walking System for Urban Central Business District: A Case Study of Jiangbeizui CBD in Chongqing, China

Jiangbeizui CBD in Chongqing, China, is facing sub-healthy conditions: the urban space is fragmented in mobility system, service system and landscape due to topography and construction. The paper proposes three hierarchies of healthy demands in walking system design together with spatial strategies to help build a continuous pedestrian system for CBD's benign circulation in both space and society.

Fenita Indrasari

In between luxury of housing and affordability of transportation: Exploring automobile dependency of housing estate residents and kampung dwellers in suburban Bandung, Indonesia

Housing estates in Indonesia are built similar to gated communities where residents are forced to be automobile dependent. However, it can be reduced by providing public access points which contribute to a more active travel.

Laksmi Tungga Dewi Jaya Wisnu Wardani, Natalia Tanan

The Pedestrians' Stories: Towards Walkable Cities in Indonesia

The paper discusses the process of providing walkable pedestrian facilities in three cities in Indonesia which is considered lacking due to the limited number and poor quality. Through identifying problems and recommendations to improve the quality of pedestrian facilities, the findings aid policy development on pedestrian facilities and green planning at the Ministry of Public Works and Housing.

Sebastien Goethals

Planning Transit-Oriented Development (TOD) in an African City Facing Rapid and Informal Urban Growth: the Case of the Urban Mobility Plan of Conakry, Guinea

Responding to the lack of urban governance and planning culture, in particular to the lack of urban development strategy and land use control, in Conakry, Guinea, the article illustrates the methodology of the capital's Urban Mobility Plan as an operational decision-making tool, and a strategic investment plan to build people-oriented urban infrastructure and healthy mobility.

Fernando Caetano, Jeronimo Meira, Suzi Rodrigues

The definition of accessible routes on sidewalks: a new challenge for Brazilian cities

The purpose of this paper is to present a method (virtual audit) to support Brazilian local administrations, in particular of small cities, to define accessible routes on sidewalks. It is expected that this method encourages local administrations to audit sidewalks situation aiming to include walkability's improvement in their investment agendas; and to define public policies towards urban environment qualification.

3.6 Session 6: Data, Indicators and New Paradigms for Public Health

11 September (Wednesday), 14:00 - 15:30

David Green

Health Districts: Creating Healthy Cities

The paper examines several specific cases across the globe that problematise scientific research that informs methods of urban and city design and argue for protocols to frame a scientific method for planning and urban design at a consistent, international level.

Daniel Mambo Tampi, Linda Darmajanti, Irene Sondang Fitrinitia

Sustainable Urban Development: Building Healthy Cities in Indonesia

In 2045, the projection results show 61.7% of Indonesia's population will live in urban areas. The purposes of this paper is to find out actors, factors, and top healthy cities in Indonesia. The analytical method in this study is log frame analysis. The result is building healthy cities with closely related to aspects of life in urban areas: health services, environmental, and socioeconomic aspects.

Chengcheng Liu

Strategies on Healthy Urban Planning & Construction for Challenges of Rapid Urbanisation in China

This paper studies how to achieve the equalisation of medical and health services and the sustainability of urban environment in China through four strategies of healthy city. China has formulated a national plan for healthy cities, reformed its territorial and spatial plans, formulated local plans for the distribution of health care facilities, and carried out urban repair and ecological restoration

Gabriela De Souza Tenorio

Better places for a liveable - and lively - city: a method of Post-Occupancy Evaluation of public spaces.

This paper brings together the knowledge and repertoire available on public spaces' design, translates, complements and structures them into a method of Post-Occupancy Evaluation of public spaces. It is offered as a tool to support those who deal with public spaces at different levels - from academic studies to municipal management.

Dayinta Pinasthika, Puteri Rizqi Amelia, Elkana Catur Hardiansah, Adriadi Dimastanto

IAP Indonesia's Most Livable City Index (MLCI): A Perception-Based Survey to Measure City Liveability Index

The Indonesian Association of Planners (IAP) developed the "Most Livable City Index"; (MLCI), surveying city liveability based on citizen's perceptions. It has been conducted since 2009 and was last held in early 2017. The indexing measurement was based on 28 assessment criteria, which were conducted in 26 cities throughout Indonesia. The result showed the most and the worst cities in terms of best liveability.

Authors are responsible for the content of their work.

Raeesa Ghoor, Keneilwe Pholo, Karishma Busgeeth

Developing a Spatial Transformation Scoring Tool to Monitor South African Catalytic Housing Projects

The Spatial Transformation Scoring Tool (STST), developed by the Monitoring and Evaluation, Knowledge Management and Research Planning unit in the Housing Development Agency is currently being used to assess housing projects classified as catalytic projects. This presentation intends to explore the challenges, opportunities and lessons learnt of the STST in monitoring housing projects in South Africa

Session 7: Public Space, Public Life 3.7

12 September (Thursday), 11:30 - 13:00

Hang Sui, Dongfeng Yang

Analysing the perceptions of the elderly on space vitality and related environmental factors based on residential community

Taking Dalian, China as the research range, this paper identified the potential environmental factors which related to the perceived level- and actual satisfaction- of the elderly offered by the "space vitality" of the residential community, and put forward the environmental optimisation strategies promoting mental health for the elderly.

Juan Li, Anrong Dang

Empirical study on the evaluation of publicness of public space: taking Chinese megacity as the case

This study proposes a pragmatic model to evaluate the publicness of public space and come up with a systematic framework based on the Chinese context. It has been applied to a community within Beijing to find out how public the public spaces are in the Chinese megacity. The empirical study will provide suggestions for urban planning and governance.

Matej Niksic

Liveable and just public space - Conceptual approach to urban walkability on the case of Ljubljana, Slovenia

The research aims to point out the power and responsibility of urban planning as a discipline in providing the urban walkability conditions within the just city agendas. It points out the need for the planners in the transitional socio-economic contexts to develop new skills and competences to assure social and spatial cohesion as a precondition for the truly livevable places.

Apostolos Kyriazis

Urban morphology and behavior mapping in Abu Dhabi's public spaces: informality as an interaction of cultural context and urban form.

This paper presents findings for a link between the design, use and the surrounding morphologies within the diverse sociocultural context of Abu Dhabi. Fourteen public spaces were examined in terms of their typology, functions, social profile, urban context and connectivity. The program amplifies the importance of informality as an indicator of urban health, programming, social cohesion and inclusivity.

Adriadi Dimastanto, Rachmatika Fitri Insani Tanjung, Tri Saptiwi

Improving the Quality of Public Space in Bogor City Through CSR Founding Scheme

This paper aims to explain one of Bogor's park development projects using the corporate social responsibility (CSR) fund scheme. The municipality's budget available for improving the quality of public spaces, especially to build city parks, were limited. However, by inviting the private sector, the city government could innotvate the provision of city parks and set an example in Indonesia.

Session 8: The Right to Housing and Livelihoods 3.8

12 September (Thursday), 14:00 - 15:30

Akino Tahir, Risye Dwiyani, Saut Sagala, Nino Viartasiwi

Secondary cities and forced migration: accommodating refugees and asylum seeker in Indonesia

Secondary cities are impacted by forced migration trend around the world. Such cities attract forcibly displaced migrants who view them as more accessible and 'friendly' compared to primary cities. The study explores the capacity of secondary cities in Indonesia in accommodating the influx of displaced people. By understanding the system, we hope to identify improvement to the city resilience.

Mengqi Zhong, Yifan Yu

The Spatio-temporal Disparities in Healthy Food Accessibility: A Case Study of Shanghai, China

This paper examines the spatio-temporal disparities of health food accessibility through a case study of Shanghai communities. Based on the disparities, we use the spatial autocorrelation to analyze the spatial patterns of healthy food accessibility and propose the corresponding improvement strategy.

Fujun Xia

Discussion on the Fairness in the Planning of Relocation Community - Taking the Constructive Detailed Planning of Longhai Community as an Example

Through the research on the constructive detailed planning of Longhai South District, the strategies for community planning of demolition and resettlement under the background of urbanization in China are proposed, which are to strengthen public participation, innovate organizational management system, consider the future livelihood of residents and fairness and homogeneity.

Mahak Agrawal

A Dream of open defecation free India? Decolonise and innovate urban sanitation to reach those left behind

There is no delicate way of describing matters of shit. Through evidence, urban narratives from India, the project reflects upon the less spoken dimensions of sanitation deprivation in India and most importantly why and where we are going wrong, and what we can do to truly achieve an Open Defecation Free India- as there is no one 'right way'.

Rouve Bingle

Hunger in revered spaces: Exploring the impact of planning on the university campus food system in South Africa

This exploratory study examines how campus planning and its spaces affect the food security of students. The study is conducted on the campus of the University of the Free State in South Africa and uses a mixed methods approach which includes an online survey, qualitative interviews and a site inspections.

Track 4

Knowledge economies and identity
Planning for culture


CONGRESS TEAM

Nasim Iranmanesh
(Iran)
Piotr Lorens
(Poland)

LOCAL EXPERTS

M. Faisal
Dias Budiati Prasetiamartati
Ratna Sri Widyastuti

Culture and heritage are both taking globalising cities forward and being put at risk by them. Relentless pressures of urbanisation and 'urban marketing' initiatives sometimes promote an image of the city that hides or even removes local diversity and 'unwanted pasts'. Yet culture and heritage are essential to retain cohesion and create local identity in a megacity, which would otherwise be faceless.

Within the themed sessions the interrelations between locality, local identity and megacities will be explored, focusing on the four key sub-topics:

- Historic cities, local identities and city branding
- Design for urban regeneration
- Culture-sensitive approaches to city planning
- Culture, heritage and sustainable development.

In addition, a special session dealing with culture as urban renewal resource will become an introduction to the entire track. Accompanied by keynote speeches, all sessions will build a vast picture of contemporary issues associated with 'planning for culture'.

As a result, it will be possible to discuss how local identities and modern approaches towards dealing with heritage can be reconciled with global marketing of city and globalising urban models. Also, the issues associated with shaping the planning strategies for culture and identity different in a megacity will be dealt with. These shall allow reflection on the role of cultural development and creative industries in contemporary city planning and development along with redefining the approaches to mass tourism and its role in preservation of the local identities. At the same time, within the sessions it will be possible to discuss the reverse questions: How can cities and megacities promote their culture and local identity to establish a dynamic knowledge economy, capable of shaping locally sensitive urban solutions?

Each of the track sessions will start with the pre-selected keynote presentation. This will be followed by a discussion panel, during which each of the presenters will be asked by both track coordinators questions regarding the most important messages associated with their papers. Afterwards, a more general discussion with active participation of all session participants will follow. Such a structure shall allow focusing on key messages delivered within the papers submitted and-at the same time-drafting clear conclusions regarding the sessions' topics.

Sessions:

Session 4.1
Cool Planner in South East Asia: City Resilience Design

Understanding urban conditions of our cities in a new way – embracing informality, reconsidering built environment policies, and encouraging formation of new public landscapes – is at the very base of climate change resilience. What is the role of designers and planners in this process, in the Asian context?

At this year's World Planning Congress in Jakarta, ISOCARP continues with its interactive Cool Planner Talks, tackling the challenges, the thrills and the responsibilities planning profession faces in the context of climate change. The

photo: DAVIDSONLUNA, Unsplash

upcoming Cool Planner Session focuses on South East Asia and examines the profile and the design skills Cool Planner needs in this region, in order to help cities become more resilient. As the first Cool Planner Session during 2018 ISOCARP's 54th World Planning Congress in Bodø, (Norway) has shown, the profession of urban planning is no longer limited to urban space. It has expanded to other fields and merged with other expertise. The aim of this year's Cool Planner Session is to showcase and discuss examples and challenges of "designing for resilience". Can we frame the main ingredients of the City Resilience Design? How can we further develop and promote it? What is the role of technology and what do planners need to know and learn in this field? How can design help make realistic, bankable climate resilience projects for neighbourhoods and districts? The Session will host four short talks from invited speakers and a peer-to-peer experts' panel. The talks will highlight projects, best practices, and experiences from urban professionals across many fields of climate change resilience, with relevance to Asian, South Asian and particularly Indonesian context. Guests and speakers at this year's Cool Planner SEA Session are experts from international planning practices, financial institutions, academia, cities governances and governmental planning institution

Session 4.2
Culture-sensitive Approaches in City Planning
The scope of the topics associated with this session will include a vast array of issues associated with city planning in culture-sensitive areas. Both the tangible and intangible cultural assets and issues will be dealt with. At the same time the issues associated with minority cultures and specific manifestations of cultural activities and heritage will be discussed. On this basis the specific concepts and solutions for diversified places, cities and regions will be presented, with the special focus on "non-traditional" heritage sites. The cases analysed will include location in Europe and Asia, with interesting presentations from – among others – Germany, China and Indonesia.

Session 4.3
Historic Cities, Local Identities, and City Branding
Within this session the issues associated with managing local identities will be discussed. Topics dealt with will include both reinventing heritage as notions of local identities as well as development of interrelations between heritage and city branding. A number of issues will be discussed, including the "shared heritage" (e.g., colonial cities), non-traditional types of heritage (e.g., hydraulic infrastructure or underground built heritage) as well as interrelations between heritage and socioeconomic development. Also, the ways of using the new technologies and concepts for the purpose of shaping the modern urban development strategies will be part of the session discussion. The cases analysed will cover a wide range of locations, including China, Dubai, Indonesia, Central Asia, Iran and others.

Session 4.4 (Special Session)
Beyond Heritage: Culture as Urban Renewal Resource
The Beyond Heritage: Culture as Urban Renewal Resource Session focuses on the contemporary approaches in using cultural heritage as a tool for urban renewal. Based on the results of the recent two very different UPAT workshops in China – Suzhou's "Panmen-Shantang Street in the Grand Canal National Culture Park" and Wuhan's "New Hangzheng Avenue" - the Session will look beyond the layers of history, and examine how to use heritage as a motor to promote cultural values, restore social cohesion, foster sustainable economic growth and revive public spaces.

Session 4.5
Design for Urban Regeneration
This sub-theme will include a number of papers / presentations associated with new approaches toward design for transformation of cities. Both general concepts and particular tools will be discussed, including the real-life cases. These will span from regional to very local scales and include the discussion of both analytical and decision-making tools and instruments. In addition, a number of concepts associated with urban regeneration, such as resilient planning and healthy cities will be discussed. The cases analysed will cover mostly Asian locations, although a strong set of references to other parts of the world will be made.

Session 4.6
Culture, Heritage and Sustainable Development
The main purpose of this session is to discuss the culture and heritage issues in the wider context of the sustainable development concept and practice. In particular, the interrelations between urban form, socioeconomic issues, environmental concerns as well as heritage and identity aspects of urban transformation will be put in the centre of this debate. On that basis, more specific issues will be dealt with, such as roles of various types of development and economies as well as emerging and re-established knowledge hubs in the process of sustaining urban and regional development. Furthermore, social problems associated with gentrification and social exclusion will be debated on. The cases analysed will include both (but not exclusively) Asian and African cases, including South African, Nigerian, Indonesian and Chinese ones.

In addition, a special session dealing with culture as urban renewal resource will be organised. Accompanied by keynote speeches, all sessions will build a vast picture of contemporary issues associated with 'planning for culture'.

Session 4.7
Panel Session on Culture-led regeneration: Issues and challenges for planning and development processes

Session 1: (Special Session) Cool Planner in South East Asia: City Resilience Design 4.1

10 September (Tuesday), 9:00 - 11:00

Moderators: *Milena Ivkovic*

Speakers: *Dushko Bogunovich, Rogier van den Berg, Beverley Salmon, Bert Smolders*

Understanding urban conditions of our cities in a new way – embracing informality, reconsidering built environment policies, and encouraging formation of new public landscapes – is at the very base of climate change resilience. What is the role of designers and planners in this process, in the Asian context?

Panel leading questions:

- What are the main ingredients to City Resilience Design, from planning, but also societal point of view?
- What do planners need to learn and be aware of when they have to make climate resilient "bankable projects" in the SEA context
- How can design help make realistic climate resilience projects working together with the local communities? How to maintain dialogue throughout the project design and implementation process?

4.2 Session 2: Culture-sensitive Approaches in City Planning

10 Septemeber (Tuesday), 11:30 - 13:00

TRACK KEYNOTE

Ehsan Ranjbar

The Power of Culture in Creative Placemaking for Future Urban Economy; Evidence from Contemporary Iranian Urban Spaces

Based on socio-economic changes of cities in 21th century, urban design as an interdisciplinary science which concentrates on public domain needs to introduce new lens to a improve quality of contemporary urban life. This presentation emphasizes on cultural approach to urban design and reviews the European cities experiences and analyses Iranian cities efforts using the cultural approach.

TRACK KEYNOTE

Benjamin Scheerbarth

An Awkward Dance: Nightlife and Urban Development (Lessons from Berlin)

Berlin, like few other cities, exemplifies the productive synergies between alternative culture, identity, and the emergent knowledge economy. While history created a testbed for cultural diversity, today's planning administration threatens its existence; while politicians begin to recognize the value of vibrant nightlife, resourceful actors of the subcultural scene turn to urban development themselves - join in the awkward dance.

Vicky Ariyanti

Cultural sensitive approach in water management for a volcanic river basin of Yogyakarta Metropolitan Area

In the literature on integrated water resources management and multilevel governance of water, less attention is given on how and why cultural values contribute to the integration level of its implementation. This paper examines how cultural ecological knowledge impacts current water management practices in Opak sub-basin, Yogyakarta, which is threatened by the volcanic activities of Mt. Merapi in its upstream.

Lin Chen

Inheritance and Development of Traditional Minority Culture in Southwest China: A Case Study of Miao, Dong and Dai Nationalities

This paper introduces the inheritance and development of traditional cultural changes in Guizhou, Yunnan Province in Southwest China from the perspective of anthropology. Government, media and Miao, Dong ,Dai minorities not only retain the essence of culture, but also inherit and develop traditional culture in the new era by encouraging tourism, increasing cultural and tourism projects, publicising intangible cultural heritage.

Haixuan Zhu, Sai Liu, Xiaoyu Jia

Study on Urban Morphology Optimization Based on the Construction of Urban Memory Structure - Take Dazhi Street in Harbin as an example

"In order to cope with the lack of urban characteristics in the process of rapid urbanisation in China, this paper takes Dazhi Street in Harbin as the research object, through the construction of urban memory structure, puts forward the optimisation strategy of urban morphology, hoping to provide reference for other cities.

Dian Zhang, Suning Xu

Research on Humanistic Technology of Urban Design of Historical Blocks in Harbin

This paper analyzes the status and problems of conservation planning of two historical blocks in Harbin from the perspective of humanism, and attempts to propose humanistic technology including human and culture aspects as the research foundation of urban design, emphasizes the importance of humanistic care in planning and design.

4.3 Session 3: Historic Cities, Local Identities, and City Branding

10 September (Tuesday), 14:00 - 15:30

TRACK KEYNOTE

Peter Starr

Old Deira, Dubai: The Role of Culture, Identity and Planning in a Global City

"How do we plan for multi-cultural cities? Dubai's Old Deira district may have an answer. From colonial outpost to global trade hub, via petrodollar wealth and neo-liberal urbanism, Deira is now one of the world's transnational capitals. As such, this paper reflects on the organic growth of cities and ponders the success of Old Deira and Dubai.

Giuseppe Pace

Underground Built Heritage as catalyzer for Community Valorization (Underground4value)

This paper tells the story of how a well-motivated group of people can transform a network activity, with a little budget, the COST Action CA18110 "Underground Built Heritage as catalyser for Community Valorisation", in a research and on field project and how such a network can provide innovative tools for engaging and empowering local communities.

Citra Persada, Yunita Kesuma, Fadhilah Rusmiati

A City Branding Framework in Planning: The Case Study of Pringsewu Lampung, Indonesia

City branding is not about slogans and logos but it has to be a practical program framework of the local development planning. The three branding strategies selements for Pringsewu case study: 1) involving and strengthening branding in planning and strategies, 2) infrastructure revitalisation, and 3) community empowerment. The city branding can represent the community entity, geographical wideness, and potential local comodities.

Nasim Iranmanesh

Improving the identity of historic city by considering hydraulic infrastructure (the case study: Qazvin city)

The water of most cities of Iran mostly harvested from underground water by a technic which is called Qanat which irrigate city and farms. Water supplement in urban fabric and locating the hydraulic structure in cities had an important effect in forming the city whose impact should not be ignored in reparation or rehabilitation of their urban fabric.

Roman Pomazan, Alexandr Khvan

Culture capital of the Turkic World

Presenting the masterplan strategy for urban transformation of Turkistan, one of the oldest cities in Kazakhstan. Responding to the Kazakhstan state authorities' key objectives to create a new administrative center and culture capital of Central Asia and the Turkic World, the team of Urban Sustain Architecture and Frame Art presents its core strategy to meet these objectives.

Luni Shen

The activation and revitalisation of Yihe, Nanjing

Based on the revival planning of Yihe, Nanjing, this paper emphasizes the importance of culture to the metropolis, explores the alignment of new formats and historical spaces, and generalises several strategies of historical space activation on the respects of culture revitalisation, industry innovation and space activation.

Session 4: (Special Session) UPAT Session Beyond Heritage: Culture as Urban Renewal

4.4

10 September (Tuesday), 16:00 - 17:30

Moderators: *Milena Ivkovic*

Speakers: *Xiuli Yao, Zichao Liu, Emilie Roell, Matt Benson, Su Hong, Keith Davis,*

The Beyond Heritage: Culture as Urban Renewal Resource Session focuses on the contemporary approaches in using cultural heritage as a tool for urban renewal. Based on the results of the recent two very different UPAT workshops in China – Suzhou's "Panmen-Shantang Street in the Grand Canal National Culture Park" and Wuhan's "New Hangzheng Avenue" - the Session will look beyond the layers of history, and examine how to use heritage as a motor to promote cultural values, restore social cohesion, foster sustainable economic growth and revive public spaces.

Panel leading questions:

- How to plan within preservation and conservation rules in a complex, dynamic urban environment?
- How to define unique, place, culture and community responsive approaches?
- What can be the applicable recommendations for adapting the heritage to the modern tourism-and-culture consumers demands?

Session 5: Design for Urban Regeneration

4.5

11 September (Wednesday), 11:30 - 13:00

TRACK KEYNOTE

Milan Sijakovic, Ana Peric

Recycling of industrial heritage: promoting local diversity and cohesion in globalising cities

Global capitalism, network society and multiculturalism impose spatial patterns that lack distinctiveness: continuous change of urban layers lead to the loss of readability, local diversity, and identity of a place. To tackle the issue of preserving local identity in a globalising world, an emphasis is on industrial heritage and the effect of its recycling on a local urban area.

Ferdous Farhana Huq, Imzamam Ul Khan Shuvo, Nidalia Islam

Essence of Urban form and its Relationship with Urban Aesthetics: A case from Rajshahi City, Bangladesh

This research explores the weaknesses of current building codes regarding the compatibility of the design of the building elements as well as the relationship between building and street which leads to degrade the urban aesthetics. The research findings suggest some strategic and design solutions with a view to improving the look of the urban form of Rajshahi city.

Xiaoxiao Deng, Dihao Zhang, Shuang Yan

Revitalising historic urban quarters by Cityscape Control Plan: The case of Xi'an , China

Taking the historic urban quarters around the Daming Palace National Heritage Park as an example, the Cityscape Control Plan is researched as a method to preserve and optimise the cityscape in the historic area during the process of urban regeneration.

Zhiqing Zhao, Jie Zhang

Regeneration of Railway Industrial Heritage-Protection, Renovation and Development of Hengdaohezi Town

Hengdaohezi Town is the railway industrial heritage in the period of Russia building railways by borrowing land in Northeast China. Taking Hengdaohezi Town Conservation Project as an example, this paper introduces the measures of protective development at three levels buildings, areas and town. Then through the questionnaire survey to evaluate the satisfaction of the protection status quo.

Małgorzata Hanzl, Lia Maria Bezerra

Healthy City versus Resilient Planning paradigm

The study addresses healthy and resilient cities paradigm and focuses on physical structures. For this, we use a qualitative assessment and typo- morphological approach. The evaluation uses health indexes and looks for healthy lifestyles and climate-resilient development. The case study applies the method to the city centre of Lodz, Poland.

Weisi Zhou, Wei Xiong, Qi Hong

The Road Of Rebirth - Place making in Bidur from the Perspective of CulturalLandscape

As the Nepal history capital, Bidur has prosperous historical and cultural resources with unique landscape, but developed slowly due to the limitation of natural conditions. This paper sets Bidur as example, from the perspectives of cultural landscape, putting forward the place making strategies of 'Promotion with Protecting, Form with Function' to explore the developing country urbanisation path.

4.6 Session 6: Culture, Heritage and Sustainable Redevelopment

11 September (Wednesday), 14:00 - 15:30

TRACK KEYNOTE

Natasa Zivaljevic Luxor, Petar Mitovic

Forever frenemies: built heritage, megacities and new technologies

Having on one side heritage experts who value their legacy according to success in preserving heritage, on the other side planners facing new economic and societal challenges due to historic growth of urban population and, in addition, new technologies, which develop faster than our capacity to apply them adequately, we discuss approach which may lead to desired outcome.

Qinglian Wang, Zhiqing Zhao, Bocheng Zhang

Cultural Heritage Conservation and the Sustainability of City's Orderly Development: identification, conservation and construction of historic space

Chinese Eastern Railway is the most well-conserved linear cultural heritage in China in the 20th century. In this paper, Hengdaohezi Town, a station-located town along Chinese Eastern Railway, is taken as an example to explore its conservation of cultural heritage and sustainable ways for the city's orderly development from the view of historical space.

Harini Septiana, Noora Al Naema, Amna Khalid J A Al-Jaber, Fatma Al Bader, Lolwa M. Alfaya Al Khaldi

Forward Thinking on Culturally Urban Imprint in the Contemporary Era Rejuvenating the Traditional Neighbourhood Values and Characters: An Urban Morphology Review on Qatari Cities

Qatari cities and towns have adopted the globalised language of urbanism, which overshadows the country's historic blend of maritime, rural and urban culture. This paper examines the morphology of traditional neighbourhoods that are still intact in Doha and elsewhere and seeks to capture their principal characters to inspire modern spatial layout that fits the Qatari context.

Qi Shen

Informal entrepreneurs in old districts in central city Shanghai

This paper focuses on the informal sectors in old districts in Shanghai, including family-owned retail shops, street vendors, recycling, delivery, which plays a significant role in the current economic structure and offers enormous work opportunities for migrant labour. The discussion asks how strategies can integrate native community and migrant workers into the process of urban development.

Tubagus Furqon Sofhani, Fikri Zul Fahmi, Dika Fajri Fiisabiilillah, Brigitta Sadnya Wulandari

Community capacity for creativity-based rural development in a developing country: Case studies from Indonesia

This paper aims to investigate the extent to which a rural community develops a capacity to support the establishment of a local creative economy despite various limitations. This study employs qualitative research methods in examining two villages in Indonesia. The findings show that the community capacity and actor networks potentially spark the development of rural economies.

Yang Yang, Jilong Zhao, Qian Sun

Research on Online Public Participation and Platform Construction of Historical Block Protection in Data Age

The issue of public participation has become an essential issue in the process of urban renewal in China. This article discusses (1) the method and mechanism of public participation in the protection of urban historical blocks and (2) the content and structures of public participation platforms for historical districts.

4.7 Session 7: Panel Session on Culture-led Regeneration: Issues and Challenges for Planning and Development Processes

12 September (Thursday), 11:30 - 13:00

Moderators: *Michael Stott*

Speakers: *Ana Peric, Tubagus Furqon Sofhani, Peter Starr, Ehsan Ranjbar, Natasa Zivaljevic Luxor,*

Panel leading questions:

- How to plan within preservation and conservation rules in a complex, dynamic urban environment?
- How to define unique, place, culture and community responsive approaches?
- What can be the applicable recommendations for adapting the heritage to the modern tourism-and-culture consumers demands?

Track 5

Smart futures and sustainability
Planning for innovation

CONGRESS TEAM

Dorota Kamrowska-Zaluska
(Poland)
Awais Piracha
(Australia)

LOCAL EXPERTS

Abdullah Kamarzuki
Melyana Frederica

Smart cities are appearing everywhere and are sometimes a little more than marketing devices for new towns. Yet there is no doubt that all cities are moving towards automatisation and data-driven provision of services. In addition, it is thought that smart technologies will drive cities' economic capacity and global position in future. Within this frenzy of change, we need a pause to explore critical theories and successful case studies on smart cities, smart regions and smart communities. We need to understand how virtual worlds (and our data alter egos) will interact and shape the real one; and how disruptive technologies (block-chain, crypto-money, robotisation of production, drones, hyperloop, autonomous mobility) will change the management and planning of cities and urban life. How will it change the urban form and public space? What will be the habits and behaviours of urban citizens?

What kind of policy is needed so that smart technologies answer citizens' needs and promote equitable solutions? How to encourage co-creation in the post-digital era? How to protect people from disruptive virtual worlds?

Sessions:

Session 5.1
Mobility in Smart Cities
Case studies in this track explore how smartness can assist in improving mobility. The topics in this area range from electric vehicles, smart mobility, promotion of non-motorised transport, freight analysis to autonomous vehicles and underlying themes in this sub-area.

Session 5.2
Knowledge Economy and Innovation Milieu
Papers in this session explore how new knowledge and innovation can lead to enhanced smartness and sustainability in the city. Some of the topics explored in this session are Green Heritage Tourist Circuit Design, transforming Indonesian petroleum cities into innovative green economies, improving space structure of traditional resources-based cities in China, and building energy efficiency in urban planning.

Session 5.3
Cities of Future - User-oriented Services
This session looks into how user-oriented services can be provided in cities using big data and other smart technologies. Use of big data such as mobile phone, smart travel card and other large data in planning is fast emerging as a very promising area of study. Papers in this track present case studies of big data use for providing user-oriented services for improving various planning related issues such as land use, housing provision, mega projects, commercial activities and more.

Session 5.4
Co-design and Participation in Smart Cities
Papers in this session present case studies which discuss how to ensure participation of citizens/beneficiaries in planning projects. Research in this session grapples with the following questions: Are citizens able to participate in co-creation or at least consultations related to shaping smart polices and solutions? Are their voices being heard? What are the instruments ensuring that quest for smartness does engage with the marginalised? Or is smartness leaving sections of society even further behind?

Session 5.5
Smart City Strategies in Urban Planning and Design
Along with the positives that come with densely populated cities in terms of human capital and increased productivity, there also arises the need to tackle increasing challenges such as traffic management,

photo: Octavian Rosca, Unsplash

management. The focus of this session is to examine how urban planning and urban design professionals are responding to these challenges within an ICT-led smart city framework.

Session 5.6
Smart Public Spaces
Papers in this session discuss how public spaces can be made to interact and inform public in matters that are useful and easy to understand for the public. In particular, how can planning and design professionals engage design strategies in conjunction with the new ICT technologies to make outdoor public spaces smart?

Session 5.7 (Special Session)
Cities and Digitisation: Perspectives and Challenges of the Smart City Technologies on Urban Planning and Design
The session will be chaired by Southeast University of China, based on the outcomes of the ISOCARP-SEU International Digital Urban Design Week that happened in June 2019 in Nanjing, China. The perspectives, impacts and future challenges of urban studies, planning and design disciplines will be discussed under the angle of digitization, big data, Internet of Things and blockchain communities, with practical illustrations.

5.1 Session 1: Mobility in Smart Cities
10 September (Tuesday), 9:00 - 11:00

TRACK KEYNOTE

Ozge Celik, Ozhan Ertekin
Re-thinking the city: Başakşehir Living Lab (Case of Istanbul)
Aim of the paper is to understand the challenges and potentials of new ICT technologies and its applications in an urban setting while surveying urban innovation units and living labs. While presenting the Basaksehir Living Lab, the research put focus on how planning practice advances smart planning and projects that contribute to the local development.

Daniele Vettorato, Adriano Bisello
Startdust Smart City Project in Trento
STARDUST is an EU H2020 Smart Cities project, which brings together advanced European cities in a holistic approach to transform the carbon-based cities to smart, highly efficient, intelligent and citizen-oriented cities, and define a new Urban Metabolism. The project presents its results from city of Trento, Italy.

Alloysius Joko Purwanto, Dian Lutfiana
Future Urban Mobility Development Framework to Maximize Benefits of Plug-in Electric Vehicle Penetration in ASEAN Countries
This study identifies the importance of electrification of the transport sector for future urban mobility development, especially in the ASEAN region. Electricity supply and demand have to be analyzed carefully to avoid additional stress on urban electricity grid systems. This study aims to provide insights on which factors have to be considered in penetrating electric vehicle in this region.

Andrey Borisov
Presenting the prospects for Ropeway Implementation as a Public Transport Mode, the case of Moscow
The paper analyses international ropeway commissioning experience as a mass transit component used in urban environments. We suggest factors can influence decision making in favour of aerial cableways as a form of public transport in Moscow. Within the proposed approach, we identify adjacent districts pairs where cableways could be sufficient as an element of an intermodal transit system.

5.2 Session 2: Knowledge Economy and Innovation Milieu
10 September (Tuesday), 11:30 - 13:00

Yu Sun, Hong Leng, Wei Tian
The Framework Research on building energy efficiency in urban planning : Integrated Visioning Based on Agent-based modelling and Spatial Analysis approach
The research is a preliminary study, in 12 districts of Harbin in China, on an integrated energy model approach with a standard bottom-up model and an Agent-Based behavior Model that interact with geospatial parameters, building design and operations. The findings contribute to understanding the link between energy consumption patterns and buildings at the district scale.

Mariana Fiuza, Gabriela Uchoa, Flavia Maia
The Goldilocks Zone for the public sector innovation: Teresina 2030 towards resilience to climate change in the developing world
The term Goldilocks Zone refers to the habitable zone around a star where the conditions are just right for liquid water to exist on the surface of a planet. Just like in astronomical science, there is evidence of a public sector Goldilocks Zone, where the conditions are perfect to find thriving innovation in the public sector.

Dianhong Zhao
Improving Space Structure of Traditional Resources-Based Cities Transformation in a Background of Supply-Side reform: a Case Study of Yantai City of Shandong Province
China's resource-dependent urban transformation not only faces the threat of 'urban disease', but also faces the 'resource curse'. This report takes the reconstruction of resource-based urban space as the starting point, and proposes to establish a compact spatial structure optimization model. Taking Yantai as an example, this paper discusses the spatial structure optimization model of resource-based cities.

Session 3: Cities of Future - User-oriented Services 5.3

10 September (Tuesday), 14:00 - 15:30

TRACK KEYNOTE

Jianxiang Huang

Data Empowering Planners: Sensors, Simulation and Machine Learning

Emerging smart technologies provide new opportunities for planners to tackle urban issues of growing complexity. Examples are drawn from Hong Kong, in which academic researchers work side-by-side with practitioners to improve community environment and the quality of lives. People-centric values, combined with the power of data are the keys.

Ming-Chun Lee

People, Places, Memories and Mobile Apps: Understanding the Potential of Augmented Reality in Public Participation and Community Development

Augmented Reality goes beyond the dichotomy of passive methods of engagement with the public. It offers an interactive method to expand visualisation techniques in participatory planning. This paper discusses three mobile apps developed to support community events aimed at increasing overall public participation and civic engagement with a goal of increasing awareness of community history through data visualisation and stories.

Qinglai Zhang, Jiatian Bu, Yifan Yu

Measuring Visual Quality of Street Space Based on Deep Learning and Street View Picture: Pilot in The Linong Area in Shanghai

Built environment indicates that street space quality have been carried out in a profound influence on the image of city, human behavior and public health. We attempts to measure subjective qualities of the Lilong environment comprehensively and objectively in Shanghai with the method of image semantic segmentation techniques and Street View Picture dataset.

Dian Hasanuddin

Smart Cities and The People: Urban Planning Collectives in Indonesian Cities

In the past decade, urban planning collectives have been growing organically, attracting a new generation of young, energetic, and critical urban professionals. These collectives demonstrate the civic and democratic aspects of city initiatives, one without government support, and put forward another vision for being 'smart' which extends into horizontal learning in between the intellectual elite and general citizenry in Indonesian cities.

Daniele Vettorato, Adriano Bisello

The next generation of EU smart city projects: turning "clean energy for all" into "clear benefits for all".

This paper discusses the results of ongoing research on multiple benefits of EU smart city projects. It suggests the steps to analyse the multiple benefits in a coherent framework, in order to make them an effective communication tool or even including them among the KPIs to be used in the assessment phase of the smart city projects all around the world.

Session 4: Co-design and Participation in Smart Cities 5.4

10 September (Tuesday), 16:00 - 17:30

TRACK KEYNOTE

Amandus Jong Tallo

Why We Need Participatory Mapping ?

By using participatory action research method for mapping boundaries of forest management area, the method addresses the spatial challenges of land tenure rights, land history, spatial layout, and sustainable village development in Mensuai, a village in rural Indonesia. More than a map, the outcome is a collective, village product that reveals the lack of food security of the local community.

Tian Qin

Comprehensive Evaluation and Dynamic Evolution Analysis of Shanghai's Urban Vulnerability

This paper takes Shanghai as an example, using the comprehensive evaluation system which includes natural resource, eco-environment, economic and social aspects. From 2002 to 2017, Shanghai's comprehensive urban vulnerability has been declining and has changed from a dominant eco-environment vulnerability to a more balanced one, while declining co-environment vulnerability has still been the dominant factor.

Huiyi Xia, Nankai Xia

Urban living environment assessment index system based on psychological security

With the development of urbanisation and the continuous development, construction and renewal of the city, the living environment of human beings has also undergone tremendous changes, such as residential community environment and service facilities, urban roads and street spaces, and urban public service formats.

Xuhui Liu, Xin Sui, Yu Yifan

Measurement of spatial equity : a case study of nursing institution

The results of accessibility measured by 2SFCA of nursing facilities are used to find the degree of the inequity about getting this service among elderly in Shanghai caused by this location pattern. Results of the study help the urban planners to further arrange the nursing facilities and improve the equity of public service facilities caused by location.

Silja Tillner, Eva Maria Kuehn

Habitat 5.0 - Towards affordable and sustainable housing in the developing world: A pattern- and block chain-based approach

The need for affordable housing leads to the surge in informal settlements. The approach Habitat 5.0 to upgrade informal settlements in situ uses 'disruptive innovations' to build communities by following urban design patterns for sustainable settlements. Blockchain guarantees the secure transfer of qualified know-how that enables residents to build their houses with ecological materials - safer, cheaper, faster.

5.5 Session 5: Smart City Strategies in Urban Planning and Design

11 September (Wednesday), 11:30 - 13:00

Thibault Pilsudski, Si Ying Tan, Devisari Tunas, Fabien Clavier, Andrew Stokols, Araz Taeihagh

Smart planning in Southeast Asian cities: the role of urban governance and knowledge transfer

This paper analyses how smart city planning and urban governance inform each other and how these are translated and adopted by cities in Indonesia. It is part of an ongoing research; its final output will be an analytical framework that can be used by technology producers, city authorities and funders, to help them strategise and plan for better smart cities.

Dorota Kamrowska-Zaluska

Smart city and regenerative city – complementary or contradictory approaches

The aim of the study is to recognise relation between smartness and regenerative sustainability in contemporary cities. There is a need to determine how new technologies affect the development of cities and wellbeing of their inhabitances.

Hanna Obracht-Prondzyńska

Big data based assessment on metropolisation processes in Poland

Due to new determinants influencing and shaping urban and regional structures and new analytical possibilities, the aim of the research is to assess the impact of the metropolisation processes on the small towns' development in Pomeranian Province in Poland. A two-phase model allows to study the impact on both functional and spatial development of the regional settlement networks.

Fadhilah Rusmiati, Citra Persada, Dini Hardilla

The Tourism Concept of Emergency Shelter: A Strategies For Community Resilience In The Coastal Area of South Lampung

This paper aims to provide a new perspective and strategies on developing emergency shelters not only for evacuating residents and improving disaster preparedness infrastructure in South Lampung, Indonesia. It also aims to explore their potential for community-based tourism planning in vulnerable areas.

Jassim Al-Sorour, Noor Alamri

How can cities succeed and boom in the long run? CASE IN QATAR

As technology is advancing, the places we live in need to be adapted as well. In the modern times, we are bombarded with many gadgets and gizmos that are making life easier and enabling us to do more in less time. How can cities succeed and boom in the long run?

5.6 Session 6: Smart Public Spaces

11 September (Wednesday), 14:00 - 15:30

Mennatullah Hendawy

Urban Planning in a Mediatised World , case of Egypt

While urban planning in Egypt still follows a centralised, large scale, top-down and entrepreneurial approach, demands for democratic and communicative planning practices are growing. In the context of digital and information revolution, the research explores how media structures the way planning is communicated and how, in turn, this is reflected in planning decisions.

Mayank Dubey

Smart signals and corresponding challenges in heterogeneous traffic conditions

Smart signals dynamically optimise the signal phases by analysing trend and real time data to increase the throughput at intersections. But in mixed traffic conditions where neither the traffic flow parameters nor the corridor specifications and hierarchy are uniform, the efficacy of such signals gets questioned. This study attempts to answer some questions around smart signals in India.

Le Dong, Chen Xu, Baolu Chen

Investigation about tourism image optimisation of Lugu lake scenic area based on internet reviews

The utilisation of online information becomes an important way to explore the scenic areas image and improve tourist's satisfaction. This essay takes Lugu lake scenic area as an example, firstly focus on comments extraction about tourism resources, infrastructures and service, then deals with the analysis of tourists' behaviors and perceptions. Lastly, this paper proposes the optimisation strategy.

Vaishali Aggarwal

Spaces of becoming- Space shapes public and public (re)shapes their own spaces

This paper looks at the social production of space, inspired by the right to the city movement, in Delhi, India. In particular, the question is raised if cinema and digital technology can be used to empower a new citizenry who is not a mere user of the city but a participant in creating and interpreting the space which is actively produced.

5.7 Session 7: (Special Session) Cities and Digitisation: Perspectives and Challenges of the Smart City Technologies on Urban Planning and Design

12 September (Thursday), 11:30 - 13:00

Moderators: *Yi Zheng*

Speakers: *Sebastien Goethals, Fedor Kudryavtsev, Junyan Yang*

The session will be chaired by Southeast University of China, based on the outcomes of the ISOCARP-SEU International Digital Urban Design Week that happened in June 2019 in Nanjing, China. The perspectives, impacts and future challenges of urban studies, planning and design disciplines will be discussed under the angle of digitisation, big data, Internet of Things and blockchain communities, with practical illustrations.

Track 6

Changing environment and risks
Planning for resilience


CONGRESS TEAM

Markus Appenzeller
(The Netherlands)
Juanee Cilliers
(South Africa)

LOCAL EXPERTS

Mangapul Rudy Saut Sagala

Continuing the conversation from last Congress in Bodø and the need to urgently address disaster prevention and adaptation to the consequences of climate change: Jakarta and other megacities are showing dangerous vulnerabilities to extreme pollution, sea level rise, salt-water intrusion and water shortages. This is, however, matched by steadily decreasing poverty that runs in parallel to the increasing urbanisation. If cities with their consumerist nature are part of the solution to poverty, what models can they use to minimise their impact on the environment and become leaders in the fight to respond to climate change? What is already being done and what are the outcomes?

Food, water, transport and energy systems need resilience to climate change to avert catastrophic events and to cope with a further increase of global and urban populations. Pollution and waste demand the urgent understanding of urban metabolism to achieve better social justice and to safeguard the balance of the planet. What are cities doing to transition their urban economies to achieve improved well-being and environmental justice and to transform dependence on non-renewable materials to resource-efficient and renewable flows and better management of ecosystems? What role should planning/ planners play in developing resilient plans, designs, buildings and infrastructures?

Sessions:

Session 6.1
General Introduction: Climate Change - Globally
Climate change is probably the biggest man-made global threat we are currently facing. This comes in a time where our cities are growing in an unprecedented way – often in areas that are affected the most by climate change. This session wants to give a general introduction to the topic, outline its main fields of impact and evaluate what we can do to steer measures globally.

Session 6.2
The Currencies of Climate Change: Water
Water is the currency of climate change. It is the impact of too much or too little water that will have the biggest impact on human lives. This session will evaluate the scale of impact and how water can and ideally should be dealt with in different urban conditions.

Session 6.3 (Special Session)
Planning for Climate Change

Session 6.4
The Currencies of Climate Change: Heat
One of the main consequences of climate change is global warming. In the future we will not only see higher overall temperatures but also more extreme heat. Without measures, this can very well lead to places, especially cities becoming uninhabitable. The session will look at planning tools and approaches that help mitigate the effects of heat, especially in those global regions that will be affected most.

Session 6.5
Climate Change and Operating Cities - Metabolism
The biggest indirect-and therefore a lot less directly mitigatable - impact climate change has on mankind is through the changes in the ecosystems. This puts our food base at risk, and it threatens other species. This session will investigate the order of challenge and identify possible ways forward.

Session 6.6 (Special Session)
Building Unique Cities: An Imperative for Sustainability and Liveability in the Global South

photo: Tom Zimmerman, Unsplash

Session 6.7
Climate Change and Operating Cities - People
Climate change affects the lives of people. At the same time, it is those very people that have to be the agents to limit climate change and to implement measures for its mitigation. Planning that involves local communities is imperative in achieving the goals set out. This session investigates means and processes to involve the local residents in climate change mitigation.

Session 6.8
Climate change and Urbanism: Planning Tools
Next to all other players, we as urban planners, designers and policy makers need to take responsibility for the effects of climate change. This session looks at our own tools, the tools of the planner and how they (can) accommodate this responsibility.

Session 6.9
Planning - Looking Forward
In this session we want to summarize the findings of the previous days and we want to define a set of planning measures, paradigms, policy proposals for planning for more resilient cities from now on.

6.1 Session 1: General Introduction: Climate Change – Globally

10 September (Tuesday), 9:00 - 11:00

Natalie Rosales Pérez

Expanding an understanding of urban resilience in the realm of adaptation planning

By using the case study of Mexico City's Climate Action Programme, this work contests the way in which resilience has been embedded in urban adaptation planning. This descriptive research incorporates urban-regional metabolism dynamics and environmental data such as carrying capacity, into the climate change scenarios and vulnerability analysis matrix.

Mattias Vansteenwegen, Etienne Drouet

360cityscan: integrated solutions to face urban challenges

Tractebel has developed the 360 city scan, a methodology to assess cities and guide them according to their needs and priorities. Based on this scan, we offer integrated and tailormade approaches to our clients using our urban engineering expertise.

Juanee Cilliers

Trans-disciplinary planning approaches towards resilience

In South Africa, like elsewhere, the depletion of natural resource, including green spaces, are leading to cities that are far removed from the safe, clean, and liveable environments, as envisioned in planning theory. Resilience thinking could pose solutions in this regard, drawing on trans-disciplinary planning approaches to manage change and steer Spatial Planning towards the era of transurbanism.

6.2 Session 2: The Currencies of Climate Change: Water

10 September (Tuesday), 11:30 - 13:00

Matej Niksic, Jernej Cervek

Changed precipitation patterns and the need for a novel approach to building plot planning: The lessons learnt in the sub-alpine climate zone of Slovenia

Developed by the Urban Planning Institute of the Republic of Slovenia, the paper presents a tool to reform the urban planning system in the face of challenges posed by climate change. To respond to heavy rainfalls, urban design criteria for building plots planning is under revision to allow for rainfall penetration into the ground.

Ramya Sakkeri, Devadas V

Systems' approach: Climate change, glacier melt and development planning of the Himalayan region

A gradual increase in global temperatures coupled with erratic precipitation patterns has a serious impact on the socio-ecological system. Therefore, in this paper, authors developed a methodology to effectively understand the dynamic inter-linkage and interdependence of the complex systems and sub-systems in a region by using system dynamics technique.

Priyanjali Prabhakaran, Suja Kartha

Flood resilience planning for Disaster prone Panchayaths. A case of Karumaaloor Panchayath in Ernakulam District,Kerala

Karumalloor panchayat, a rural area in Ernakulam district of Kerala in South India was one of the severely affected areas in one of the worst floods in a century in August 2018. The aim of this paper is to explore the issues in such panchayats and to identify the need and strategies.

Tanaya Sarmah, Sutapa Das

Determining urban flood vulnerability using an indicator-based approach and HAZUS-MH

Urban flood (UF) is becoming frequent and intense in terms of death and building damage. This study aims to develop a UF vulnerability index (UFVI) for Guwahati, India by combining human and building vulnerability indices. It gives a theoretical explanation of the method to be incorporated. The UFVI will help to improve resilience of the population and buildings against UF.

Theresa Audrey Esteban

Living with water: how memory and experience help build community resilience in Dordrecht

In Dordrecht those who experience flooding more frequently have more built in memory and knowledge. This memory-based disaster experience can be a starting point in building knowledge on disasters.

Session 3: (Special Session) Planning for Climate Change 6.3

10 September (Tuesday), 14:00 - 15:30

Travis Bunt

Sinking, growing, resilient: a multidisciplinary approach to climate adaptation in Semarang, Indonesia

2018, the Netherlands Enterprise Agency kicked off Water as Leverage, a program aiming to bring water-based solutions to address climate and urban risk in three Southeast Asian cities: Chennai, Khulna, and Semarang. The 'ONE Resilient Semarang' team - a group of designers, engineers, economists, ecologists, art activists, and academics - was tasked with developing design-driven, bankable project ideas following an initial phase of research, analysis, stakeholder engagement, and on-the-ground coalition-building with agencies and institutions. In this presentation, members of four partnered organizations on ONE Resilient Team (One Architecture & Urbanism, Kota Kita, Deltares, and Wetlands International) will bring multidisciplinary perspectives to Semarang's current catch-22: it is a city economically dependent on the same extractive coastal industries that exacerbate its subsidence and flood risk, projected for even more drastic urban densification and economic expansion in the coming years. Instead of developing one-off infrastructure proposals for the city, ONE Resilient Team instead chose a more holistic approach centered around a widespread reorientation of water use across the entire city, from coast to upland, from Kendal to Demak - altogether comprised of potentially hundreds of projects. The embedded goal is to address challenges in a programmatic manner, potentially sparking transformational, bottom-up and top-down change in processes and governance. With the combined disciplines of urban design, community-based planning, water / coastal engineering, and ecological restoration, ONE Resilient Team's conceptual proposal aims to find integrated solutions to the combined water related risks of climate change and socio-economic growth by drawing from expertise across sectors and backgrounds from across the globe. This presentation will seek to address these issues through the prism of four disciplines among many more represented within the team, asking how resilience can operate beyond an individual project as a guiding development principle for climate-vulnerable cities and landscapes.

Session 4: The Currencies of Climate Change: Heat 6.4

10 September (Tuesday), 16:00 - 17:30

Shuo Zhang

Research on the Spatial Effect of Urban Construction on Heat Island Effect in Shanghai Based on Remote Sensing Data

Taking Shanghai as a typical case, this paper concentrates on the urban heat island effect under the influence of urban construction by Landsat-7 ETM+ remote sensing image data. We analyse the spatiotemporal distribution of land surface temperature and summarises the evolution characteristics of urban heat island effect, analysing the spatial impact of urban construction related factors.

Olufemi Ojo-Fajuru, Sijekula Mbanga

Green Landscaping - an Interventionist Approach to Build Cool, Healthy and Liveable Future African City: The Case of Ado-Ekiti, Nigeria

Rapid urbanisation and population explosion account for urban socio-economic and environmental challenges in the developing countries of the world as evident in Ado-Ekiti, Nigeria. The study examines the extent of public space contestation, effects on urban environment and liveability, and intervention with green landscaping techniques to re-naturalise the cityscape towards building a green, liveable and sustainable environment.

Ferdous Farhana Huq, Nidalia Islam, Sakib Zubayer, Nessar Uddin Ahmed

Green Roof: An Approach to Repair the Climate of Dhaka City

This study employs satellite and GIS technology to identify the buildings with and without the green roof in Dhaka, Bangladesh, and present the hardscape to softscape ratio of the city. Findings suggest a gap between the user and the government on green roof perspective and recommends measures to make this approach successful.

Adinarayanane Ramamurthy, Anusha Roy

Green and Blue Infrastructure to Regulate Thermal Comfort in High Density City Planning: a Case of Navi Mumbai, India

This Research work is an attempt to understand how urban climate maps can be operational to arrive at plausible decisions in high density city planning, thereby undertaking measures to regulate thermal comfort in the city through green and blue infrastructure.

Session 5: Climate Change and Operating Cities – Metabolism 6.5

11 September (Wednesday), 11:30 - 13:00

David Mathewson

Effects of ongoing infrastructure improvements in relation to planning policy for flood resilience and historic urban morphological development in Jakarta

This paper explores historic institutional responses to flooding and the influences of such planning policies on the spatial development of Jakarta within the context of pressures from severe flooding and rapid urban development. Next to the local and city scales, where new flood defense and mitigation measures are being implemented, the article's scope extends to a wider city-regional perspective.

Shivangi Singh Parmar, Joy Sen, Arkopal Goswami

An assessment and delineation of Socio-economic Resilience Landscapes of the Region based on the inherent latent factors of vulnerabilities

The socio-economic resilience of the region is the capacity to absorb or adapt shocks caused by external forces and inherent latent weak conditions of the regional system. The present paper contributes to delineate the socio-economic resilient landscape by measuring arrivals and departures of socio-economic resilience to the degree of socio-economic vulnerabilities of the region.

Natalie Rosales Pérez

Relict ecosystems in urbanised contexts. Challenges and opportunities to renature cities, ecological restoration, and biodiversity enhancement through planning for sustainability.

How can planning assist cities to transit from natural resources into natural spaces that enables ecological processes that support life, sustains flora and fauna, enhance biodiversity, and promote sustainable development? Comprehensive planning strategies can promote regional and urban environmental development as illustrated by a case study in Morelos, in Mexico.

Wiwandari Handayani, Barry Beagen, Santy Paulla Dewi

Promoting Water Resilience in Semarang: Building a Coalition through the Water as Leverage (WaL) Program

Semarang is chosen as one of the three cities in Asia for the Water as Leverage program initiated by the Government of Netherlands in 2018. This study documents and examines the Water as Leverage program as an opportunity to build a coalition amongst stakeholders to promote water resilience in Semarang.

Thai Son Pham

Identifying climate resilience challenges in Vietnamese cities: case studies of Can Tho and Da Nang

This paper aims to discuss major issues regarding urban climate resilience in urban areas in Vietnam, through an investigation on Can Tho and Da Nang cities. Resilience challenges from natural conditions, urbanisation patterns, climate change conditions and risks are identified. Besides, resilience capacity is limited with weak coordination mechanism and plans and community resilience are not sufficiently addressed.

Aishwarya Talluri

Spatial planning and design for food security ; Building Positive Rural-urban Linkages

The Agenda 21 Document strongly advocates for urban-rural continuum and food security, this paper is an attempt to translate the ideas into spatial guidelines, as it is observed, that often the spirit and intentions of the project is lost in translation from text to space: with cultural resilience and ecology as a prime focus.

Dani Muttaqin

Earthquake Post-Disaster Relocation Identification in Meuredu Pidie Jaya Nangroe Aceh Darussalam

Through micro zonation mapping of earthquake-prone areas, the Indonesian Government aims to reduce the impact of earthquake risk and restrict the development of settlements around active fault lines. Identifying suitable locations, in line with spatial regulations and land requirements, for relocation is central to this process and carried out by GIS analysis.

Sani Nuraini, Imam Indratno

Embodied Carbon Emission Analysis of Industrial Sector Based on Input-Output Analysis : Case Study in Bitung City, Indonesia.

Bitung City has experienced environmental degradation, even though economic growth continued to increase. This study aims to build a model of environment-economy linkages through Input-Output (I-O) Environment and to calculate the impacts of the economic sector in Bitung City. The paper presents the conceptual and analytical framework of the Input-Output approach of the Bitung City.

Raka Suryandaru

How to Plan in a Volcano-related Disaster Prone Area? Lesson Learned from Adaptive Spatial Planning in Dieng Plateau, Central Java

Located in the Asia Pacific's Ring of Fire as well as has one of the longest shorelines in the world, Indonesia is prone to various kind of disasters. Over the past few years, Indonesia has made headlines around the world due to devastating natural disasters that resulted in environmental damage and thousands of casualties. The result obtained from this project is an adaptive spatial planning that is tailored to the region's disaster risk profile and aimed at achieving a higher standard of living.

6.6 Session 6: (Special Session)Building Unique Cities: An Imperative for Sustainability and Liveability in the Global South

11 September (Wednesday), 14:00 - 15:30

Olga Chepelianskaia

Cities face an unprecedented urbanization pressure, which led cities of the Global South to building infrastructure hurriedly, compromising on their natural ecosystems, cultural distinctiveness, human scale, wellbeing and liveability. As a result, many cities in developing countries are charac¬terized by vovercrowded, poor quality and insufficient infrastructure services, low-quality building stock and a uniform cityscape. Negative consequences related to building uniform go far beyond a cultural loss and severely compromise urban sustainability, economic vibrancy and quality of life.

6.7 Session 7: Climate Change and Operating Cities – People

11 September (Wednesday), 16:00 - 17:30

Rolf Schuett

Building Dignity: A participatory concept for climate change-impacts mitigation in informal settlements in North Jakarta

Analysis of current challenges of Jakarta, including overpopulation, sprawl, environmental stress, social inequality and poor mobility. The concept of gotong royong or communal cooperation is introduced as an opportunity to inspire participation in tackling these issues, including physical implementation to incorporate these approaches in informal settlements in Pandemangan, North Jakarta.

Priyanjali Prabhakaran, Suja Kartha

Role of Women Self Help Groups in Disaster Resilience and Livelihood Regeneration: Post Flood Experience from Kerala

A study of one of the worst affected villages after the 2018 floods in Kerala was conducted. Community level women self-help groups called 'Kudumbashree' units came forward in post flood reconstruction and livelihood restoration through collective farming on leased land, poultry rearing and homestead farming which proves to be a successful model in disaster resilience.

Andie Arif Wicaksono

Participatory and Good Governance: The role of stakeholders in increasing the adaptive capacity of the poor to cope the impact of climate change. Case studies: Surakarta and Yogyakarta, Indonesia

The collaboration of government and riverside resident's community-based organisations (CBOs) in Yogyakarta and Surakarta illustrates how pro-poor planning approach can build the adaptive capacity of the urban poor to climates change-induced flooding. Findings indicates that stakeholders have a critical role in maintaining active collaboration for this adaptation strategy to become successful.

Niken Prilandita, Saut Sagala, Jeeten Kumar, Teresa Retno Arsanti

The Stakeholders & Stakeholder Network - Role in Sustaining the Renewable Energy System in Sumba Island

Indonesian government, through the Sumba Iconic Island program, attempts to increase the electrification rate to 100% in 2020 and also encourage the implementation of more renewable energy systems. There are various stakeholders involved in this program, and this research aims to examine and evaluate the stakeholders? role in sustaining the renewable energy system in Sumba Island.

Anastasia Widyaningsih

Community responses to displacement threats in flood prone areas. The case of Ciliwung River, Jakarta

This study deals with displacement phenomena occurring around the Jakarta Urgent Flood Mitigation Project during the period 2013-2017 and explores the emergence of social innovation in the affected communities by taking Bukit Duri and Kampung Tongkol as the case studies. It reveals how the crisis become a moment of change and an opportunity for Jakarta to co-produce a resilient city.

Session 8: Climate change and Urbanism: Planning Tools 6.8

12 September (Thursday), 11:30 - 13:00

Peijun Lu, Yimin Sun, Bilin Chen, Sheng Xia

Urban Design Study of Resilient City in Guangdong-Hong Kong-Macao Greater Bay Area

Based on theory of resilient city, this paper discussed the resilience of Greater Bay Area due to the contradiction between the vulnerable natural conditions and rapid urbanisation and developed three resilient urban design principles and a research-design-feedback loop pattern, which apply into various urban design stage in Pazhou, one of the more resilient areas in Greater Bay Area.

Shuang Zheng, Xiaowen Huang

Resilient Infrastructure Framework of China Coastal Cities

Taking Binhaiwan Bay Area as an example, this paper combines infrastructure framework with resilient city theory, then analyse the strategies of some world-class coastal cities coping with the problems of urban public security, and deduces the resilient infrastructure strategies for coastal cities, so as to provide references for the further study of the resilient coastal cities.

Muhammad Shamsuzzaman

Challenge of planning the Coastal Cities of Bangladesh: A Case for Chalna.

This paper studies spatial planning challenges of Chalna, a coastal town of Bangladesh following the Structured Geospatial Analytic Process. Identified challenges are primarily in the process of planning and decision making rather than lacking in technical know-how, such as weakness in the regional planning framework, undermining values of environmental/public goods, defying rule/regulations, and not accounting public opinions.

Cong Cao, Suning Xu

Research on Strategies of Low-impact Urban Design in China

This paper aims to provide theoretical method support and practical experience for creating environment friendly urban space in China by low-impact urban design methods, and discussed on two aspects of theory and practice.

Session 9: Planning – Looking Forward 6.9

12 September (Thursday), 14:00 - 15:30

TRACK KEYNOTE

Theresa Audrey Esteban

Mind the gap: Stakeholders perspective on resilience building in the City of Rotterdam

The study seeks to investigate the institutional and community actors perspective on resilience and the environmental threats in the City of Rotterdam. The research assumes that knowledge and experience on Rotterdam's environmental vulnerabilities and threats lead to better collaboration between and among stakeholders in making the city resilient

Rahul V

Reimagining Pamba; Sustainable design strategies for Sabarimala Pilgrimage.

As a pilgrimage centre with more than five million pilgrims, Sabarimala holds a special attention due to natural setting. Due to the ephemeral activities and recent devastating climate changes in the state, its necessary to study and redesign the whole pilgrimage architecturally and non architecturally in order to conserve the natural heritage of the state.

Tuan Manh ,Julia Babcock, Hien Bui, Thi Khanh Nguy

Capacity and Trade: Alliance for Green Actions

As nations shift planning around the reality of climate change there is an opportunity to redefine incentives across industries that promote clean energy and lower emissions in building, transportation and land use. In turn, workforce training and education across a broad international network can help ensure a just distribution of benefits as markets transition.

Track 7

Urban governance and planning profession
Planning for future


CONGRESS TEAM

Eric Huybrechts
(France)
Jennilee Kohima
(Namibia)

LOCAL EXPERTS

Teti A. Argo
Deden Rukmanaty

Large cities and megacities are a main feature of human settlement in the 21st century. The level of complexity of large cities requires new governance systems that are different from traditional urban and municipal administration. Soft power is necessary to mobilise actors from different levels of government, sectors, and territories. Multiform management across sectors and issues (water, economy, environment, mobility, housing etc.) need to share visions, strategies and policies with the support of technical bodies, political platforms and a variety of actors. Building the structures of a functioning megacity is an iterative process, which ranges from the very local to the regional and metropolitan scales. New methodologies are emerging, and this will be an opportunity to share the experiences of building large scale governance and consider the consequences on planning. People participation is different in a megacity, with more complex relations between local communities, local governments, and metropolitan governance. Informal dynamics also represent a bottom-up approach to the expansion drive of the city.

Urban governance and planning are some of the cross-cutting themes at this year's congress with an element of it visible in each of the other tracks. But within Track 7 these two themes will be explored and discussed in greater detail owing to the wide range of abstracts accepted for presentation in different forms, such as papers, case studies, research projects and special sessions. This track received close to 100 abstract submissions with rich and interesting content around megacity governance and planning from all parts of the world. As governance requires both top-down and bottom-up interaction in various forms between many different actors in the quest of planning, the importance of this track cannot be overemphasized. Planning for the future by exploring urban governance and planning in seven fully packed sessions of which two are special sessions will bring forth approaches, strategies and best practices for congress attendees. The sub-themes for the track include cross-border governance, territorial planning, regional cooperation, metropolis management, local leadership, metro-hub, democratic urbanism and metropolitan governance.

Sessions:

Session 7.1
Cross-border Governance
Megacities and large metropolis are expanding out of the national or regional limits. The different spatial management systems in each country should be articulated to better manage these megapolises. How to manage functional metropolitan areas located on several national or regional jurisdictions with contradictory laws, standards and management systems? The coordination tools are crucial for managing spatial and social dynamics, offer cross-border infrastructures and services. How should these multi-actor and multi-level spaces ensure effective cooperation and collaboration?

Session 7.2
Territorial Planning
Territorial planning covers different scales with strategic documents and regulations. The articulation is crucial to make policies a reality at the local level, to face huge challenges as climate change, social and spatial inequalities, heritage protection or limitation of urban sprawl. Territorial planning needs specific bodies to develop policies and strategies, to feed the public debates and to monitor the spatial development. Well-coordinated planning across different scales should speak governance.

photo: Bagus Ghufron, Unsplash

Session 7.3
Local Leaderships
Building a metropolitan governance requires a flexible system of decision making with local authorities, with the support of State government. What are the processes to build the metropolitan governance? How can one make efficient decision making with a large number of actors? How to manage the different scales and sectors to deliver public services and invest in infrastructures? How to foster economic development efficiency through city marketing? How to ensure social and spatial equity in metropolitan areas? Local leadership is the key to manage metropolitan areas.

Session 7.4
Metropolis Management
Metropolises, as they expand, cover several jurisdictions. Infrastructures and public services are managed on different areas. The share of competencies between the different administration levels (State, regions, local authorities) is complex. The metropolis management requires specific tool for coordinating sectors, territories and communities. The international experiences on metropolitan management offer innovation on governance and innovation mechanisms for the well-being on communities.

Session 7.5 (Special Session)
Democratic Urbanism
Democratic Urbanism is a method of city-building that integrates democratic ideals into the urban design process and applies broader shared governance models to the implementation of community aspirations, creating places of deep meaning that are broadly "owned" in the civic mindset. This interactive session will include a number of case studies, short films and exercises demonstrating the value of democratic approaches to city-building, highlighting communities that have applied democratic urbanism to achieve remarkable transformations across a variety of contexts. These demonstrate our civic capacity to overcome the stark challenges of the 21st century and reinvent our communities, illustrate the advantages of a democratic method for city-building that is broader than conventional practice, one based in a collaborative approach to governance that offers guidance to local leaders across the world working on the front lines of change today.

Session 7.6 (Special Session)
Using Metro-Hub
Metropolitan areas have a key role in achieving the 2030 Agenda for Sustainable Development and the New Urban Agenda. Despite being innovation and opportunities hubs, they encounter many challenges in governance, planning and financing. To support integrated approach to metropolitan development, UN-Habitat and its partners have developed the MetroHUB approach that embraces different aspects of metropolitan development and management including planning, governance and finance, that aims to foster capacity of metropolitan stakeholders on how to address and better manage urbanisation challenges at a metropolitan scale. It provides a vital pool of resources, tools and expertise for developing institutional and human capacity, directly contributing to the New Urban Agenda objective of leaving no one and no place behind.

Session 7.7 Metropolitan Governance
Metropolises, as expanding, are covering several jurisdictions. Infrastructures and public services are managed on different areas. The share of competencies between the different administration levels (State, Regions, local authorities) is complex. The metropolis management require specific tool for coordinating sectors, territories and communities. The international experiences on Metropolitan management offer innovation on governance and innovation mechanisms for the well-being on communities.

Session 7.8
Debate: Governing the Metropolis
This session is devoted to a general discussion on governing the metropolis, deliver key messages for the conference regarding governance and the role of planners and to fix recommendations for the final declaration of the conference. The discussion will have 4 steps: keynote; debate; synthesis; recommendations for Isocarp and the final declaration

Session 1: Cross-border Governance 7.1
10 September (Tuesday), 9:00 - 11:00

TRACK KEYNOTE

Sindi Haxhija, Karina Carius De Barros
Breaking through rigid administrative boundaries - synergies in 'soft' spaces of cooperation
Through case studies at the Dutch-German and the Finnish-Russian border areas, the paper explores the institutional and cultural challenges of 'soft' territorial cooperation. Challenging conventional regional or urban governance regimes, cross-border cooperation demonstrates a need for soft and more flexible decision-making powers, to mobilise stakeholders across various levels of governance, sectors and territories in the interest of functional territorial cooperation.

Khaled Abdellatif
Integrated Metropolitan Governance Framework for the GCC Future Metropolis
Due to gap between the current Gulf Cooperation Council (GCC) country's urban governance systems and the future of its newly born metropolitan areas, this paper examines and tackles various patterns, problems and challenges of the current urban governance system, to reach to the optimum scenarios for governing the future GCC metropolis in an integrated metropolitan governance framework.

Zivile Simkute
Practical point of view: preparation of the National Urban Policy Framework
The proposal for the National Urban Policy Framework for Lithuania is an attempt to restart the urban planning tradition and culture in a country that historically has a difficult relationship with it. The case presentation will review the preparation process, structure and the content of the document with questions raised about the necessity of such a policy in other countries.

Daniel O'Hare
Towards effective planning of transborder city regions: three Australian case studies
Polycentric city regions are expanding worldwide, often crossing national or state borders. Using literature review and document research, comparative case studies of regional planning of Australia's emerging internal trans-border city regions are presented. Evidence is provided that effective trans-border planning of city regions depends on overcoming differing levels of commitment to trans-border planning by the state jurisdictions involved.

Serin Geambazu

Dynamics of public urban waterfront regeneration in Istanbul, the case of Halic Shipyard Conservation

The global embrace of waterfront regeneration is widely recognized, however it is incompletely understood in planning theory due to dominance of North American and European case studies. The analysis of the Halic Shipyard Conservation project in Istanbul offers an opportunity to challenge this theoretical bias, and reevaluate the governance and planning process of urban waterfront regeneration in developing countries.

7.2 Session 2: Territorial Planning

10 September (Tuesday), 11:30 - 13:00

TRACK KEYNOTE

Huihui Nan

Planning and Management Experiences of Global Metropolitan Area - Lesson of New York Metropolitan Area, Tokyo Metropolitan Area, Paris Metropolitan Area, and London Metropolitan Area

New York metropolitan area, London metropolitan area, Tokyo metropolitan area, and Paris metropolitan area are internationally recognised as the four major metropolitan areas around the world. After reviewing their development process, some factors, including urban functions, regional division of labor, transportation, social equality and environment protection, necessary for the success of urban development were discovered.

Serin Geambazu

The New Istanbul: the expansion of a metropolis

As global capital proliferates, new spatial patterns emerge among which megaprojects denotes the biggest investment boom in recent times. Megaprojects are examples of new governance styles and policy targets, and this study looks at how the development of the new Istanbul Airport distinguishes itself from other build-operate-transfer megaprojects.

Slawomir Ledwon, Fatma Al Bader, Noora Al-Suwaidi

Developing the regulations for rapid urban growth: the new centres of the Doha metropolis, Qatar

Qatar's capital Doha has developed rapidly from a town a metropolis in a short time, being boosted by winning hosting FIFA 2022 World Cup and oriented around the new metro system. This presentation discusses how the regulations of a young planning system have evolved to introduce new urban centres and TODs, including the rationale for such changes and their applicability.

7.3 Session 3: Local Leaderships

10 September (Tuesday), 14:00 - 15:30

TRACK KEYNOTE

Ery Supriyadi Rustidja, Teti Argo

The Role of Local Leadership in Fragmented Urban Development : the Case of Higher Education Town - Jatinangor, West Jawa, Indonesia

The Higher Education Town HET is a campus area, park of cultural technology science and an urban center. As a part of metropolitan, HET faces deterioration environment and urban space problems. The local leadership role in managing urban strategy and must have strong networks in quadruple helix context. Leadership behaviour and capability of local leaders detemine performance of urban planning .

Xiangyi Meng, Taofang Yu

Infrastructure Imbalance, Financial Investment and AIIB's Role: Non-state Actor in Regional Governance

The Asian Infrastructure Investment Bank (AIIB) is an emerging force to solve the problem of infrastructure imbalance in Asian developing countries. Based on the economic geographical framework of density, distance and division, the paper analyzes traditional governance phenomena and the AIIB?s role in spatial governance. Cases indicate the infrastructure-led development will widen differential rent gaps and bring agglomeration economies.

Thai Son Pham

Organising urban governance in Vietnam: an investigation on housing development in Ho Chi Minh City

This paper investigates the governance of urban housing development in Ho Chi Minh City (HCMC) in Vietnam. By focusing on capacity, finance, diversity, security and authority dimensions of governance, the paper conclude that current configuration of urban governance in HCMC is not sufficient to address housing as cross-cutting and multi-faceted issue and proposes integrated approaches towards a good governance system.

Olga Chepelianskaia

Fostering Local Leadership for Climate Resilience in Asian Cities

Ecosystem based climate resilience has been globally recognised as viable, cost-effective and generating multiple co-benefits for cities. However, it requires a transparent and supportive local governance and leadership, which remains a critical challenge in Asia. The paper looks at potential solutions to overcome these challenges and foster local leadership, as exemplified by Tri Rismaharini, the Mayor of Surabaya.

Tathabrata Bhattacharya

Fixing the wrongs against 'rights' in Kalyani (India): slum sanitation, land tenure, a municipality and the state

Working on a participatory slum sanitation programme, Kalyani Municipality (West Bengal) utilised people's participation to negotiate urban land governance by triggering voluntary habitat improvement by slum-dwellers. The paper explores the manner in which a municipality can impact the established land administration system that limits its constitutional powers and transform the perception of land tenure in two slums.

Session 4: Metropolis Management 7.4

10 September (Tuesday), 16:00 - 17:30

TRACK KEYNOTE

Eric Huybrechts

Urban planning agencies: a key support for metropolitan governance

Metropolitan governance is facing technical high complexity and several shape regarding scales, sectors and political changes. Permanent technical bodies are essential to provide scientific knowledge, prepare policies and strategies and support the public debates. Decision makers find in several shapes of territorial planning agencies the interdisciplinary tools to help them to define visions, prepare strategic decisions and manage metropolitan areas.

Mennatullah Hendawy

Visual Communication and the Mediatised City: From Billboards to Offices of Urban Planning in Cairo

Today, by simply walking in the streets of Cairo or opening one of the national TV channels, one get captured by hundreds of real estate ads. To what extent these dominant narratives and visuals impact/construct the professional planning practice, is interrogated in this paper through adapting an assemblage ontology and employing Actor- Network-Theory starting from street billboards.

Ana Peric, Theodora Papamichail

Informal planning: a tool towards adaptive urban governance

By using the example of a 'test planning' procedure that links both formal and informal planning, and observed through the lens of collaborative rationality as a theoretical background, the paper elucidates the following pillars of adaptive (collaborative) urban governance: 1) flexible and agile institutional arrangements, 2) proactive and imaginative planners, and 3) inclusion of numerous stakeholders.

Marc Wolfram

Un-planning the metropolis: Urban transformative capacity as a transdisciplinary heuristic and disruptive sustainability strategy

The concept of urban transformative capacity offers novel perspectives for addressing the metropolitan sustainability crisis: It focuses on dismantling path dependencies and supporting emergence for reconfiguring urban systems across scales domains.

Haward Wells, Frank D'hondt

Beyond the Plan: Building In-House Capacity to Plan, Design and Implement Territorial Transformations, Case of 'Castries Vision 2030'

Written by practitioners who were involved in drafting of the 'Castries Vision 2030' in Saint Lucia, the article testifies their experience with in-house and rapid planning to address pressing challenges related to depopulation of the core-city, informal housing, urban crime, environmental degradation, traffic congestion and imminent threats triggered by climate change in the context of insufficient and ineffective planning capacities.

Session 5: (Special Session) Democratic Urbanism : A Method for City-building 7.5

11 September (Wednesday), 11:30 - 13:00

Moderators: *Erin Simmons, Joel Mills*

When urban democracy expands, cities flourish. Democratic urbanism is a method of city-building that integrates democratic ideals into the urban design process and applies broader shared governance models to the implementation of community aspirations, creating places of deep meaning that are broadly "owned" in the civic mindset.

Session 6: (Special Session) Using Metro-Hub 7.6

11 September (Wednesday), 14:00 - 15:30

Maria Del Pilar Tellez Soler, Michael Kinyanjui

By adopting the NUA (Paragraphs 90. 91, 95, 96, 130 and 131 mainly), Member States of the United Nations committed to support the strengthening of the capacity of subnational and local governments to implement: Metropolitan governance, planning and financing. To do so, renewed metropolitan management that incorporates new capacities, competences and new ways of managing cities and urban agglomeration is needed. Therefore, in collaboration with different Partners, UN-Habitat has developed the "MetroHUB" initiatives. MetroHUB focuses on innovative capacity development for key-actors on metropolitan management. This novel approach to plan, govern and finance the urban and territorial development is gaining momentum. The event will showcase one of the innovative tools within the MetroHUB: "The Pyramid of Metropolitan Management". The tool demonstrates how 12 metropolitan management topics can be effectively talked to support the achievement of the NUA on "Leaving no one and no place behind". The tool is highly relevant for those interested in metropolitan development, because it identifies which are the fundamental topics facing a metropolitan area and then find pathways to simultaneously unleash, integrate and articulate the pyramid of governance, planning and financing. One of the key results of that the Pyramid of the Metropolitan Management Tool is to enable an integrated and holistic approach to manage multi-governance planning and financing of metropolitan áreas.

7.7 Session 7: Metropolitan Governance

12 September (Thursday), 11:30 - 13:00

Ananya Ramesh, Nirupama M Vidyarthi

Decentralisation and Devolution in Growing Megacities: Case of Bangalore, India

Unpacking decentralisation and devolution in megacities, an element of 'disconnectedness' emerges; between parts affecting the whole, embodied as intents and outcomes. How do we then retain decision-making within the democratic realm and strengthen the role of local bodies. This is critical across megacities globally, as cities continue to seek autonomy in functioning, identity and influence, within networks of global flows.

Ali Alraouf

Towards a New Paradigm in City Branding and Marketing: The Case of Doha, Qatar

The paper articulates a model for Doha city banding which is based on a balanced approach. It considers traditional assets and includes contemporary and innovative assets resulting from the last decade's unprecedented investments in the sectors of education, research and culture. The paper suggests holistic approach to city branding which would balance between social equity, economic prospertiy and ecological intergrity.

José Álvaro Antunes Ferreira, Joana Almeida, Pedro Pinto

Metropolitan governance in Southern Europe: working across sectors and boundaries

This comparative study of governance structures across southern European metropolitan areas ask how inter-sectoral cooperation and coordination, and multi-jurisdictional collaboration is best achieved. The analysis focuses on the scope of their mandates, and management and legislative authority, and highlights best practices.

Arif Gandapurnama, Irene Sondang, Ahmad Zubair, Nala Hutasoit

Mapping institutions and actors in urban coastal management of Jakarta's Bay

This research has a comprehensive understanding of governance on Jakarta's bay. Having a mixed method methodology through content analysis and actor mapping tools, this paper describes a network of interactions between state and non-state actors regulating the planning process until implementation in the coastal development of Jakarta.

Jyoti Vijayan Nair

Making TOD Implementable in Indian Megacities : From theory to practice

India's unprecedented economic growth and ubanisation require innovative solutions over traditional planning practices. Transit-Oriented development(TOD)- widely acknowledged as a solution to sprawl, has been a popular buzzword in Indian urban policies for a decade, yet the first fully implemented TOD is still awaited. This paper examines key TOD projects to develop a framework for feasibility analysis of future TODs.

Papers

TRACK1: Limitless cities and urban futures:
planning for scale

TRACK 2: Besides the megacity and other cities:
planning for balance

TRACK 3: Liveable places and healthy cities:
planning for people

TRACK 4: Knowledge economies and identity:
planning for culture

TRACK 5: Smart futures and sustainability:
planning for innovation

TRACK 6: Changing environment and risks:
planning for resilience

TRACK 7: Urban governance and planning profession:
planning for future

Authors are responsible for the content of the short outlines and the full papers which are listed in the order of their presentations in each track.

Index

Track 1

Track 2

GAN Zhengkun, LONG China Lingege, ZHANG Dayu, Research of Traditional Village Conservation and Development Planning in the Perspective of “Multiple-planning”

GOLDIE Stephen, Two Thousand New, Million-Person Cities by 2050 - We Can Do It!

GREEN David, AL RASHAD Sulaiman, KNIGHT Paul, CAMMELLI Nicole, A 21st Century National Ordinance

HE Liang, From one-way to interactivity - difficulties and strategies in the planning of adjacent areas of metropolis

HILGEFORT Jason, Rural Revolution, leveraging emerging infrastructures

JIANG Xue, ZHAO Tianyu, Whole-region Tourism Greenway Network Organization Mechanism Based on Gravity Model Flow Measurement

KUNDU Raroola, The Informal Syndicate Raj:Emerging urban governance challenges in newly incorporated villages of Bidhan Nagar Municipal Corporation, West Bengal

LESTARI Dwitantri Rezkiandini, LATIFAH Latifah, Anticipation Strategy for Urban Conurbation in Semarang - Surabaya Corridor

LI Yanqun, GENG Hong, SHI Erpeng, Response path adapted to the unbalanced shrinkage of small towns in metropolitan areas: A case study of Wuhan in China

LI Bin, GUO Weihong, ZHANG Yuqing, Rural revitalization of Batang village in Guangdong province under the background of balancing urban and rural development

LI Yi, ZHU Xihua, Analysis of the Correlation between the Establishment of Rural Land Share Cooperatives around Shanghai and the Government & Villager Satisfaction - A Case Study of Jinxi Town, Kunshan City

LIU Tianzhu, LI Jingsheng, Out-migrate Elites as Rural-Urban Link: an Innovative Pathway Toward Rural Development Around Metropolis

LU Zhengyin, WEN Xiaoyi , The Shrinkage and revitalization of villages in metropolitan area of mega cities

MAITI Sohini, MAL Satyajit, Defining the RUrban - a case of Hyderabad

MARAT-MENDES Teresa, BORGES Joao, The role of food on re-imagining the sustainable city: from the neighbourhood to the region.

MARDIANSJAH Fadjar, RAHAYU Paramita, RUKMANA Deden, Urban Population Growth and the Growth of Towns and Cities in Indonesia: the challenge of non-statutory town development

O’CONNELL Derry, The Smaller Town as Component of an Urban Settlement Cluster

PAKOZ Muhammed Ziya, BAS Ahmet, EREN Fatih, AN ANALYSIS OF THE CHANGING ROLE OF ISTANBUL AS A MEGACITY IN THE WORLD

PERMANA Mirza, SETTLEMENT DEVELOPMENT ANALYSIS OF MALANG CITY PERI URBAN AREA and ITS CONFORMITY WITH THE REGIONAL SPATIAL PLAN

QI Huimin, Analysis on Integration Path of Urban and Rural Industries Based on Economic Data Model - A Case Study of Overall Strategy Planning of Taiyuan Rural Revitalization

SADEWO Erie, HUDALAH Delik, SYABRI Ibnu, PRADONO Pradono, Deciding Where to Live in The Suburb: Linking Utility-Maximization and Residential Mobility in Polycentric Urban Region Context

SETIAWAN Bakti, RAHMANI Sita, Global-Local Dynamics in Urbanization: The transformation of the desa-kota in Bali and the roles of adat institutions

SHI Ding, ZHAO Dianhong, A Study on the Approach of Sustainable Development on Traditional Cultural Landscapes Surrounding Metropolitan Shanghai

SOEMAWINATA Soelaeman, MUTTAQIN Dani, PANGERAN Adhamaski, Township Development by Private Sector: Lesson Learned from Jakarta Megapolitan Area

SUSMAN Roni, WEITH Thomas, FACTORS INLFUENCING of LAND USE CONFLICTS IN PATIMBAN SEAPORT INDONESIA

VLASWINKEL Esther, WALVIUS Minze, The City of the Future, a new paradigm, a new vocabulary

WARRIER Soumya S, The Anti-city

WEITH Thomas, FIENITZ Meike, Just Schwerin: Balanced urban-rural development?

WEN Xiaoyi, LIU Ye, Planning Practice in Areas Beyond Megacities under the Rural Revitalisation Strategy in China: Case Study of the New Jijiadun Village - A Concept of ‘Co-Creation Community for Rural Life’

WEN Xiaoyi, ZHANG Guoquan, JIANG Qiuyi, Exploration and practice of formulating strategic planning for rural revitalization in the Shanghai metropolitan area

ZHAO Dianhong, Construction and empirical study of evaluation index system of rural revitalization in China’s metropolitan areas from the perspective of social ecosystem -- taking villages and towns around Shanghai as examples

ZHU Haixuan, LIU Sai, JIA Xiaoyu, Urbanization Mechanism Study under the Dynamics of State Capitalism: A Case Study of the Far East with the Construction of the Siberian Railway in the Early of 20th Century

Track 3

AERTS Jens, Training session on child-responsive urban planningw

AGRAWAL Mahak, A Dream of open defecation free India? Decolonise and innovate urban sanitation to reach those left behind

AKBAR Poeti, EDELENBOS Jurian , Temporal and Regular Place-making in Indonesian Kampung: Creating Urban Spaces that Enhance Local Empowerment

ANDRIANI Dhea, DEWI Indarti Komala, HIDAYAT Janthy Trilusianthy, The Implementation of Children Friendly City in DKI Jakarta through Assesment of Child-Friendly Integrated Public Space (RPTRA). (case study : Kecamatan Kemayoran, Jakarta Pusat)

BINGLE Rouve, Hunger in revered spaces: Exploring the impact of planning on the university campus food system in South Africa

CAETANO Fernando, MEIRA Jeronimo, RODRIGUES Suzi, The definition of accessible routes on sidewalks: a new challenge for Brazilian cities

CAP Constant, The Importance of Participation and Inclusion in Developing Livable and Affordable of Housing, Transport and Social Services in Kenya

DIMASTANTO Adriadi, INSANI TANJUNG Rachmatika Fitri, SAPTIWI Tri, IMPROVING THE QUALITY OF PUBLIC SPACE IN BOGOR CITY THROUGH CSR FUNDING SCHEME

GHOOR Raeesa, PHOLO Keneilwe, BUSGEETH Karishma, Developing a Spatial Transformation Scoring Tool to Monitor South African Catalytic Housing Projects

GOETHALS Sebastien, Planning Transit-Oriented Development (TOD) in an African City Facing Rapid and Informal Urban Growth: the Case of the Urban Mobility Plan of Conakry, Guinea

GREEN David, Health Districts: Creating Healthy Cities

INDRASARI Fenita, In between luxury of housing and affordability of transportation: Exploring automobile dependency of housing estate residents and kampung dwellers in suburban Bandung, Indonesia

KYRIAZIS Apostolos, Urban morphology and behaviour mapping in Abu Dhabi's public spaces: informality as an interaction of cultural context and urban form

LEDWON Slawomir, Health and the city: creating built form and planning for the physically active

LI Juan, DANG Anrong, Empirical study on the evaluation of publicness of public space: taking Chinese megacity as the case

LI Shuai, Children-friendly design of Urban public space: based on the study of Shanghai, China

LIU Xuhui, YIFAN Yu, SUI Xin, Neighborhood Environment and the Elderly's Subject Well-being

LIU Chengcheng , Strategies on Healthy Urban Planning & Construction for Challenges of Rapid Urbanization in China

MAJEED Rushda, WATANATADA Patrin, BUILDING INDIAN NEIGHBOURHOODS TO THRIVE IN: GUIDELINES FOR PLANNING, DESIGN & POLICY FOR INFANTS, TODDLERS + THEIR CAREGIVERS IN INDIA

MEWS Gregor, Realising the potentials of a design-dividend towards a lovable urban future

NIKSIC Matiej, Liveable and just public space - Conceptual approach to urban walkability on the case of Ljubljana, Slovenia

PENG Cheng, LI Jingsheng, Research on the build of Healthy Walking System for Urban Central Business District: A Case Study of Jiangbeizui CBD in Chongqing, China

PINASTHIKA Dayinta, AMELIA Puteri Rizqi, HARDIANSAH Elkana Catur, DIMASTANTO Adriadi, IAP's Indonesia Most Livable City Index (MLCI): A Perception-Based Survey to Measure City Livability Index

SUI Hang, YANG Dongfeng , Analysing the perceptions of the elderly on space vitality and related environmental factors based on residential community

TAHIR Akino, DWIYANI Risye, SAGALA Saut, VIARTASIWI Nino, Secondary cities and forced migration: accommodating refugees and asylum seeker in Indonesia

TAMPI Daniel Mambo, DARMAJANTI Linda, FITRINITIA Irene Sondang, Sustainable Urban Development: Building Healthy Cities in Indonesia

TANAN Natalia, Laksmi Tungga Dewi Jaya WISNU WARDANI, The Pedestrians' Stories: Towards Walkable Cities in Indonesia

TANG Lynn, PUN Vivian, RADIAWATI Ririn, Importance of air quality management for public health and development progress in Jakarta, Indonesia

TENORIO Gabriela De Souza, Better places for a liveable - and lively - city: a method of Post-Occupancy Evaluation of public spaces.

XIA Fujun, Discussion on the Fairness in the Planning of Relocation Community - Taking the Constructive Detailed Planning of Longhai Community as an Example

YE Yang, Residents' Perceptions of Walkability Attributes in Cold Region Chinese Cities: Reliability and Validity

YUAN Qing, GUO Ran, Outdoor Public Space Activities Characteristics of Children and Their Inter-generational Parents and Design Strategies from the health perspective: a case study in Harbin, China

ZHONG Mengqi, SHEN Yuanyi, YU Yifan, Association between Neighborhood Built Environment and Body Mass Index among Chinese Adults: Hierarchical Linear Model

ZHONG Mengqi , YU Yifan , The Spatio-temporal Disparities in Healthy Food Accessibility: A Case Study of Shanghai, China

Track 4

ARIYANTI Vicky, Cultural sensitive approach in water management for a volcanic river basin of Yogyakarta Metropolitan Area

CHEN Lin, Inheritance and Development of Traditional Minority Culture in Southwest China: A Case Study of Miao, Dong and Dai Nationalities

DENG Xiaoxiao, ZHANG Dihao, YAN Shuang, Revitalizing historic urban quarters by Cityscape Control Plan: The case of Xi'an , China

HANZL Małgorzata, BEZERRA Lia Maria, Healthy City versus Resilient Planning paradigm

HUQ Ferdous Farhana, SHUVO Imzamam Ul Khan, ISLAM Nidalia, Essence of Urban form and its Relationship with Urban Aesthetics: A case from Rajshahi City, Bangladesh

IRANMANESH Nasim, Improving the identity of historic city by considering hydraulic infrastructure (the case study: Qazvin city)

LIU Sai, ZHU Haizuan, JIA Xiaoyu, Study on Urban Morphology Optimization Based on the Construction of Urban Memory Structure - Take Dazhi Street in Harbin as an example

PACE Giuseppe, Underground Built Heritage as catalyser for Community Valorisation (Underground4value)

PERSADA Citra, KESUMA Yunita, RUSMIATI Fadhilah, A City Branding Framework in Planning: The Case Study of Pringsewu Lampung, Indonesia

POMAZAN Roman, KHVAN Alexandr, Culture capital of the Turkic World

RANJBAR Ehsan, The Power of Culture in Creative Placemaking for Future Urban Economy; Evidence from Contemporary Iranian Urban Spaces

SCHEERBARTH Benjamin, An Awkward Dance: Nightlife and Urban Development (Lessons from Berlin)

SEPTIANA Harini, AL NAEMA Noora, AL-JABER Amna Khalid J, AL BADER Fatma, AL KHALDI Lolwa M. Alfaya, Forward Thinking on Culturally Urban Imprint in the Contemporary Era Rejuvenating the Traditional Neighbourhood Values and Characters: An Urban Morphology Review on Qatari Cities

SHEN Qi, Informal entrepreneurs in old districts in central city Shanghai

SHEN Luni, The activation and revitalization of Yihe, Nanjing

SIJAKOVIC Milan, PERIC Ana, Recycling of industrial heritage: promoting local diversity and cohesion in globalising cities

SOFHANI Tubagus Furqon, FAHMI Fikri Zul, FIISABIILILLAH Dika Fajri, WULANDARI Brigitta Sadnya, Community capacity for creativity-based rural development in a developing country: Case studies from Indonesia

STARR Peter, Old Deira, Dubai: The Role of Culture, Identity and Planning in a Global City

WANG Qinglian, ZHAO Zhiqing, ZHANG Bocheng, Cultural Heritage Conservation and the Sustainability of City's Orderly Development: identification, conservation and construction of historic space

YANG Yang, ZHAO Jilong, SUN Qian, Research on Online Public Participation and Platform Construction of Historical Block Protection in Data Age

ZHANG Dian, XU Suning, Research on Humanistic Technology of Urban Design of Historical Blocks in Harbin

ZHANG Jie, ZHAO Zhiqing, Regeneration of Railway Industrial Heritage- Protection, Renovation and Development of Hengdaohezi Town

ZHOU Weisi, XIONG Wei, HONG Qi, The Road Of Rebirth, Place making in Bidur from the Perspective of Cultural Landscape

ZIVALJEVIC-LUXOR Natasa, MITOVIC Petar, Forever frenemies: built heritage, megacities and new technologies

Track 5

AGGARWAL Vaishali, Spaces of becoming- Space shapes public and public (re)shapes their own spaces

AL-SOROUR Jassim, ALAMRI Noor, How can cities succeed and boom in the long run? CASE IN QATAR

BISELLO Adriano, VETTORATO Daniele, Startdust Smart City Project in Trento

BISELLO Adriano, VETTORATO Daniele, The next generation of EU smart city projects: turning "clean energy for all" into "clear benefits for all".

BORISOV Andrey, Presenting the prospects for Ropeway Implementation as a Public Transport Mode, the case of Moscow

CELIK Ozge, ERTEKIN Ozhan, Re-thinking the city: Basaksehir Living Lab (Case of Istanbul)

DONG Le, XU Chen, CHEN Baolu, Investigation about tourism image optimization of Lugu lake scenic area based on internet reviews

DUBEY Mayank, Smart signals and corresponding challenges in heterogeneous traffic conditions

FIUZA Mariana, UCHOA Gabriela, MAIA Flavia, The Goldilocks Zone for the public sector innovation: Teresina 2030 towards resilience to climate change in the developing world

HASANUDDIN Dian, Smart Cities and The People: Urban Planning Collectives in Indonesian Cities

HENDAWY Mennatullah, Urban Planning in a Mediatized World , case of Egypt

KAMROWSKA-ZALUSKA Dorota, Smart city and regenerative city – complementary or contradictory approaches

LEE Ming-Chun, People, Places, Memories and Mobile Apps: Understanding the Potential of Augmented Reality in Public Participation and Community Development

OBRACHT-PRONDZYŃSKA Hanna, Big data based assessment on metropolisation processes in Poland

PAL Sugandha, THAKUR Palak, Switching to a sustainable auto-rickshaw system (Namma Auto Project)

PILSUDSKI Thibault, TAN Si Ying, TUNAS Devisari, CLAVIER

Fabien, STOKOLS Andrew, TAEIHAGH Araz, Smart planning in Southeast Asian cities: the role of urban governance and knowledge transfer

PURWANTO Alloysius Joko, LUTFIANA Dian, Future Urban Mobility Development Framework to Maximize Benefits of Plug-in Electric Vehicle Penetration in ASEAN Countries

QIN Tian, Comprehensive Evaluation and Dynamic Evolution Analysis of Shanghai's Urban Vulnerability

SANTOSO Putrikinasih, Reinventing the City Centre: Implementation Strategies for TOD Concept in Existing Built Environment in Jakarta

SUI Xin, LIU Xuhui, YIFAN Yu, Measurement of spatial equity: a case study of nursing institution

SUN Yu, LENG Hong, TIAN Wei, The Framework Research on building energy efficiency in urban planning : Integrated Visioning Based on Agent-based modelling and Spatial Analysis approach

TALLO Amandus Jong, Why We Need Participatory Mapping?

TILLNER Silja, KUEHN Eva Maria, Habitat 5.0 - Towards affordable and sustainable housing in the developing world: A pattern- and block chain-based approach

XIA Huiyi Xia, XIA Nankai, Urban living environment assessment index system based on psychological security

YANG Junyan, ZHENG Yi, MARVIN Simon, Cities and Digitization: Perspectives and Challenges of the Smart City Technologies on Urban Planning and Design

ZHANG Qinglai, BU Jiatian, YU Yifan, Measuring Visual Quality of Street Space Based on Deep Learning and Street View Picture: Pilot in The Linong Area in Shanghai

ZHAO Dianhong, Improving Space Structure of Traditional Resources-Based Citie`s Transformation in a Background of Supply-Side reform: a Case Study of Yantai City of Shandong Province

Track 6

ARIF WICAKSONO Andie, Participatory and Good Governance:
The role of stakeholders in increasing the adaptive capacity of the poor to cope the impact of climate change. Case studies: Surakarta and Yogyakarta, Indonesia

BUI Hien, MANH Tuan, BABCOCK Julia, NGUY Thi Khanh, Capacity and Trade: Alliance for Green Actions

CAO Cong, XU Suning, Research on Strategies of Low-impact Urban Design in China

CHEPELIANSKAIA Olga, Building Unique Cities: an Imperative for Sustainability and Liveability in the Global South

CILLIERS Juanee, Trans-disciplinary planning approaches towards resilience

ESTEBAN Theresa Audrey, Mind the gap: Stakeholders perspective on resilience building in the City of Rotterdam

ESTEBAN Theresa Audrey, Living with water: how memory and experience help build community resilience in Dordrecht

HANDAYANI Wiwandari, BEAGEN Barry, DEWI Santy Paulla, Promoting Water Resilience in Semarang: Building a Coalition through the Water as Leverage (WaL) Program

HUQ Ferdous Farhana, ISLAM Nidalia, ZUBAYER Sakib, AHMED Nessar Uddin, Green Roof: An Approach to Repair the Climate of Dhaka City

LU Peijun, SUN Yimin, CHEN Bilin, XIA Sheng, Urban Design Study of Resilient City in Guangdong-Hong Kong-Macao Greater Bay Area

MATHEWSON David, Effects of ongoing infrastructure improvements in relation to planning policy for flood resilience and historic urban morphological development in Jakarta

MUTTAQIN Dani, EARTHQUAKE POST-DISASTER RELOCATION IDENTIFICATION IN MEUREDU PIDIE JAYA NANGROE ACEH DARUSSALAM

NIKSIC Matej, CERVEK Jernej, Changed precipitation patterns and the need for a novel approach to building plot planning: The lessons learnt in the sub-alpine climate zone of Slovenia

NURAINI Sani, INDRATNO Imam, Embodied Carbon Emission Analysis of Industrial Sector Based on Input-Output Analysis : Case Study in Bitung City, Indonesia.

PARMAR Shivangi Singh, SEN Joy, GOSWAMI Arkopal, An assessment and delineation of Socio-economic Resilience Landscapes of the Region based on the inherent latent factors of vulnerabilities

PHAM Thai Son, Identifying climate resilience challenges in Vietnamese cities: case studies of Can Tho and Da Nang

PRABHAKARAN Priyanjali, KARTHA Suja, Role of Women Self Help Groups in Disaster Resilience and Livelihood Regeneration: Post Flood Experience from Kerala

PRABHAKARAN Priyanjali, KARTHA Suja, Flood resilience planning for Disaster prone Panchayaths. A case of Karumaaloor Panchayath in Ernakulam District, Kerala

PRILANDITA Niken, SAGALA Saut, KUMAR Jeeten, RETNO ARSANTI Teresa, The Stakeholders & Stakeholder Network' Role in Sustaining the Renewable Energy System in Sumba Island

RAMAMURTHY Adinarayanane, ROY Anusha, GREEN AND BLUE INFRASTRUCTURE TO REGULATE THERMAL COMFORT IN HIGH DENSITY CITY PLANNING: A CASE OF NAVI MUMBAI, INDIA

ROLLINGS Jackson, BUNT Travis, HIDAYANI Rizqa, LETITRE Peter, CARPAIJ Sander, THOMA Despo, Sinking, growing, resilient: a multidisciplinary approach to climate adaptation in Semarang, Indonesia

ROSALES PÉREZ Natalie, Expanding an understanding of urban resilience in the realm of adaptation planning

ROSALES PÉREZ Natalie, Relict ecosystems in urbanized contexts. Challenges and opportunities to renature cities, ecological restoration, and biodiversity enhancement through planning for sustainability.

SAKKERI Ramya, V Devadas, Systems' approach: Climate change, glacier melt and development planning of the Himalayan region

SARMAH Tanaya, DAS Sutapa, Determining urban flood vulnerability using an indicator-based approach and HAZUS-MH

SCHUETT Rolf, Building Dignity: A participatory concept for climate change-impacts mitigation in informal settlements in North Jakarta

SHAMSUZZAMAN Muhammad, Challenge of planning the Coastal Cities of Bangladesh: A Case for Chalna.

SURYANDARU Raka, How to Plan in a Volcano-related Disaster Prone Area? Lesson Learned from Adaptive Spatial Planning in Dieng Plateau, Central Java

TALLURI Aishwarya, GARIKAPARTHI Manasa, Spatial planning and design for food security ; Building Positive Rural-urban Linkages

V Rahul, Reimagining Pamba; Sustainable design strategies for Sabarimala Pilgrimage

VANSTEENWEGEN Mattias, DROUET Etienne, 360cityscan: integrated solutions to face urban challenges

ZHANG Shuo, Research on the Spatial Effect of Urban Construction on Heat Island Effect in Shanghai Based on Remote Sensing Data

ZHENG Shuang, HUANG Xiaowen , Resilient Infrastructure Framework of China Coastal Cities

Track 7

ABDELLATIF Khaled, Integrated Metropolitan Governance Framework for the GCC Future Metropolis

ALRAOUF Ali, Towards a New Paradigm in City Branding and Marketing: The Case of Doha, Qatar

ARGO Teti, RUSTIDJA Ery Supriyadi, The Role of Local Leadership in Fragmented Urban Development: the Case of Higher Education Town - Jatinangor, West Jawa, Indonesia

BHATTACHARYA Tathabrata, Fixing the wrongs against 'rights' in Kalyani (India): slum sanitation, land tenure, a municipality and the state

CARIUS De BARROS Karina, HAXHIJA Sindi, Breaking through rigid administrative boundaries - synergies in 'soft' spaces of cooperation.

CHEPELIANSKAIA Olga, Fostering Local Leadership for Climate Resilience in Asian Cities

CORBALAN Alfredo, Role of planning and governance to better manage European metropolitan areas - SPIMA research

D'HONDT Frank, WELLS Haward, BEYOND THE PLAN: BUILDING IN-HOUSE CAPACITY TO PLAN, DESIGN AND IMPLEMENT URBAN AND TERRITORIAL TRANSFORMATIONS, CASE OF 'CASTRIES VISION 2030'

FERREIRA José Álvaro Antunes, ALMEIDA Joana, PINTO Pedro, Metropolitan governance in Southern Europe: working across sectors and boundaries

GANDAPURNAMA Arif, SONDANG Irene, ZUBAIR Ahmad, HUTASOIT Nala, Mapping institutions and actors in urban coastal management of Jakarta's Bay

GEAMBAZU Serin, The New Istanbul: the expansion of a metropolis

GEAMBAZU Serin, Dynamics of public urban waterfront regeneration in Istanbul, the case of Halic Shipyard Conservation

HENDAWY Mennatullah, Visual Communication and the Mediatized City: From Billboards to Offices of Urban Planning in Cairo

HUYBRECHTS Eric, Urban planning agencies: a key support for metropolitan governance

LEDWON Slawomir, AL BADER Fatma, AL-SUWAIDI Noora, Developing the regulations for rapid urban growth: the new centres of the Doha metropolis, Qatar

MENG Xiangyi, YU Taofang, Infrastructure Imbalance, Financial Investment and AIIB's Role: Non-state Actor in Regional Governance

MILLS Joel, SIMMONS Erin , Democratic Urbanism: A Method for City-Building

NAIR Jyoti Vijayan, Making TOD Implementable in Indian Megacities : From theory to practice

NAN Huihui, Planning and Management Experiences of Global Metropolitan Area - Lesson of New York Metropolitan Area, Tokyo Metropolitan Area, Paris Metropolitan Area, and London Metropolitan Area

O'HARE Daniel, Towards effective planning of transborder city regions: three Australian case studies.

PAPAMICHAIL Theodora, PERIC Ana, Informal planning: a tool towards adaptive urban governance

PHAM Thai Son, Organizing urban governance in Vietnam: an investigation on housing development in Ho Chi Minh City

RAMESH Ananya, VIDYARTHI Nirupama M, Decentralisation and Devolution in Growing Megacities: Case of Bangalore, India

SIMKUTE Zivile, Practical point of view: preparation of the National Urban Policy Framework

WOLFRAM Marc, Un-planning the metropolis: Urban transformative capacity as a transdisciplinary heuristic and disruptive sustainability strategy

Track 1

Limitless cities and urban futures

Planning for scale

photo: Mariana Gil/WRI Brasil Cidades Sustentáveis, Flickr

Research Paper

Smart Cities in India: Branded or Brain-dead?

Vaishali AGGARWAL, Bauhaus-Universität Weimar; Germany

Abstract

The notion of 'smart cities' is increasingly visible in discourses on the future of cities but Change is coming to transportation, whether we are ready for it or not. But how sustainable and digital innovation can unlock better people health and well-being, enhance safety and security and provide seamless mobility experiences. It can be argued that smartening the mobility infrastructure enables the citizens to make informed decisions, and this is indeed true- if done well, but it has a big "if."

This research engages with the key drivers of change and provides affirmative aspirations for mobility in the not-so-distant future in order to facilitate conversations about change. However, the development of possibilities (scenarios) for the government policies and business innovation is dependent on the advanced technology and socio-economic values, which are embedded in the context and culture. The research paper aims to visualize through foresight by design, plausible alternatives of sustainable future for passenger transport in Delhi to stimulate sustainable innovation developments for transportation and analyse the present innovative influences for smart mobility in Delhi to accelerate the adoption.

The first part of the paper analyses how do urban planners use the discourse of smart cities and how it has defined in India then later suggest future scenario for the future which will empower users, changing mobility models and transforming eco-system where intelligent connectivity would unite varied rage of emerging technologies to enable smarter, healthier and more resilient and economically vibrant urban life. This research considers smart mobility by outlining current challenges, suggesting technological, infrastructural and policy solutions and distilling explorations of the future into a series of 'user journeys.' It seeks to answer if 'branding of technology' can be used as a tool to create a new identity for mobility of Delhi or 'upgrade' the existing situation. How can the context of Delhi be decoded to describe the perceptions of the people?

Keywords

Livability, Sustainable Transport, Narrative transportation, Personas, inclusive design, integrated transportation system, user journey & experience

1. Introduction

Future is fiction, but the cities of the future will be 'smart.' 'Smart cities' is the most fashionable concept in urban policy nowadays but the meaning of the term is often obscure in a different context. But is "smart city" just another buzzword or does it have some meaning? Smart City is considered like a winning urban strategy using information and communication technologies, **business models**, and solutions to increase the operational efficiency, share information with the public and improve both the quality of services and citizens welfare.

Mobility shapes the cities, but cities are not static, they change and adapt like living organisms over time. Though historically, mobility was primarily viewed as a 'product' that includes vehicles, physical infrastructure, fuels required to move around but now mobility is approached as a 'service' for seamless movements from place to place. Therefore, strategies for measurable economic and environmental sustainability and improved traveller experience would be achieved by reducing the use of fuel and power consumption for vehicles, reduction in congestion and traveller frustration and promoting the efficient, cost-effective system to eliminate adverse impacts on health and environment and would provide improved accessibility and affordability of transport providers and travellers.

However, **if "smart cities" is the answer, then what was the question? How can technology and intelligent design be used for creating a better world for people?** Therefore technology will be used in a manner which is no longer isolated in different devices or services; rather it would be used to surround us, support us and promise us for a better urban experience. Will everyone get the benefit from the technological transportation advances or will it be accessible only to those who have the resources or knowledge to use them? Therefore, 'how' is the **crucial key for smart city/mobility** solutions. However, in a rush for the smart cities, we are seeking for wrong questions.

"Smart cities" has become a **buzzword in India** since Prime Minister Narendra Modi outlined his vision. But the smart cities **ambition remains elusive in the Indian context** as cities in India face a range of challenges to meet demand and supply gaps in urban regions in areas such as water, waste management, energy, mobility, the built environment, education, healthcare and safety and if timely and adequate action is not taken, these challenges may worsen and could derail India's growth (world economic forum, 2016). **Ironically, this is precisely why India desperately needs a system of smart(er) cities.** Delhi, which is a second most populous city in the world (world population review, 2019) has a car-centric landscape with trends of rapid urbanization, rapidly growing economies and high level of transport related problems such as pollution, accidents, and congestions, which has an adverse impact of urban quality of life.

Can technology allow us to rectify the mistakes of the past? What **new possibilities** will exist with the creative use of technologies? What is the 'value' which smart mobility will provide to Delhi? To accomplish the **inclusivity** in mobility, we need to ask if this is the role we want mobility to play then how do we ensure things are in place for this to happen? **Smart mobility for whom? Cities for whom?** The question is **not** how do we make my city smarter by smart mobility? or even 'how do I make it more efficient?' Rather we should ask, 'how can smart mobility be implemented in the places like Delhi where planning is both essential and broken? How can the **gap between the bottom up and top-down initiatives** be reduced? Does smart mobility provides solutions for the transportation problems in Delhi or does it raise the questions of resistance of being 'alternative smart' with a power of 'image'?

2. Smart Cities

2.1. Definition

Despite the ongoing discussions over the past few years, there is no agreed definition of a 'smart city.' The label "smart city" is a fuzzy concept and is used in ways that are not always consistent. There is neither a single template of framing a smart city, nor a one-size-fits-all

definition of it (O'Grady and O'Hare, 2012). There is still confusion about what a smart city is, especially since several similar terms are often used interchangeably. **Collective smartness** is an important aspect of smart cities because it supports creative human capital, learning, technological development, and citizen participation. The definition of 'smart city' is not just based on the use of 'ICT.' According to Hollands (2008), the smart city is based on "urban labeling" phenomenon that downplays some of the adverse effects networked infrastructures on cities. Cities by nature are supposed to be smart, creative and cultural, and by using this marketing label a disjuncture between reality and image is created (Hollands, 2008).

2.2. Frameworks

Smart city is defined in three ways- technology- oriented vision, approach oriented vision and service oriented vision.

- **ICT oriented vision** system which interconnects to promote optimum performance & efficiency to create 'systems of systems'.
- **Service oriented vision** which further consists of dimensions of Smart Economy, Smart Governance, Smart Mobility, Smart Environment, Smart People and Smart Living for self-decisive, independent and aware citizens.
- **Approach oriented vision** which empowers the collective intelligence and in co-creating capabilities of the 4P model public, private, people and partnership.

3. Understanding the Indian Context

3.1. Urbanisation in India

Urbanization is one of the biggest challenges which both developed and developing countries across the world are facing. In 2015, the urban population in India was 410 million people (32% of the total population) and was expected to reach 814 million (50%) by 2050. Three of India's metropolitan areas are among the most populous in the world: Delhi (25 million), Mumbai (21 million) and Kolkata (15 million) rank 2nd, sixth and 14th, respectively (WEF, 2016). This 'disordered urbanization' is indicative of the failure to adequately address congestion constraints that arise from the pressure of urban population on infrastructure, essential services, land, housing, and the environment (Velmurugan, S. et al., 2016).

3.2. Emerging urban landscape of India

According to World economic forum (2016), the landscape of India has undergone a dramatic change between 2004 -2014 where India witnessed an increase in urban population from 14% to 27% while the rural population grew only 8%.

This shortcoming is due to the weak local governments and the complex urban regime, which prevails in the cities.

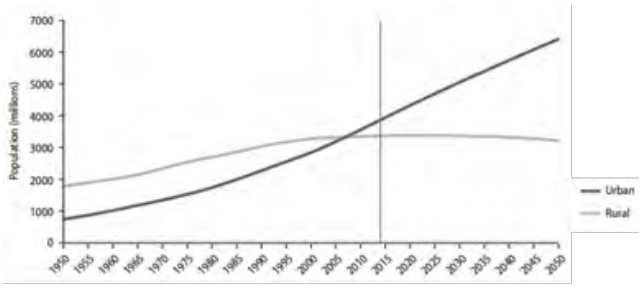


Figure 3 Urban and rural population of the world. World urbanization prospects, 2014

3.3. Why Delhi is a special Case

New Delhi, India's capital, is of particular interest not only because of the high level of air pollution and traffic congestion but also because of the exposure levels experienced by a population of 18.6 million. Delhi has astounded the World with its transformation, from feudal backgrounds to modernity, Delhi with its rich past is the perfect contrast between Occident and the Orient. It is a relevant example of a city that responds to the dualities of urban India while keeping its physical form legible. The government of India launched the scheme to create hundred smart cities across the country where the national capital Delhi was chosen to be the frontrunner to decongest national capital and facilitate modern abilities despite its limitations in the current scenario of economic & environmental performances & people's perceptions.

Spatial structure - According to Delhi development authority (2014), Delhi has grown as a borderless city where the urban agglomeration area has increased from an ordinary 43.2 sq. Km (1901) to 888.74 sq. Km (2001) while the density increased from 5501 (1901) persons per sq. Km to 14521 (2001) sq. Km.

Economic Profile - Delhi is India's second largest economy with per capita income of € 4125 (2018) which is three times higher than the national average. The gross state domestic product (GSDP) has recorded a growth rate of 8.14% and presently is € 93.2 billion.

Governance complexities - Delhi faces complex issues in an administration with the government running at three different levels- macro, state & local body. The New Delhi municipal council is one of the five urban local bodies in the national capital territory (NCT) of Delhi, while the central government has most of the controlling power.

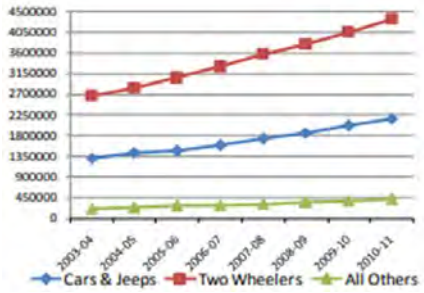
3.4. Urban Transport Scenarios in Delhi

Delhi seems to lack an institution that holds an overarching responsibility for managing and coordinating the entire transport sector. Delhi is in a situation where things need to move quickly for the present as well as precisely for the future for the safe travel with reduced level of pollution and congestion.

I. Emerging patterns and characteristics

Vehicle ownership-

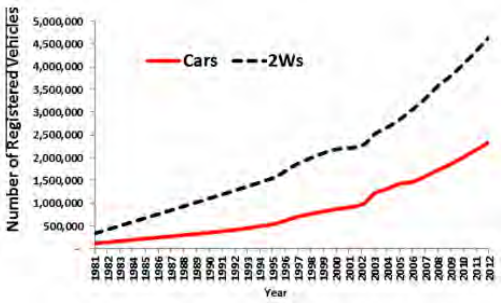
According to Delhi Statistical Handbook 2011, the vehicles in Delhi have grown at the rate of 7.41% per annum between 2003-04 and 2010-11 where the number of private vehicles has increased substantially from 3.98 million to 6.52 million during that period where the growth rate of commercial vehicles (9.42%) is higher than the growth rate of private vehicles (7.29%).



S.N.	Category of Vehicle	No. of vehicles (in million)		Annual Compound Growth Rate
		2003-04	2010-11	
1.	Private Vehicles	3.98	6.52	7.29%
2.	Commercial Vehicles	0.22	0.42	9.42%
	Total	4.20	6.93	7.41%

Figure 2- Vehicular growth in Delhi, Census of India, 2011

II. Vehicle density



The vehicular population o Delhi has increased by more than nine times from 1971 to 1991 whereas the road length increased by only 206 times which has resulted in high vehicle density because of reduced vehicular speed causing more extended time travel, accidents and extra fuel consumption (Kumar et al., 2002).

Figure 3- Vehicle registration in Delhi, Census of India, 2011

III. Travel demand

Sl. No	Mode of Transportation Facilities	2001			2011		
		Rural	Urban	Total	Rural	Urban	Total
I	No. of Households	169528	2384621	2554149	79115	3261423	3340538
1	Bicycle	48.70	36.80	37.60	44.20	30.30	30.60
2	Scooter/ Motor Cycles	20.70	28.50	28.00	38.50	38.90	38.90
3	Car/ Jeep/ Van	7.30	13.40	13.00	10.80	21.00	20.70
4	None of the Specified Mode of Transportation	38.90	43.40	43.10	34.70	37.20	37.10

The travel demand arose from 4 million trips per day (1994) to 20 million trips per day by 2011, in which the road based transport need to fulfil 12 million trips (403% increase) while the daily trips were 22.5 million in 2011(Kumar et al., 2002).

Figure 4- Distribution of mode of transportation in Delhi, Census of India, 2011

3.5. Transportation problems in Delhi

Road congestion

The increases in population directly co-relates to the average travel distance and intensity. The average trip length for Delhi is around 22 km and this trend in trip length and frequency is only expected to increase with an increase in income levels, migration, participation of women and service-oriented economy but since more people travel over longer distances on a regular basis for employment and education purposes, it leads to road congestion (IIHS, 2015).

Parking problems

The acute shortage of parking spaces both on and off the street in Delhi increases the time spent in searching for a parking spot, which induces traffic congestion. 14% of road length in Delhi used on-street parking, and the public parking charges are fixed and low (€ 0.13 for 8 hours) (IIHS, 2015).

Air pollution

Delhi's air quality has become worse than before. According to the Environment Pollution Control Authority (EPCA) report for the decade 2002 to 2012 shows that the number of vehicles increased by 97 percent, contributing enormously to pollution and direct exposure to vehicular toxic fumes to nearly 55 percent of Delhi's 17 million people who live within 500 meters from any roadside (CSE, 2014).

3.6. Barriers

Based on the literature study and expert interviews, the barriers (Rana, NP et al., 2018) which hinders the smart mobility in Delhi.

	category	barriers	description
1	Governance	Lack of cooperation and coordination and confused priorities & inefficient inspection Strategies	Lack of co-ordination and confused priorities
		Institutional gap & unclear vision (for IT management)	Multiple agencies with multiple mandates & lack of vision on how IT management can be imposed
		Political instability & lack of trust (between governed and government)	Until there is political stability, smart cities Delhi cannot become a reality
		Poor private-public participation & lack of development of common information system model	Poor PPP interaction creates negative impact but to ensure end-to-end visibility, a common model is missing.
2	Economic	Shortage of High IT infrastructure and intelligence & lack of competitiveness	Lack of IT infrastructure and capabilities of artificial intelligence & lack of competitiveness lies within the local firms
		Cost of IT training and skills development	High cost of IT training and skills development programme to the IT professionals
		Global economy unpredictability & higher operational and maintenance cost	Increasing instability, uncertainty in the global economy & high maintainance cost is a concern
3	Social	Lack of citizens participation/sense of ownership	Lack of citizen's engagement in realising the smart cities according to their experience
		Low-level community awareness, Increased cost of travel for economically low class & geographical diversity	lack of understanding among the public towards the idea of smart city and its implications but due to lack of public supportnn & obstruction due to unbalance
		Degree of inequality & rise in traffic congestion	High degree of inequality lies within citizen's education and increase in the usage of private transportation
		Changing lifestyle, demand for customer groups	Cause poor customer experience if their demands are not met
4	Technology	Lack of technological knowledge among the planners	Lack of enabling or transformative technological knowledge within planners and policymakers.
		Lack of access to technology	Lack of access to modern digital technology to majority of citizens
		Lack of technological knowledge among the planners	Lack of enabling or transformative technological knowledge within planners and policymakers.
		Lack of access to technology	Lack of access to modern digital technology to majority of citizens
		Privacy and security issues & System failures issues	Issues related to privacy and security tend to be a major concern for smart cities development
		Lack of integration of IT solution with public transportation & poor data availability and scalability	Integration of IT solutions with public transportation is missing & lack of specific data and corresponding scalable methods
5	Environmental	Growing population & lack of ecological behaviour in practise	Rapid increase in population & lack of ecological view in pro-environmental behaviour for consumption.
		Influx of intermediary public transport (IPT) & rising vehicular Pollution	IPT services like auto rickshaws, e-rickshaw, and cycle rickshaws adds congestion – flouts traffic & ever-increasing number of diesel vehicles due to subsidies on diesel has again led to high levels of air pollution
		Urban sprawl,mobility needs & lack of sustainability	Lack of awareness about sustainability
		Carbon emissions effect & degradation of resources	lack of strict emission checks and control have led to increased carbon emissions and noise pollution
6	Legal and ethical	Cultural issues (demographic pattern) & perception of the status & aspirational nature	Lack of inflow of creative & sharing culture of the people living together & vehicle ownership behaviour
		lack of women safety, road safety & standardization	Lack of gender based infrastructure and increased number of deaths due to road infrastructure
		Issues in openness of data & lack of transparency and liability with regulatory norms, policies and directions	Open data and its accessibility can obstruct the smart city services delivered to cities residents and business & lack of transparency and unclear lines
7	Physical	Insufficient infrastructure, incomplete last mile connectivity & Poor infrastructure for NMT	Lack of inflow of creative & sharing culture of the people living together Insufficient cost advantage & unsafe and inadequate infrastructure

Table 1: Barriers in the India to adopt smart city principles quickly

3.7. Megatrends influencing smart mobility

Following key technologies can bring a range of new functionalities to reduce congestion, bring the social and economic changes for future of mobility 2040 for Delhi.

- Automated Vehicles
- Next generation connectivity using ICT
- Intelligent processing using Big Data and User applications
- Internet of things
- Innovative materials and Sensors in infrastructure
- User centred
- Pricing and payments
- Public and private innovation

4. Analysis

4.1. Annual household disposable income

	2015 - 2025	Category	Income	Characteristics	Categories
1	-13%	Deprived	<$ 1969	Poorest Group	Engaging in un-skilled or low-skilled activities
2	-7%	Aspirers	$1969-$4376	Struggle to live comfortably	Small-time shopkeepers/ service workers
3	+13%	Seekers	$4376-$10,941	Varied in employment, attitude, age and other factors	- Mid-level government official - Traditional white collar jobs
4	+8%	Strivers	$10,941-$21,882	Very sucessful Financially stable	Businesspeople/ traders Established professional/
5	+1%	Global Indians	>$21,882	New breed of upward mobile-mid-level executives	Senior corporate executives/ large business owners

Table 1: Comparable from Deloitte, McKinsey & Company, Rise -Indian consumer market 2007

4.2. Existing Personas

Figure 5- Analysis of 10 different existing user journey on their painpoints & future goals

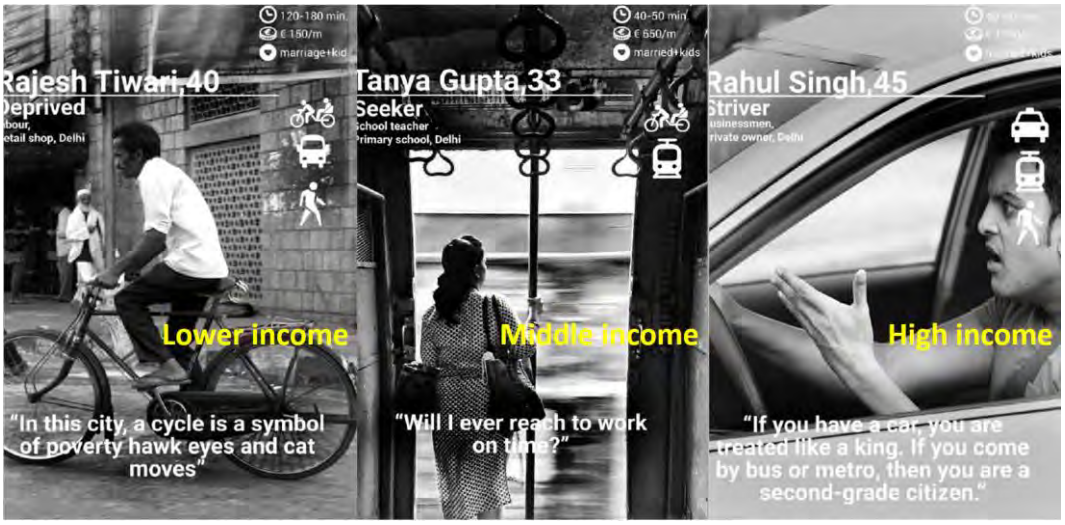


Figure 6- Three classifications of existing users based on income scale

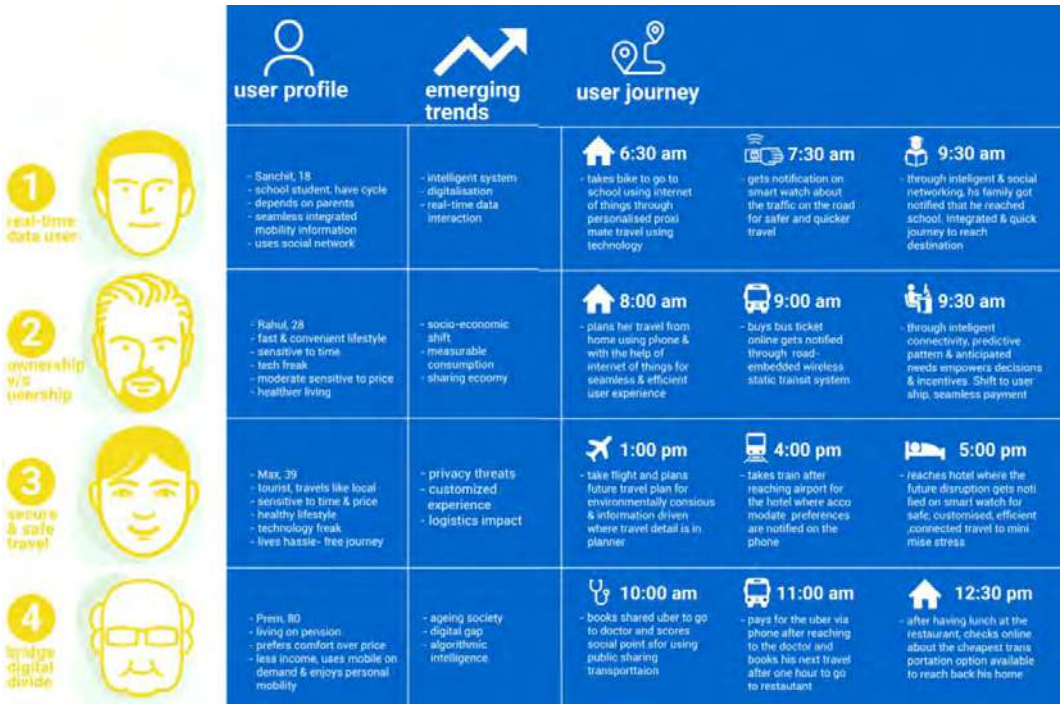


Figure 7- Future User journey based on the emerging trends

5. Recommendations

Future Scenario: Live Glocal

Though it's difficult to make detailed predictions for the future of mobility, but it's not so hard when current trends are grouped with features of being enormously networked, integrated, dynamic pricing, user-centered with the development of both public and private stakeholders since we have to recognize that no single solution would save transportation from in this rapidly urbanizing and complex world. This scenario is notable by the lower per capita travel and the high use of digital substitution of ICT, user applications and internet of things for travel. **Changes in the environmental and social behaviour** for travel demand is visible with focus on uplifting the informal transportation, increased employment, and last mile connectivity. In this scenario, automation is not widely adopted by the public. The future of mobility is likely to be fundamentally based on broadly connected vehicles, or "the internet of cars", prices as per demand and supply; and transportation decision making through social networking but would be highly dependent on the interplay of various stakeholders from public (government, institutions) and private sector (manufacturers, entrepreneurs) as reflected in the scenario below. What will be the possible steps to reach there?

Economic Trends

11,000 new e-rickshaws are expected to ride on the streets of Delhi every month by 2021 where annual sales are supposed to increase by 9 percent making it €1.32 billion markets (Economic times, 2018). However, with increased demographics by 2040, the demand for informal transportation using ICT would be increased and thus encouraging an affordable ecosystem of technology.

Technology

The E- mobility is shaping the informal transportation for Delhi with the increased use of E-rickshaws, thellas, etc. which play a significant role for enhancing the last mile connectivity and thus improving the air quality of Delhi. Technology-driven trends like electrification, shared mobility and connectivity would be a disruption in this scenario. However, due to several loopholes, initiatives have to be taken by the government to improve the informal transportation sector (Down to earth, 2018).

Travel implications

Though the travel will be much more expensive by 2040 in this scenario for informal sector due increased road pricing, digitalization, higher travel demands but a change in the acceptance and commuter's behaviour would be visible due to improved technological advancement in transportation industry with rising in ride-sharing apps, travel information applications with increased user's experience and seamless travel.

5.1. Step: 1- Dynamic payment

Transportation industry is moving towards the notion where services will no more be priced statically due to widespread of mobile technology, location-based services, and predictive forecasting will allow to pay actual costs of the services used where the price (supply) would be based on the demand which will allow the users to make **better decisions** about their travel as per their needs. This will allow the commuter to choose their between the lowest cost and quickest routes with the help of real-time reporting traffic conditions for their final destination.

Figure 8- Dynamic payment

Concern

- Who would be in charge to determine the difference between the benefits, loses/ negative impact of the system where the providers have set the prices as per the demand, and other considerations of the services on their own? What will be the overall impact for setting the prices as per demand?
- Should there be a potentially competitive market for the mobility as a service or should the pricing be dependent on the community or economic background of the social group for the commuter?

How to get there?

- By exploring new payment business models
- Promoting digital payments
- Predicting about the needs and desires of the future transportation market

5.2. Step: 2- Social Move

Existing transportation systems lacks in connecting all the various transportation system directly but with the rise of networked cars, awareness, social network, the future of transportation will be based on socially informed decisions of the communities, government, traffic controllers, **real-time travel conditions** and community values from people who have already used it for experiential travel. Creating **gamified experience** which encourages fitness, saves money and provide business benefits and loyalty with the users to the services.

Figure 9- Social move

Concern:

- Difficulties in getting a holistic view as information would be scattered and based on the decisions of various people.
- Might create differences with the people who will not be able to attend the network or lack the ability to influence or engage to become second-class inhabitants. Will these people be able to take the benefit of such social network system?

How to get there?

- Analysing the changing behaviour and designing user-centric solutions
- Providing social points as incentives and creating a gaming experience for users which allows to compare their social points for changed travel behaviour

6. Conclusions

Cities are dynamic. Cities are its people. It changes and adapts over time in response to economic, political and environmental shifts where the infrastructure is not the driver but an enabler, a side effect or a by-product of people and culture.

However, a city cannot be 'smart' and inefficient at the same time and therefore, high activity is far more important than the big idea for enabling the citizens to make informed decisions. For smart cities, **context is more important than the product** but can this smart city be simply rebooted through the integration of digital technologies? Is this 'smart urbanism' branded, exaggerated in offering **'new possibilities'** for the future transformation of cities or it is a brain-dead idea of **'business as usual'** value propositions for tweaking the existing scenario through technology and influence from western countries? To access the technology advancements and its potential impacts for the society, monitoring of the future technologies is substantial because technology is not the **'shortcut for development'** but it **'can be an accelerator.'**

As transportation is the **backbone** of economic, cultural, social and industrial development, the transformation of existing urban areas to mitigate the existing challenges in a traditional society like India was a concern despite its rising economy and therefore understanding the existing spatial dynamics, hopes and fears about the technology, core needs and expectations of the transportation users was accomplished by analyzing the existing user groups to propose the experiential design for users using technology and services. India gives the appearance of just waking up to the urban realities and the inevitable transformation awaiting its cities. India's attempts to urbanization have been at a snail's pace, and the smart cities mission seem to be a knee-jerk reaction to the sudden realization of not wanting to be left behind (Chandrasekar, S. et al., 2016).

Delhi is a paradox where despite the increasing challenges it provides opportunities to shape the future of mobility. **No single solution** can be recognised for the rapidly urbanising and complex mobility situation of Delhi as the innovations are rarely linked and optimized to provide convenient, practical, affordable and sustainable door-to-door trips for the users. Connectivity is the key, but accessibility is the goal for the future of mobility as transportation is a system, or rather a 'system of systems' which connects modes, services, technologies, and designs according to the purpose and needs of the people.

The **future of mobility** lies in the **seamless transportation experience** can be accomplished by physically connecting the transportation modes and services for the community, bringing together the telecommunications framework which offers real-time information of availability (departures and arrivals), access to affordable or convenient ride and quick payments. In some places, it is almost therein Delhi but not evenly distributed. It can be achieved through **connecting** Spatial (physical linking the transportation modes), component (enhancing the accessibility capabilities with improved infrastructure), technological (technologies to support multi-modal transportation for seamless experience), institutional (transforming collectively on local and regional level with the help of planners, city officials, innovators, etc.) and economic (developing new business models, creating jobs and increasing competitive market) optimisation of Delhi

With the shifting mobility needs and customer expectations, the future of mobility has to evolve and adapt to provide intelligent connectivity for enabling effective, seamless and end-to-end journey experience. Analysing the existing users' needs and desired helped to explore the future user journey under the themes of user-ship vs ownership, big data eco-system, Bridging digital divide and safe travels to engage the range of issues: enable better choices with smarter decisions; predictive dependable and productive mobility; cybersecurity; public safety; and mobility opportunities for everyone where distinct stakeholders like users, municipalities and owners/operators play a critical role for a safer, healthier and better user journey experience.

Live Glocal scenario describes a future of moderate growth in which incomes do not rise quickly in future informal transportation but high usage of technology for travel steered the economy towards a more sustainable path for growth and enacted constraints on vehicle ownership and driving to try to reduce their negative impacts which results in a future of strong travel demand across all modes of transportation and improved last mile connectivity. **Dynamic payment and social transport** to widen the recognition of 'information everywhere' to disrupt the transportation status quo and bring new ways of using existing infrastructure more efficiently with high speed and offers the chance to

rethink the existing challenges for mobility of Delhi and prepares the eco-system with set of features. Through reshaping how urbanites in Delhi would get around by introducing mobility as a service and collective intelligence of the citizens might help in making better decisions but cities will need to explore the digital mobility platforms to accelerate the realization of the integrated transportation system.

Successful urban planning process can be creative, flexible and democratic because reality comes into being through interaction. However, the more significant question lies in what is next for the smart city in India? Smart cities will not be a recipe for social segregation only if inclusivity is considered along with the booming of technological development has encouraged multiple vision for urban futures of India and analyzed the 'surface' of many cities but there exist troubles with determinism and attitude of government towards the socio-political changes and consequent ways of owning and managing the initiatives as this give rise to the **'classic dilemma'** for urban space and governance which affects the lifestyles of the emergence of the information society. Does this 'virtually enhanced city' in which we would live and communicate need more control or does it need more open participation? How can these two aspects be integrated? Should the smart city's ethos be oriented towards service provision with better city management or should it focus on enhancing the social and political linkages for public discourses? Does the policies and technological initiatives aim at the 'end-users,' or it is aimed by the 'actors and owners' of the city?

Technology will only enhance the future of smart mobility if the technology works around the **'existing behaviors'**. Technology is interesting and is the future only when it interacts according to the human understanding and therefore, understanding the value exchange is important which can be implemented by encouraging gamified experiences that is helpful to get the loyalty of the services using the long-term relationship and big data. Though the future lies in the hidden connections as it is not difficult to change the city but to change their **mindsets**. Therefore, evolving a mobility landscape after understanding the patterns of consumer behavior and analyzing how to build the services around the existing infrastructure with **'on-demand'** and personalized mobility services also known as **'mobility as a service (MaaS)'** will unlock the potential for innovation for the city to function on a larger scale.

Things which are hardly mentioned in the 'smart cities propaganda' is the 'other side of the city' and therefore the 'branding' of smart cities have to do by keeping and creating the spirit and emotions of India. Who wants smart cities and who does not want to be seen as being smart? Does the discourse of smart in India explore the **global explorations** with the value of smart cities or with the needs and realities or urban India? In order to understand the algorithmic urbanism of smart Indian cities, the examining of the politics of a country is essential. What is next to cities or what could be next for cities if we dare to reimagine ourselves? What is next for the future of mobility? Are we there yet? **Will Delhi be a city of things or a city for people?**

7. References

Alice Charles: India wants to create 100 'smart cities' - how can it get there? World economic forum, 2016

Baindur, Deepak: Urban Transport in India: Challenges and Recommendations. India, 2015

Delhi Development Authority (2014) Ministry of urban Development, GOI Draft Master Plan for Delhi 2021

Hollands, R: Will the real smart city please stand up? Leuven, 2008.

Komninos, N.:"Intelligent Cities and Globalisation of Innovation Networks", London and NewYork, Routledge, 2008.

Kumar, Sujeet: Indians promised benefits of 100 smart cities, but the poor are sidelined again. India, 2018

Mitchell, W. J.: Intelligent cities. Knowledge Society - Universitat Oberta de Catalunya, 2008

Rana, Nripendra P.; Luthra, Sunil; Mangla, Sachin Kumar; Islam, Rubina; Roderick, Sian; Dwivedi, Yogesh K. (2018): Barriers to the Development of Smart Cities in Indian Context. In Inf Syst Front 37 (3), p. 99. DOI: 10.1007/s10796-018-9873-4.

R.G. Hollands: "Will the Real Smart City Please Stand Up?" City: Analysis of Urban Trends, Culture, Theory, Policy, Action 12: 3 (2008) 303–320.

Velmurugan, S., Ravinder, K., Madhu, E., Nataraju, J., Sekhar, C.R., Kumar, P.V.P., Kumar, R., Umat, S.K., 2012. Evaluating Bus Rapid Transit (BRT) Corridor Performance from Ambedkar Nagar to Moolchand, Delhi (No. Final Report). Central Road Research Institute, Delhi.

8am-8pm is new 'Delhi rush hour': CSE study - Times of India. India, 2017

Research Paper

The Value of Less and Small: Transforming Metropolitan Doha into Connected, Human and Resilient Urban Settlements

TITLE

Subtitle

Ali ALRAOUF, Prof. of Architecture and Urbanism; Qatar

Abstract

Qatar is one of few Middle Eastern oil producing countries that realized the vitality of a needed swift transformation from resources to knowledge economy. Until a few decades ago, Qatar was dominated by nomadic people whose livelihood depended on fishing, pearling, camel breeding, and fishing ships building. However, the discovery of oil and gas has encouraged not only socio-economic change, but environmental change as well. The discussed account will cover the main strategies adopted by the country to create a distinctive model of development in the Middle East. The study also analyzes the shift over the past decade which reveals how Qatar views investments in knowledge-based urban development as essential vehicles to survive in a globalized and competitive world. More significantly, the study illustrates an interesting form of urban resilience in the face of major challenges which faced Qatar in the last decade including, winning the bid to host the FIFA World Cup 2022, the decline of oil prices and the air, sea and ground blockade imposed by its adjacent neighbors. The study sheds light on different urban planning strategies and policies adopted to shift the focus from creating a mega city with an image which resonate with typical global cities to a more sustainable, resilient, knowledge-based and decentralized urbanity. The model of Qatar is analyzed holistically in the paper to go form the strategic planning decisions all the way to case studies and best practice planning projects. The study demonstrates how Qatar has captured the world's imagination by balancing global aspirations and local necessities in a sustainable and resilience context. This paper examines a framework for city and urban regions inspired by the theory of placemaking and its relevance to the boundaries of human urbanism. The paper sheds new light on the transformation of the city from a metropolitan exploiting the oil and gas revenues to a multi-centered model of urbanism. In doing so, the city adopted a number of significant strategies include the well distributed livable urban centers, transit-oriented development, introducing compacted urbanism and encouraging models of mixed use development. The paper concludes with a planning matrix which suggest that for Qatar, adopting such strategies and the deliberate move towards multi=centered urbanism is inevitable in the age of post globalizing world, the need for an urban human scale and the challenges of post-Carbon paradigm.

Keywords

Metropolitan Doha, Urban Resilience, Doha Sustainable Development, Transit Oriented Development.

1. Resilience in Urbanism and City Planning

1.1. The Conceptual Discourse

The holistic understanding of urban resilience resonates with the Sustainable Development Goals (SDG) as compiled by the UN Habitat. Particularly, goal 11 suggests the importance of creating inclusive, resilient, sustainable and safe cities. This paper provides an overview of the development of the resilience concept in the domain of urban development and planning. Over the last two decades the concept of resilience has experienced escalating interest. However, due to a lack of consistency in defining and measuring this theoretical construct within and across disciplines, the recent explosion of literature on resilience has contributed more to confusion than clarity among researchers and policy makers. The notion of resilience is gaining increasing prominence across a diverse set of literatures on cities and climate change. Although there is some disagreement among these different literatures about how to define and measure resilience, there is broad consensus that: (1) cities must become resilient to a wider range of shocks and stresses in order to be prepared for climate change; and (2) efforts to foster climate change resilience must be bundled with efforts to promote urban development and sustainability (Leichenko, 2011). Resilience is the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to, and recover from the effects of a hazard in a timely and efficient manner (Jha and al., 2013). (Pizzo, 2015) problematizes the introduction of the concept of resilience into the planning domain from three main starting points: 1. The nature of the events which are said to require resilience; 2. The different nuances in meaning that resilience assumes according to those different events, and 3. The theoretical and operational problems the concept entails. The paper sustains that multiple sub meanings are embedded within one interpretation of resilience that leave the concept open to rather large margins of ambiguity, which emerge considering its operationalization. The concept seems to fit and to be appropriate within different paradigms, planning traditions and policy frameworks. Its alleged 'neutrality' is one of the main reasons of its pervasiveness, but also of its ambiguity, showing latent controversial implications, which are progressively emerging in critical planning theory. Hence, the interpretation of holistic urban resilience should start with the people and their social dynamics. Here, the notion of the interaction between the people and the city should be based on concepts like just city and cities for all without any form of segregation or marginalization.

Hence, the paper calls for a need to revisit the concept and its utility to the prosperity of cities. However, resilience has been closely associated with sustainability for more than a decade, although without precise meaning and often as an additional label attached to pre-existing research (Timon, 2014). Urban resilience is a broad concept that is sometimes blurred and abstract. Part of the effort to render the concept to a clearer interpretation is first to assert that Urban resilience addresses adaptation as well as mitigation. It is associated with spatial planning policy-making in the context of different levels and forms of uncertainties. Therefore, urban resilience provides a new way of framing and responding to uncertainty and vulnerability. Considering this interpretation, urban resilience offers an alternative paradigm for planning strategies.

Figure 1 The urban growth of Doha witnessed unprecedented rates due to the use of oil revenues in reshaping the image of the city at the end of the twenties century. The city moved through a decade of change from 1995-2005.

2. The Narrative of Qatar: Qatar's Context and Territorial Background

2.1. The Contextual Understanding

Qatar is a peninsula in the east of Arabian Desert and covers an area of 11,437 km2, with a coastline of 563 km. The country is a mostly low-lying and flat stretching into the Gulf from the lands of Saudi Arabia. Until few decades ago, Qatar was dominated by nomadic people whose livelihood depended on fishing and pearling. However, the discovery of oil and gas has encouraged not only socio-economic changes, but urban and environmental changes as well. The newly acquired wealth and associated development have not come without challenges. Since 1984 the population has grown from just under 350,000 to 1.5 million in 2008 and to over 2.2 million in January 2015 (Qatar Statistics Authority, 2015). Qatar's overall population witnessed unprecedented increase since 2010 after the declaration of the State's wining a bid to host the FIFA world cup 2022. The current population is 2.5 million, of which only around 15 percent are native Qataris. Today, the capital, Doha is home to more than 90% of the country's 2.7 million people, the majority of whom are professionals from all around the globe (QSA, 2015). Up to the mid-1960s, the majority of Doha's built environment was composed of traditional houses that represent local responses to the surrounding physical and socio-cultural conditions. During the 1970s and 1980s Doha was transformed into a modernized city because of extensive use of oil revenues in modernization projects particularly housing, infrastructure, roads and community facilities.

Figure 2: An aerial photo captured in mid-forties showing Doha's waterfront, AL Jessra Area, the cemetery and Al Khot Fort (Source: Ministry of Municipality -MME).

2.2. The Post-Independence Paradigm

Qatar was under the British Protectorate from the year 1916 and gained independence in 1971. Since that time, it has been going through tremendous growth in different sectors. This growth has mainly been facilitated by the country's massive oil and natural gas reserves. The revenues have been used to streamline sectors such as health, construction, education, financial, and manufacturing. Conditions for doing business are friendlier as there is no income tax and corporate tax for domestic firms, but only foreign firms are charged a 10% corporate tax (Almfraji, Almsafir, &Yao 2014). Qatar is currently ranked among the highest GDP capita globally. The country has continuously experienced a high level of economic growth, averaging to 25.4% between the years 2004 and 2012 (World Bank, 2013). The economy in Qatar is diversified into various sectors, all of which contribute significantly towards achieving the growth of the country. Even tourism, especially in the last decade, is becoming one of the main platforms for diversifying Qatar's post-oil economy (Phelps, 2013). Over the past decade, Qatar has become one of the major world producers and exporters of Liquefied Natural Gas (LNG). The wealth produced by Qatar's oil and gas exports has generated a construction development boom in the capital, Doha, and the surrounding vicinity. This resulted in significant growth at all levels from urban development and infrastructure provision to cultural, recreational, health and educational facilities.

Figure 3: The patterns of accelerated growth in Doha resulted in uncontrolled urban sprawl which created a major challenge for the city's urban future.

2.3. Moving Towards Knowledge and Creative Economy: From Oil to Knowledge

Qatar has embraced the idea of developing a knowledge-based economy and successful steps have been implemented. One example of this is the support of human capital development in the founding of the Qatar Foundation in 1995 with a fund of $2 billion and in 2009/10, education accounted for 13% of government expenditures. Qatar Foundation supports education, research, capacity building and open dialogue at all levels, supporting activities such as the Doha Debates and Al Jazeera television station. Al Jazeera, an overwhelmingly successful Arabic language news channel, has provided a forum for open discussion and criticism. In terms of Qatar's National Vision 2030, the security of the peoples' standard of living is to the fore, but the government realized that this cannot be the main and only goal of a country. With the focus on its values, Qatar has to balance some further challenges: modernizing traditions while ensuring their preservation, serving the needs of this and future generations, managing the country's growth and expansion, controlling the targeted size and the quality of the expatriate labor, going a path of development that is compatible to it, managing the economic growth and the social development and protecting the environment (J. Gremm et al., Transitioning Towards a Knowledge Society, 2018). To resolve these challenges and to fulfill the transformation of Qatar into an advanced country until 2030, the government outlines and promotes four pillars that the Vision rests on.

Qatar leaders are convinced that post oil paradigm is becoming a reality. Hence, moving from industrial economy to knowledge economy is a global and inevitable transformation which requires understanding and better engagement. Therefore, Qatar National Vision 2030 (QNV) was articulated to construct a roadmap for the alternative future of the State. The vision outlines the development of Qatar over the next twenty years. The QNV 2030 is based on four supporting themes: human development, social development, economic development and environmental development. To facilitate the realization of QNV, Qatar is positioning itself as a knowledge-based society, principally in the fields of education, research, energy and technology. Qatar is determined, due to its awareness of the swiftly arrival of the post carbon era, to diversify its economy and go beyond the total reliance on oil and gas. The plan is to educate and train nationals properly to pave the way to a global knowledge society. This proves that the willingness to pursue the status of a knowledge and creative city definitely exists. According to Stephenson and Al-Hamarneh (2017) despite the fact that Qatar has been rapidly modernized, it has not enough developed to be considered an international tourism destination. Nevertheless, hosting mega events like the 2022 FIFA World Cup will motivate Qatar to work on developing different tourism types such as ecotourism. For this reason, Qatar has established and developed different ambitious goals of tourism development by adopting a strategy called Qatar National Tourism Sector Strategy 2030 in the year 2014.

Figure 4: The iconic development in the real-estate sector which characterized the pace of development in the beginning of the third millennium as a reflection of globalization.

3. Towards a Holistic Urban Planning Framework

3.1. Subheading 3.1

Through the wise insights of His Highness Sheikh Hamad Bin Khalifa Al-Thani, Father the Emir (AlAmir AlWaled), a National Vision (Emir Decree No. 44 (2008)) has been prepared to set out the long-term direction for the country, to inspire its people and to develop a set of common goals related to their future.

"The National Vision aims at transforming Qatar into an advanced country by 2030, capable of sustaining its own development and providing for a high standard of living for its entire people for generations to come." (QNV, 2008). In December 2006, Pacific Consultants International (PCI) provided a proposal for Qatar National Master Plan (QNMP). The suggested QNMP was needed to cope with the long-range strategic vision of Qatar. The physical development was not only considered but also economic, social, cultural and environmental factors and challenges were included and confronted to guarantee the comprehensiveness of the proposed plan. Consequently, the Oriental Consultant (OC) was hired to prepare a comprehensive urban plan for Qatar. QNMP is to guide urban development for the State over the next 25 years. And comprehensive development scheme is the main tool that will benefit all segments of society. On a strategic level and to translate QNV 2030 and other national policy directions into physical and spatial development plans, policies and actions for implementation, a structured process was used to prepare the Qatar National Development Framework (QNDF). The QNDF provides the framework for managing growth, change, land use and development in Qatar to 2032. The QNMP is the spatial representation of the QNV2030. The QNDF sets the strategic framework for sustainable development and provides plans for the country, for Metropolitan Doha and for the Municipalities that make up the nation's principal administrative structure (QNDF, 2016).

Figure 5: Qatar national spatial strategy 2032 where Metropolitan Doha is subdivided using the concept of hierarchical urban centers (Source: QNDF, MME).

3.2. Contesting Doha's Model of Resilience

In this section, an analysis of the most dominant forces that challenged the development of Doha city in the last decade will be provided. Hence, all the strategies, processes and policies which were adopted by the city will be shared to illustrate the city's resilience model. Interestingly, some of these dominant forces were celebrated like winning the bid to host the 2022 FIFA World Cup, while other were a substantial shock and have created a seismic impact on the city's people, economy and development. Doha was alert for the critical need for a flexible and dynamic approach to building resilience that goes beyond risk mitigation. Therefore, in the coming sections, three main challenges will be narrated and Doha's answer to each of them will be illustrated. Three milestones which are representing the most alarming challenges that Doha have faced in the last decade, analyzed in a chronological order. The analysis provided illustrates the wider interpretation of the challenges which require a resilient plan. The notion of city challenge is also extended as it doesn't all the time implies negativity. Cities need resilience also to deal with positive challenges facing its development and progress. Therefore, the milestones analyzed go all the way from economical threats, hosting a global event to a comprehensive blockade.

3.3. The Inevitability of the Post-Oil Paradigm and the Urban Planning

A major challenge which the paper addresses is the fluctuation of oil prices and how Doha is structuring a vison for the city in the post-carbon paradigm. Such a paradigm implies a move from oil-based economy to a knowledge-based economy and how to plan the city to facilitate such a new economical paradigm. With an unprecedented financial resources, creative strategic thinking and political commitment, Qatar is constructing a new development and urban brand; Dohaization which is a brand but also a continuous dynamic process. The case of Doha is stimulating as new mega projects are made to pave the way for a new development vison structured upon the value of knowledge economy and knowledge-based urbanity. By any measure, Qatar's growth is phenomenal; in the past decade the population has trebled, and the size of metropolitan Doha has increased fourfold. From its humble origins as fishing and pearling village, Doha has emerged as an expanding world city, where ambition and means are fuelling exciting experiments in education, health, sports and culture (Framherz, 2012; Jodido, 2014; Alraouf, 2016).

For a better understanding of how Doha came to structure its current identity, an investigation into the State's main strategy and the articulation of Qatar's role regionally and internationally is crucial. In this section, we will discuss the State's main strategies which affected the development of Doha. The Paper sheds light on the concept of Doha's attempt to construct a new identity which transcends the model that was created by Dubai's iconic development and real-estate fantasies. Then, the notion of knowledge economy as adopted by the State and clearly articulated in QNV 2030 will be analyzed to illustrate the quantitative and qualitative shift towards knowledge-based urban development in Doha. Evidently, in the last decade a new pattern of planning interventions can be clearly observed in the urban fabric of Doha. These new interventions described as the city's mega projects due to its size, location, population served and visual and urban impact.

4. Beyond the Metropolitan

4.1. Deconstructing the Metropolitan: Introducing Hierarchical Urban Centers

Doha's future urbanity is crystalized around the move from centric to polycentric urban planning. One of the most significant strategies adopted to deconstruct the metropolitan extended boundaries which was created during the years, is based on introducing the concept of hierarchical, vibrant and livable urban centers. The centers were planned to have certain common attributes that are summarized as follows: The appropriate density, the distance between land uses and community needs, the diversity represented in the mixed-use developments and finally the design and place making approach which would focus on public spaces, streetscapes and the ability to accommodate multiple forms of transportation. The significance of the previous attributes is manifested in the urban independence of such center in proportion with the relevant community it serves. More importantly, centers planned as such facilitated introducing the concept of transit-oriented development (TOD) and the move towards reliance on public transportation. Evidently, the future growth of Doha includes multi urban centers. In addition to their strategic locations, the relationship of these centers to each other and to their service catchments in a hierarchy and the mix of uses that exist or can be guided to each center in the future are major elements of the QNDF National Spatial Strategy.

As clearly explained in the QNDF, the hierarchy of centers was identified using a sequential strategic assessment based on five key criteria:

- Level of existing population and employment density, economic investment and infrastructure.
- Level of existing Government/Municipality office and community facility provision.
- Potential accessibility to the future strategic transportation Network.
- Proximity of committed mega projects or other major Government developments including Qatari national housing schemes.
- Availability of vacant land and potential for regeneration or urban infill.

This hierarchical structure promotes mixed-use, mixed density centers and enables more efficient and equitable use of national level investment in transportation and utility infrastructure, which in combination, provide the sustainable development pattern that the QNV2030 strives to achieve (QNDF, 2016 P.40)..

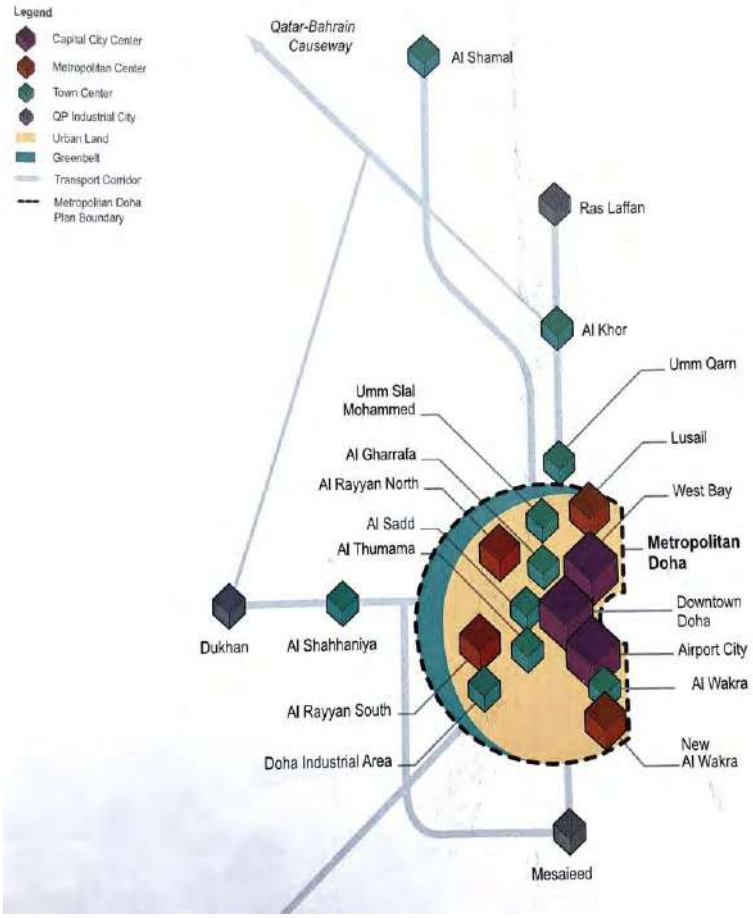


Figure 6: The Spatial Strategy Concept 2032 indicating the location and hierarchy of urban centers.

5. Less is Beautiful: Strategies to move beyond the Metropolitan

5.1. The Transformation from Car-dependent Sprawled Urbanity to Transit Oriented Development (TOD)

The Qatari society is in dire need to move from a car-based development to a TOD approach for the urban growth. The future plans adopted set of actions and policies to gradually encourage the needed transformation. These policies include; Vibrant Metro Stations, Accessible Public Transportation, Streets for People not Cars, Water Transportation and Connected Bike Routes. The aim is to establish a high quality and integrated public transport network that results in a modal shift from private motor vehicles to public transport across Qatar. Additionally, to ensure radial routes act primarily as public transit corridors designed to reduce private motor vehicle usage and environmental costs and promote orbital routes to aid the creation of balanced growth. For a more effective transit-oriented development and pedestrian-friendly cities in Qatar, a comprehensive plan to encourage bicycle riding was also prepared. The Qatar Bicycle Master Plan suggested the proposed Greater Doha bikeway network. Three categories of routs were suggested; green (Bicycle Paths) for recreational, blue (Cycle Tracks) for major transportation and red (Bicycle Lanes) for local transportation

(see map below). The form of urbanism which was produced during the availability of lucrative oil revenues was predominantly car-oriented urbanism. The whole process of Doha evolution was characterized by unlimited urban sprawl due to the population increase and the dominance of a single-family house as the only form of housing for Qatari families. These patterns of urban growth facilitated the unprecedented investment in roads network which can connect all such scattered urbanism. Hence, singles or Families, locals or expatriates consider private vehicles as the only form of transportation. While the local bus services company, Karwa, provides well-distributed routes all over the city but with the availability of cars, the cheap gas and lack of positive culture of walkability, people opt to use their cars in all their daily activities from going to work, dropping their kids at schools, buying groceries and recreation activities. More significantly is the social barrier towards public transportation as it becomes gradually associated with workers and low paid expatriates. On the other hand, Qataris were considering using public transportation in the form of bus riding as a social degradation and inappropriate behavior. With such background, the introduction of Doha's new metro will create a substantial change. The metro which is composed of four lines covering all of Doha's main destination and connecting the city with the airport, universities, industrial area, cultural facilities, shopping centers and main residential areas would be seen as an excellent solution for both locals and expatriates particularly giving the fact that commendable effort were invested to create state of the art transportation experience in the metro' stations, compartments and trains. The stations and trains are designed to accommodate the peculiarities of the cultural and social context of Qatar by providing privacy for families and women in designated sections of the trains.

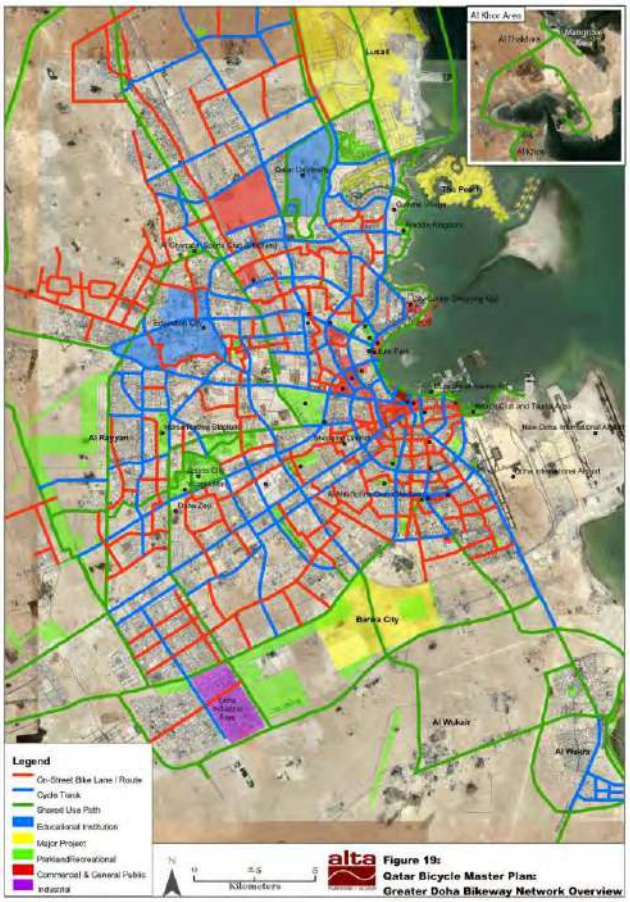


Figure 7: The Greater Doha Bicycle Network is based on three categories of Bicycle movement; Green: recreation, Blue: major street transportation and Red: local street transportation (Source: Ministry of Transportation).

Figure 8: The relation between metro stations and mixed use urban centers as a strategy to decentralize Doha and move towards small and compacted form of urbanity (Source: MME).

Figure 9: The post-oil urbanism suggests a paradigm shift towards walkability and transit-oriented development in Doha and hence Doha Metro is introduced as a main from of transportation in future Doha.

Encouraging Walkability and Livability

One the direction of urban development in Doha moved from horizontal expansion and unlimited sprawl to a multicenter urbanity which is based on the needs of the community, new values are injected in the Doha's urban scene. The principal two values introduced to the city of Doha are Walkability and Livability. Both are so interrelated and substantially support each other. To enhance livability, an emphasize on the social life in public space is becoming a priority. Public spaces -particularly lively streets and squares- among buildings enhance livability and help to animate the neighborhood. Open spaces have the role to make people passing near or stopping by and feel them welcome. Introducing the culture of walkability in Doha and doing the needed steps to have a truly walkable community, number of actions have to be made. Encouraging people to walk in the city requires positive infrastructure which includes wide vibrant sidewalks, nodes of commercial and recreational side activities, footpaths, safe pedestrian crossings exciting and informative signage, creative street furniture and more importantly shaded areas resulted from landscape features like tress or artificial elements like wooden or textile pergolas. Schemes to enhance public realm, streetscapes, open spaces, small parks or shaded town squares. The urban planning department in Qatar (UPD) is conducting a number of projects and studies to achieve these aspirations including the National Strategy for open and recreational Spaces, The National Urban Design Compendium, Streetscape Design Guidelines and National Landscape Guidelines for Vibrant Streets.

Figure 10: The different levels of connectivity which allow for an integrated and not fragmented urbanism.

Figure 11: Msherieb project as a catalyst for a new foprm of mixed use, walkable, livable and sustainable development creating a suburban center within the city fabric.

Figure 12 & 13: Creating Pedestrian friendly environments to encourage the shift towards walkability and vibrant public spaces (Source: Msherib Properties).

5.2. Doha as a Network of Knowledge-based Urban Development Centers

In a post carbon paradigm, Qatar's identity is articulated around the notions of knowledge, research and education. Qatar National Vision 2030 is a development strategy which outlines how Qatar will use the vast revenues from its hydrocarbon resources to transform itself into a modern knowledge-based economy. Within this understanding, the Doha's future was envisioned as a manifestation of the country's future vison. Hence the following actions were adhered: Engaging people in knowledge experiences, constructing an Urban Campus; a creative and inspiring urbanity and Establishing a Network of Museums, Galleries and Cultural Centers. Currently, Doha is considered by many indicators as the most advanced city within the Middle East to adopt knowledge economy as a conceptual base for its 2030 vision. Qatar did a radical transformation to go beyond the typical image of a Gulf city relaying on presumably endless assets of oil and gas. A move towards being a regional center for education, knowledge and culture is the new aspired sense of identity for the Gulf State. A major investment in knowledge-based urban development characterizes major projects in the country during the last five years (Alraouf, 2008; 2014). This new identity of Qatar paved the way for a new paradigm in Doha's urbanity which can be best described as the Knowledge-based urban Development Paradigm. Qatar has become a showplace for renowned architects, several U.S. universities have established campuses there, and it will host the FIFA World Cup in 2022. The quantity and the quality of architectural and urban projects which will be added to the city's urbanity to facilitate hosting the 2022 FIFA World Cup would make Doha a very unique world destination. Significantly, Doha has gained global significance through the growth of knowledge economy related projects. The city's new urban development and its spatial qualities contribute to the global attractiveness of Doha for knowledge economy investments, firms and people. Such urbanism fulfills the requirements of Knowledge workers coming to the city from literally every spot of the globe anticipating an attractive smooth quality of life which would foster their creativity and innovation. With increasing awareness about the carbon emissions and the negative impacts of climate change, the paper evaluates Doha's attempt to transform its urban movement pattern from purely car-dependent city to a model for a transit-oriented development with the vitalization of connected network of public transportation, pedestrian streets and bicycle routs. Doha's model of urban resilience as reflected in the city's masterplan is answering the fundamental question of how to design and operate the city, so it can withstand major threats and how to recover from them? Yamagata and Maruyama (2016) argue that land-use planning and carbon-neutral scenarios for urban planning are fundamental tools in urban management leading to a better urban resilience.

Figure 14 & 15: The new cultural centers help Doha in establishing a new form of Knowledge-based Urban Development (KBUD); the case of Museum of Islamic Art and National Museum of Qatar.

5.3. The Social Cohesion as a Catalyst for City Resilience

Many scholars in the field of urbanism, through their research, have highlighted the importance of the human dimension in urbanism (Jacobs, 1961; Gehl, 2013) and offered insights into systematically studying environmental behavior (Zeisel 2006) through international studies in public life (Whyte, 1980; Gehl, 2013). Studying public life offers immense insights to urban environment professionals by bringing users back into focus when they may be overlooked in design (Gehl, 2013). The expected outcomes could play an essential role in achieving the needs of the visitors who are considered as tourists that would need to spend half of their day to explore the city. Baldwin and King (2018) emphasize that strong social networks and social cohesion can be more important for a community's resilience than the actual physical structures of a city. That what was exactly noticed in Doha after the activation of the blockade. More significantly, urban planning and design support these critical collective social strengths by stressing the necessity of creative spaces for all

and enhance the inclusivity of the city's urbanity. In the process of realizing the goal of both sustainable and resilient development, we should see the dominant role of social factors such as urban governance in the process of urban adjustment and adaptation. The social aspect will be also addressed in the paper as Doha, like most of Gulf cities, has a much-diversified population coming from all corners of the world. The urban future of Doha is planned to encourage inclusivity and transcend the concept of gated development and isolated urbanism. Hence, the social and cultural diversity was perceived as an asset. Planning Places for People, The Heart of the City is for All and Inclusivity as a Fundamental Development Base for the Whole city. More significantly, the city is taking a number of measures to create better connections between expatriates and the city significantly sense of belonging and ownership which would radically help in inspiring the city's overall population of locals and expatriated to better defend the city and take a solidifying position towards realizing its future aspirations. The paper concludes with articulating a more holistic framework for city resilience which takes into consideration the multifaceted nature of the city and better prepare it for different forms of changes and transformations which might occur in the future. Coaffee and Lee (2017) examine how the concepts and principles of resilience exert increasing significant influence over the form and function of planning. Their discussion of the 'politics of resilience' in which fundamental questions of social and spatial justice are posed is relevant to the notion of social cohesion in Doha after activating the blockade.

Figure 16: The city spaces are planned to accommodate the different social groups and emphasize the social cohesion.

Conclusions

As a conclusion, Doha's readiness for the post-oil paradigm can be perceived on three levels; strategically, urban planning and architecture. As explained in the earlier section, Doha is moving strategically towards a development vison articulated around the concept of the inevitable move towards knowledge and creative economy. On an urban planning level, Doha is moving towards a compacted model of urbanism by relaying on multicenter-city development to stop the unsustainable sprawl which was the dominating pattern in the last three decades. In addition, the city is activating a solid transit-oriented development approach to consider public transportation as the main mode of transportation within the city. Finally, on the architectural level, both Qatar Green Building Council (QGBC) and Gulf

Organization for Research and Development (GORD) were established to produce, develop and monitor the implementation of green and sustainable architecture principles in the new buildings designed and built in Doha and all Qatari cities.

Intensifying the idea of a balanced social inclusion between major population sectors; the local citizens and working expatriates to create a sense of belonging, appreciation and recognition of mutual value and distinct roles of the country's rich human mosaic. Part of the city' success story stems from the fact that social cohesion was considered as a pillar in enhancing the resilience capabilities of the city. It describes and illustrates the ideas, tools, and tactics being used to help engaged citizens, civic leaders, and urban professionals to work together to build viable urban society. Also, adopting the principles of sustainability and environmental compatibility as the main pillars of development for Qatar National Master Plan (QNMP). ONMP is based on a set of sustainable urban development values like transit-oriented development (TOD), sustainable urbanization, social balance and the preservation of the historical and cultural identity. More significantly, dealing schematically and planner with major cities especially Doha as a framework for knowledge-based urban development through a network of research centers, universities, museums and the knowledge forums and make it available to all sectors of society in a way which would stimulate citizen and resident alike in a balanced manner.

The Future plans of Doha as described and observing its comprehensive impact on the city dwellers and visitors, cemented a paradigm shift in Doha's urbanity. The shift is based on the success of the project to introduce qualitative changes and new perceptions about the role of the built environment, historical urban areas, mixed use development, car-free planning and knowledge based urban development. The Planning of future Doha manages to adopt comprehensive inclusivity, which made the city for all a reality in all of its connected spaces. The project successfully and sensitively activated the heart of Doha and connected its veins. It is a success story, which resulted from adopting alternative planning approach, considering the environment, and more importantly allowing local communities and stakeholders to participate and gain an endless ownership.

6. References

Alraouf, Ali A. 2018. Knowledge-Based Urban Development in the Middle East. New York: IGI Global Publishing.

Alraouf, Ali. 2017. Interrogating Qatar's Urbanity as a Catalyst for Building Knowledge-Based Societies and Economies. In Bertelsen, Rasmus Gjedss; Noori, Neema; Rickli, Jean-Marc (eds.) Strategies of Knowledge Transfer for Economic Diversification In The Arab States Of The Gulf. Pp: 53 -66. London: Gerlach Press.

Alraouf, Ali. 2016A. "Dohaization": An Emerging Interface between Knowledge, Creativity, and Gulf Urbanity. Pp.: 47-68. In Katodrytis, George and Syed, Sharmeen. Gulf Cities as Interfaces. Cambridge: Gulf Research Centre Cambridge.

Alraouf, Ali. 2016B. Museums as a Catalyst for a New Urban and Cultural Identity in Qatar Interrogating the Case of Museum of Islamic Art. In Museums in Arabia: Transnational Practices and Regional Processes.). Exell, Karen and Wakefield, Sarina (eds.) (Ashgate: UK, 2016).

Alraouf, A. 2016. One Nation, One Myth and Two Museums Heritage, Architecture and Culture as Tools for Assembling Identity in Qatar. Representing the Nation: Heritage, Museums, National Narratives, and Identity in the Arab Gulf States, Publisher: Routledge, Editors: Pamela Erskine-Loftus, pp.79- 94.

Alraouf, A. 2015. Towards a holistic approach to sustainability: Heritage, architecture and culture as tools for assembling identity in Qatar. DOI: 10.5339/qproc.2015.qgbc.30.

Alraouf, Ali. 2012. A Tale of Two Souqs. In or Out of Place: The Paradox of Gulf Urban Diversity. Open House International Journal. Volume 37, Issue No. 2, June 2012. Pp:72-81.

Alraouf, Ali. 2008. Emerging Middle Eastern knowledge cities: the unfolding story. In Yigitcaular, T., and Koray,V., eds. *Knowledge Based Urban Development: Planning and Application in the Information Era.* IGI Global Publishing.

Baldwin, Cathy and King, Robin (2018). Social Sustainability, Climate Resilience and Community-Based Urban Development: What About the People? London and New York: Routledge.

Campbell, Kelvin. 2018. *Making Massive Small Change. Building the Urban Society we want. London: Chelsea Green Publishing.*

Coaffee, Jon and Lee, Peter. (2017). Urban Resilience: Planning for Risk, Crisis and Uncertainty. Palgrave Macmillan.

Cooke, Philip and Lazzeretti , Luciana (Eds.). 2018. The Role of Art and Culture for Regional and Urban Resilience 1st Edition. London and NY: Routledge.

Florida, R. (2012). *The Rise of the Creative Class: Revisited*. New York, NY: Basic Books.

Fromherz, A., 2012. *Qatar: a Modern History.* Washington, D.C.: Georgetown University Press.

Fromherz, A. J. 2017. Qatar. The Rise to Power and Influence. London, UK, New York, NY: I. B. Tauris.

Jacobs, J. 1961. *The Death and Life of Great American Cities.* New York: Random House.

Jha, Abhas K.; Miner, Todd W. and Stanton-Geddes, Zuzana (eds.). (2013). Building Urban Resilience: Principles, Tools, and Practice. Washington D.D.: World Bank Publications.

Gehl, J. 2013. *Cities for People.* Washington, DC: Island Press.

Gray, Matthew. 2013. Qatar: Politics and the Challenges of Development. Boulder, CO: Lynne Rienner Publishers.

Kamrava, Mehran. 2013. Qatar: Small State, Big Politics. New York: Cornell University Press.

Meerow, Sara, Newell, Joshua P and Stults, Melissa. 2016. Defining urban resilience: A review. Landscape and Urban Planning. Volume 147, March 2016, Pages 38-49.

Pizzo, Barbara. (2015). Problematizing resilience: Implications for planning theory and practice. Cities, Volume 43, March 2015, Pages 133-140.

Qatar National Development Framework (QNDF). 2016. The Ministry of Municipality and Environment.

QSDP. (2011) (Qatar General Secretariat of Development Planning) National Development Strategy 2011–2016. Gulf Publishing and Printing Company, Doha, Qatar.

Qatar Statistics Authority. (2015). QSA Population. Retrieved February 22, 2015, from http://www.qsa.gov.qa/eng/populationstructure.htm

Roberts, David B. 2015. Qatar: Securing the Global Ambitions of a City-state. London: C Hurst & Co Publishers Ltd.

Timon, M. (2014). The rise of resilience: Linking resilience and sustainability in city planning. Urban ecology at The New School in New York City, New York (2014).

Gremm, J., Barth, J., Fietkiewicz, K. J., and Stock, W. G. 2018. Transitioning Towards a Knowledge Society. Qatar as a Case Study. Cham, CH: Springer Nature.

Research Paper

SHAPING COMPACT CITIES FOR LIVEABILITY, AFFORDABILITY AND SUSTAINABILITY (L-A-S)

A Comparative Assessment of TODs in Jakarta and Auckland

Author 1 Felicia ATMADJA, University of Auckland; New Zealand
Author 2 Dushko BOGUNOVICH, University of Auckland; New Zealand

Abstract

Rapid urban population and territorial growth is becoming a general trend across the world, driving planning policies to promote a more compact city. As an alternative to sprawling patterns of urban development, the compact city emerges as a spatial form characterized by three key elements: densification, connectivity and accessibility. All three are articulated by transit-oriented development (TOD) strategies in today's urban context. TOD aims to encourage densification, mixed land uses, walkability and public transportation, as well as vertical housing typologies. There are now many examples around the world in which TOD has influenced the verticalization of the city, and we can expect further translations into other contexts. Auckland and Jakarta have too chosen the TOD strategy, incorporating vertical housing, to slow down the sprawl. But citizens are concerned about the quality of life in high-rise, higher density housing, as well as its price. We make a comparative assessment of TOD's ability to achieve liveability, sustainability and affordability in two cities – Jakarta and Auckland – while using Singapore as a benchmark for both. Two case studies have shown that some of the residents' complaints are justified. In the conclusion of the study we suggest improvements in planning and design strategies and produce further recommendations for an effective city transformation.

Keywords

TOD, Liveability, Affordability, Sustainability, Jakarta, Auckland

1. Introduction

1.1. The Aim and Scope

This paper is about the effectiveness of the well know urban planning and design strategy called 'Transit Oriented Development' (TOD). The 'effectiveness' in this case is defined as achieving the nowadays widely shared urban development goals of: (a) good city life – commonly labelled as 'Liveability'; (b) acceptable housing costs – commonly labelled as 'affordability'; and (c) environmental responsibility – commonly referred to as 'sustainability'.

The paper aims to assess the achievements of comparable TODs in two rather different cities – Auckland, New Zealand, and Jakarta, Indonesia – to then draw useful conclusions, some of which may have international relevance. The conclusions are then reframed into recommendations that aspire to be of practical value to the city authorities, developers and

planning professional in Auckland and Jakarta, as well as, hopefully, to other large cities in the world which operate with the 'compact city' model. This paper is accompanied with a presentation which summarises and illustrates the main points of the study.

1.2. Compact City and TOD: A Brief History

Historically, the compact city concept can be seen in medieval and ancient cities which were compact in size following a clear wall boundary surrounding the city. Following the middle ages and Renaissance, came the age of public transport in the Industrial Age, which, mainly in the form of tramway and railway, enabled a degree of urban expansion, but still with a rather compact urban fabric. After that, came the Automobile Age, and the compact city concept started to be used as a strategy to tackle rapid and expansive urbanisation in the late 20th century. In the 1980s, the emergence of sustainable development promoted the concept of compact city as the most sustainable urban form, in order to ensure that cities, as they grow, become more efficient in their use of the natural environment (Jabareen, 2006; Newman and Kenworthy, 1999; OECD, 2012). As an alternative to sprawling city development, the compact city is a spatial form characterized by three key elements (OECD, 2012). The first is a dense and proximate development pattern which is usually achieved through intensification of development and activity in an urban area. The second is connectivity which involves public transport systems to facilitate mobility in urban areas. The third is accessibility, which suggests the mixed-use development integrating residential, commercial and business activities within walking distance.

There has however been criticism of the 'compact city' idea as well, mostly arguing that the environmental sustainability effects have been exaggerated (Neuman, 2005) and never properly proven (Asa, 2018). Other studies argued that the advent of climate change has changed the priorities, so that adaptation and resilience are now more important than mitigation and sustainability (Bogunovich, 2009). In this light, the lower, suburban densities have more advantages for survival than the higher densities in the heavily infrastructure-dependent central city areas (Bogunovich, 2009 and 2012). Leaving these debates aside, the dominant position remains that excessive urban expansion is unwanted; that very large metropolitan areas must have strong public transit networks, and that the most logical urban form policy is that the nodes of these networks, should be allocated for higher density and mixed use.

In contemporary urban context, the three characteristics of compact city can be articulated by transit-oriented development (TOD) strategies. TODs – before that were called that – came into existence almost 200 years ago, as soon as public transport (PT) in its initial form started appearing in fast growing cities of Europe and Asia, after walking the new urban distances became impractical. But in its modern version, under the 'TOD' label, the concept is about 50 years old. It can be traced back to American planners who tried to offer alternatives to the seemingly endless expansion of the suburban development in the North American metropolitan areas. Since the late 20th century the model has been accepted in theory, policy and actual practice in other parts of the world, as the low density, sprawling suburbanisation became a global phenomenon.

The main strategy of TOD is densification - transforming low-density and car-oriented urban development forms into inclusive, compact, and people-oriented cities (Marks, 2016). This strategy has driven the verticalisation of cities in accommodating population growth. There are several examples around the world in which TOD has influenced the verticalisation of the

city such as Singapore, Curitiba in Brazil and Arlington County in the USA (OECD, 2012). In Singapore, TOD strategies have successfully delivered a liveable compact city with sustainable growth (Chye, 2019). Opportunities to translate and transfer such TOD strategies into other urban context can be seen in cities like Jakarta, Indonesia and Auckland, New Zealand.

The future of TOD is bright, because most big cities are still growing and the pressure for more accommodation is relentless. The pressure is for cities to grow both out and up, and while the former is faster and cheaper, the central areas remain more attractive as a location and the pressure is now building up for 'intensification'. Intensification (or 'densification') is now preferred by most city authorities as the way to slow down the horizontal sprawl, but rather than letting the free market decide where the new high-density will occur, they try to channel the intensification to PT nodes. Typically, these are inner city and suburban rail stations, above the ground, or under the ground.

2. Context

2.1. Background of Compact City and TOD in Jakarta

Jakarta is the fastest growing city in Indonesia. It encompasses a total land of 656 km2 and 9.6 million inhabitants (Indonesia Statistical Report, 2011). The prominent urban challenges – due to rapid population growth in the city - include traffic congestion, air pollution, and housing shortages. More than 1,100,000 people commuting to the city every day results in a perpetual gridlock, which established commuter satisfaction in Jakarta as the lowest among major cities in Asia. Rapid population growth has also impacted urban spatial growth, which has created a sprawling development and converted more than 30 ha of agriculture areas and green open spaces into urban settlements (JICA, 2012). According to Jakarta SWOT analysis done by JICA to establish Greater Jakarta MPA, the urban development in the city is under pressure from insufficient infrastructure, exposure to natural disasters, and a large, rapidly expanding population. However, the large population can also be an opportunity for development since it will contribute to a robust economy (JICA, 2011).

Transit-oriented development (TOD) was introduced into Jakarta planning policy in the 1990s. The first initiation of TOD in Jakarta comes from the Ministry of Transportation, who proposed an integrated transportation concept to address the bad traffic congestion, and The Ministry of Public Works who proposed high-density housing developments around the public transport routes. The first masterplan for public transport integrating railway, light rail, and buses was proposed by The Ministry of Transportation in 1992. However, the decision from the Governor of DKI Jakarta Province for Mass Rapid Transit (MRT) only came in 2004, which inaugurated TOD in Jakarta. In 2012, the MRT project was also included as one of the fast-track projects in Greater Jakarta MPA. After years of feasibility studies and design revision done by the collaboration of the Ministry of Transportation and the MRT operator company, the project kicked off in 2013 and the first phase was completed in 2019. The first phase of the MRT provides 15.7 km of rail-based urban transportation with seven elevated stations and six underground stations, from the South Jakarta to Central Jakarta.

Following the completion of MRT, the Ministry of Public Works aims to expand the development of TOD, intensifying development density around the new transit stations. The TOD development in Jakarta seeks to adapt several principles such as (1) diversity; (2)

density intensification; (3) accessibility; (4) liveability; (5) social cohesion; (6) sustainability; (7) infrastructure resilience; and (8) economic renewable. With Jakarta's housing demand currently reaching 800,000 units/year, the Ministry of Public Works and Public Housing aims to provide 50 new housing developments as TOD projects, which will be the combination of middle-up-class apartments and affordable units. The TOD development sites are planned around five existing train stations and 13 new MRT stations with mixed-use development comprising of housing, business, and commercial. The existing train stations which are planned to be developed under the Ministry of Public Works and Public Housing are (1) Pasar Senen; (2) Tanjung Barat; (3) Juanda; (4) Manggarai; and (5) Tanah Abang. The MRT operator company will undertake the TOD development in 8 new stations: (1) Dukuh Atas, (2) Lebak Bulus, (3) Blok M, (4) Senayan, (5) Istora, (6) Bendungan Hilir, (7) Setiabudi, and (8) Bundaran HI.

2.2. Background of Compact City and TOD in Auckland

In New Zealand, the early examples of development favouring nodes of PT are related to the development of tramway networks in the main boom towns of the mid-to-late 19th century – Nelson (1862; horse), Thames (1872; steam), Dunedin (1900; electric). They were, followed by the main three cities – Wellington, Christchurch, and Auckland.[ii] The tramway was followed by suburban train networks in Wellington and Auckland in the early 20th century. These nodes were rarely developed in the TOD fashion as the stations were seen as only transport-related, while housing was strictly low rise suburban and separately zoned. [iii]

Auckland stopped developing its suburban railway in the 1950s, after a significant change in government policy and switch of funding to motorways (Harris, 2005). TODs never took off, until very recently, in this century, when the local councils decided to pursue the compact city model of urban form, invest more in PT and develop nodes and corridors of TOD (Auckland Council, 2018). TOD in Auckland has been the strategy to accommodate the population growth since two decades ago. However, the urban intensification has just started in 2003, since the concept is quite new.

The significant point of TOD in Auckland happened in 2003, when the new Britomart station re-open; then in 2010, when Auckland Council (AC) and Auckland Transport were formed, and then in 2016, when the City Rail Link (CRL) project started. Big improvement of TOD in Auckland happened after the governance changed in 2010 when the Royal Commission on Auckland Governance established Auckland Council (AC) as a single unity authority, replacing the Auckland Regional Council and seven territorial authorities (Blakeley, 2015). AC immediately launched the metropolitan urban limit (MUL) as the tool to control growth, so that infrastructure can be provided more efficiently. Auckland Transport, as a council-controlled organization, launched the Integrated Transport Management Plan which aims to build an outstanding public transport within one network. The plan called New Network prioritises in the City Rail Link (CRL), electric trains, rapid transit network (RTN), and building or revitalise stations.

AC, adopting the principles of TOD, is focusing the high density and mixed-use living options within a close proximity to reliable and frequent public transport. By focusing the urban growth on centres and transport nodes, the government also aims to reduce the usage of private cars and seriously promoting walking and cycling. There are at least 21 locations where the TOD will be applied including New Lynn, Onehunga and Avondale.

2.3. Singapore As the Benchmark for Liveability, Affordability and Sustainability

The third city featured in this study is Singapore. The city-state of Singapore is widely regarded as one of the best managed cities in the world, with consistent vision and planning policy aiming for a high level of liveability, affordability, and sustainability (L-A-S). This can be seen in its planning policies: Liveable and Sustainable Cities Framework, and the 10 Principles for Liveable High-Density Cities of Singapore development. It is a relatively compact city, as this policy has been the only way to develop such big and important international city on a small island.

In terms of transit-oriented development, Singapore has a long tradition of integrated land use and transport planning – it started soon after its MRT was first proposed in 1971 (Niu et al, 2019) – and has had TODs even earlier than developed western countries. The key principles learned from Singapore TOD involve incremental development of public transport capacity; integration of land use, land ownership, and transport; management of transport demand; and leveraging innovative technologies for TOD (Chye, 2019). Beginning in 1966, Singapore initiated a programme to centralise land ownership to the state in order to enable extensive transit infrastructure development. The centralization of land ownership also enabled the government to shape long-term planning for the urban renewal, followed by periodic reviews to ensure plans remained relevant for the changing population (CLC and ULI, 2013). Today, these TODs are the vitally important hubs of the entire metropolitan transport system, including a few new town centres. Singapore MRT and TOD system is mature and can be taken as the template for cities far behind, like Jakarta and Auckland.

Singapore also proves how high density can be used as an advantage to provide L-A-S to the city. Having a population density of over 7,000 persons per square kilometre, Singapore maintains a high ranking in liveability surveys - for example, Mercer's 2010 Quality of Living Survey (CLC and ULI, 2013). This paper uses Singapore planning policies as the L-A-S benchmark.

3. Methodology

3.1. Case Study Selection

The two case studies were selected based on the original, and the current place of residence and studying of the first author of this paper. She is familiar with both Jakarta and Auckland, both as a citizen-participant and a researcher-observer. The other obvious reason for the choice of Jakarta is that the ISOCARP Congress in 2019 is in this city. That makes this case more interesting for a large portion of the Congress delegates – not only the local planning professionals, academics and government officials, but also to the international visitors who want to see and understand Jakarta in the few days of their visit.

Looking globally, one could also argue that Jakarta, being one of the biggest city in the world, still growing fast, and being in a developing country is typical of the urban problems today. From a purely research perspective, the choice of Jakarta and Auckland as a pair offers a good mix of differences and similarities. The differences probably amplify the global relevance of the results; the similarities should enhance the reliability and accuracy of the results. The following table explains the differences and similarities of both cities.

Table 1 Differences and Similarities of Jakarta and Auckland

	Jakarta	Auckland
Area	661,5 sq km	1,086 sq km
Population	10,638 million	1,657 million
Population Density	4,383 people/sq km	1,210 people/sq km
Urban form	Radial-concentric	Linear conurbation
Climate	Tropical	Temperate
GDP per capita	$10,641	S35,152
City government	Ministry of Land and Spatial Planning Ministry of Public Works and Public Housing Ministry of Transport	Auckland Council
Planning system	DKI Jakarta Provincial Spatial Plan No 1/2014	Resource Management Act
Long term plan	DKI Jakarta Spatial Planning 2030	Unitary Plan

Source: Indonesia Statistic 2011 & NZ Statistic 2013

3.2. Data Collection

The main sources of information in this study are gathered from: (1) government documents such as policies, regulations, reports, plans and maps; (2) professional and commercial documents such as planning publications, property development plans, company annual reports; (3) research literature such as books, journals and conference; and (4) public news/general media; (5) site visits/field observations.

3.3. Comparative Assessment

To understand the extent to which TOD policies are achieving liveability, affordability and sustainability in the context of Jakarta and Auckland development, the research uses a qualitative methodological approach. The approach includes a critical review of key reports and project intentions, followed by a comparative assessment of TOD concept policies in both countries. Considering the limitation of the research, the analysis of TOD concept policies in both countries focuses on two concrete areas - Dukuh Atas and Lebak Bulus in Jakarta; and New Lynn and Onehunga in Auckland.

The analysis of source material is done using the comparative assessment on three criteria: liveability, affordability and sustainability (L-A-S), and it takes Singapore city-state as a benchmark. This research focuses on L-A-S goals from Singapore planning policies to assess the TOD projects in Jakarta and Auckland including (1) Liveability – walkability, density, diversity and public facilities; (2) Affordability – long-term planning and housing supply; and (3) Sustainability – green open space, carbon reduction, and resilient infrastructure.

4. Findings

4.1. TOD in Jakarta, Indonesia

Location

TOD project sites in Jakarta are planned according to the location of transit stations, both the existing ones, and the new ones. Considering the limited scope of this paper, the analysis will focus on the TOD planned in the new MRT stations. After 13 new mass rapid transit (MRT) stations were completed earlier in 2019, the operator of the services - PT. MRT Jakarta - along with the government plan to continue with TOD development, prioritised around 5 MRT stations, including Dukuh Atas and Lebak Bulus.

Lebak Bulus Station is the first elevated MRT station - connecting South Jakarta to North Jakarta – and is expected to be the new transport node for people commuting to Jakarta. As the starting station, the development of Lebak Bulus TOD will determine the whole project of MRT Jakarta (JICA, 2015). Dukuh Atas Station is the underground MRT station located in Central Jakarta. This is a strategic location due to its close proximity to Jakarta CBD, the famous Hotel Indonesia roundabout, and Sudirman Station (commuter line). Dukuh Atas area will soon become the largest urban transportation hub in Indonesia, integrating six transportation services such as MRT, Transjakarta Bus, commuter line, airport train, and LRT. Lebak Bulus and Dukuh Atas TOD projects are planned to be the regional urban core in Jakarta. Both projects are under the same company operator and generally using the same strategies.

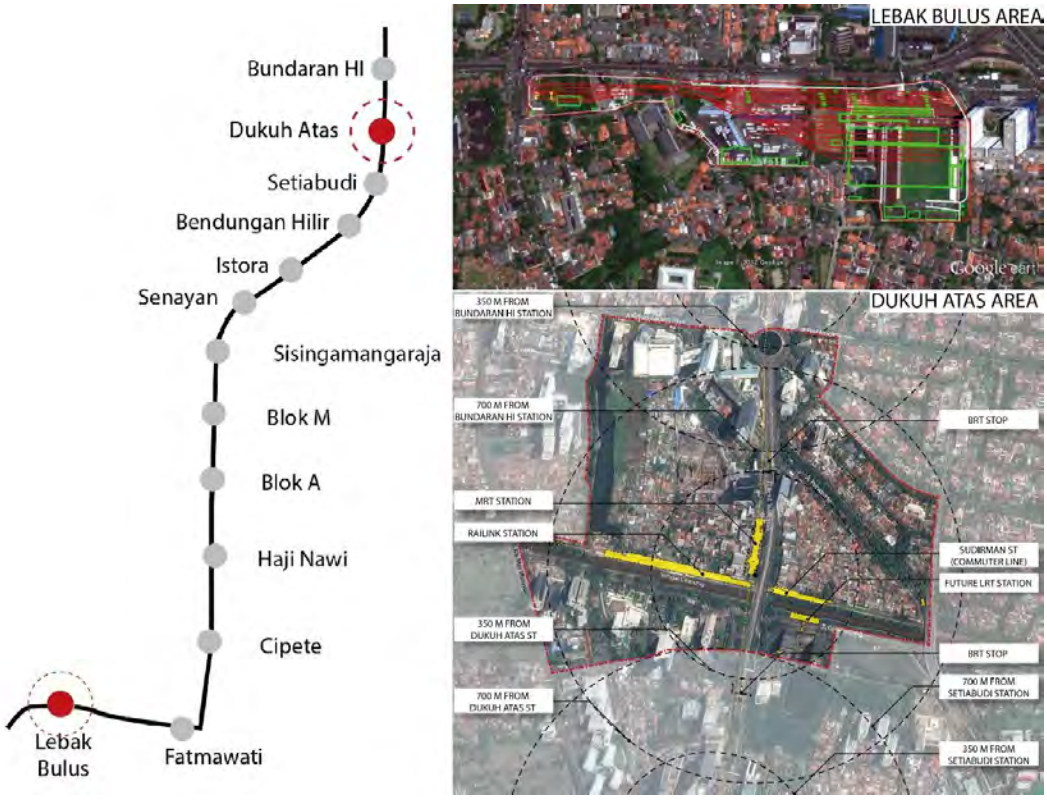


Figure 1 Jakarta TOD Areas (JICA, 2015; PDW, 2019)

TOD Strategies

TOD strategies in both areas involve densification, accessibility, connectivity and green open space. In Dukuh Atas TOD, the strategy for densification is increasing the floor area ratio (FAR). Based on the UDGL 2012, FAR for buildings along the Sudirman Street will be raised up to 6.0 from the current 1.8 – 4.5. The FAR structure has four different layers according to the distance from transit stops, where buildings inside 800-metre radius from transit stops have the maximum FAR to 12.0 while buildings outside 1,200-metre radius from transit stops have the maximum FAR to 3.5. Areas inside 400-metre radius from transit stops with the highest FAR will be the priority for mixed-use development combining business, commercial and residential. Same strategies also applied in Lebak Bulus TOD to provide higher density with diversity of uses. The development focuses on the 14-ha site located in 500-metre radius from the station accommodating residential, businesses, and retails. Thus, the significant transformation from the densification can be seen on the verticalization along the transit corridor in both areas (Figure 2).

Figure 2 Verticalization in TOD Areas (MRT, 2017; Totalindo, 2018)

Pedestrians are fundamental to achieve liveability in TOD projects. In the existing condition of Dukuh Atas, pedestrian activities are generally concentrated around Sudirman Station (commuter line) and can reach more than 5,000 people/hour during peak hours. According to the masterplan, pedestrianisation in both areas will be focused on providing different types of pedestrian movement and activity, with cycleways, a pedestrian bridge, a pedestrian tunnel, and street-level pedestrian facilities. This strategy aims to improve the permeability of pedestrian networks and provide ease of changing between public transport modes. The street level pedestrian spaces which were previously considered unfriendly are planned to be revitalized by adding disabled access, street furniture, and shading. The pedestrianisation then followed by the creation of great streets within 100-metre radius from transit stops. The great streets approach will intensify activity around the mixed-used developments along the transit corridor, through direct pedestrian access from the transit stops. This strategy also aims to improve the local economy of both areas.

In Dukuh Atas, there is a recently completed pedestrian tunnel under Sudirman overpass, connecting Sudirman Station to MRT Station and Airport Railink Station. Before the redevelopment made it pedestrian only, this tunnel was filled with private vehicles heading towards the CBD area. In the centre of the four quadrants, the main pedestrian bridge is planned to connect the whole area of Dukuh Atas. However, in Lebak Bulus, many public news reported that the pedestrian is considered unfriendly with lack of canopies and street lighting.

Figure 3 Walkability in TOD Areas (PDW, 2019; Totalindo, 2018)

The next strategy is connectivity which translates in the integration of transport hubs for ease of changing public transport modes within the area. The masterplans show that transport hubs will also be integrated into a park and ride facilities accommodating more than 300 vehicles and developed into mixed-use facilities supporting retail tenancies,

businesses, and public spaces. In Dukuh Atas, new transport hubs are planned to connect six public transport modes in four areas, which are (1) MRT station, (2) Blora market, (3) BNI Tower, and (4) Landmark Building. In Lebak Bulus, the MRT station is integrated into the Park and Ride facilities.

The next important strategy is the placement of green open space in TOD areas (Figure 5). The masterplans show that the preservation of green open space is combined with the creation of public space. The strategy includes the place making of a civic plaza and a renewal of the Ciliwung River corridor in Dukuh Atas area. In Lebak Bulus, it is also planned to provide different kinds of public open space inside the mixed-use development such as outdoor café, event plaza, multi-layered terrace garden, and semi-outdoor courtyard.

Figure 4 Open Space Strategy (MRT, 2017; Totalindo, 2018)

One civic plaza example can be seen from the Dukuh Atas Garden which located above the recently completed MRT station. Dukuh Atas Garden is a revitalisation project since the MRT station was built on the existing open space. The aim of this garden is to be a new node in the area where community activities can take place. Upon the completion of the project, Dukuh Atas Garden seemed to accommodate many public events and improved citizens enjoyment, supporting liveability (Figure 6). The next strategy in Dukuh Atas is the renewal

of the Ciliwung river corridor which is located at the centre of Dukuh Atas TOD area and divided the four quadrants. The intention of the renewal is to improve the riverbank area and support more activities along the river corridor, accommodating retails and public space, and a new river walk connecting the riverbank to the pedestrian bridge in Sudirman Street.

Figure 4 Civic Plaza in Dukuh Atas TOD (MRT, 2017)

4.2. TOD in Auckland, New Zealand

Location

There are some areas planned for urban intensification using TOD as stated in Auckland Plan 2050. These areas usually designated for town or metropolitan centre with high-density development, which integrated through strategic public transport network, including New Lynn and Onehunga.

For New Lynn TOD, AC going through a characteristic study of TOD versus the adjacent development to determine the opportunity and constraint of the projects. The study outlined that the existing condition such as suburban street pattern, low density, parking area dominance, unfriendly pedestrian space, and segregated land use are the weaknesses that planned to be improved using TOD strategies. New Lynn TOD is the first part of the district's transformation and one of the largest urban regeneration projects in New Zealand. The project starts with the completion of the new transport interchange which since then has been followed by range of projects including town centre's revitalisation, open space upgrade, and high-density housing development. These new developments establish New Lynn, which was neglected before, as one of the most important town centres in Auckland, accommodating people who work close to home, living in vertical housing, with options of public transports, also walking and cycling to get around. New Lynn is claimed to be Auckland's first true TOD.

Onehunga is one of the areas outside CBD that designated for higher density development and town centre targeted for transit-oriented development, as defined by AC. In 2014, a new

town centre and a perimeter block comprises 112 units were completed. This town centre is identified to be the future population and employment growth. In 2017, AC, through Panuku, another council-controlled organisation, launch a High-Level Project Plan (HLPP) for Onehunga which aims to transform the district into a TOD area. This project will be a long-term development, build on the existing potentials around the town centre.

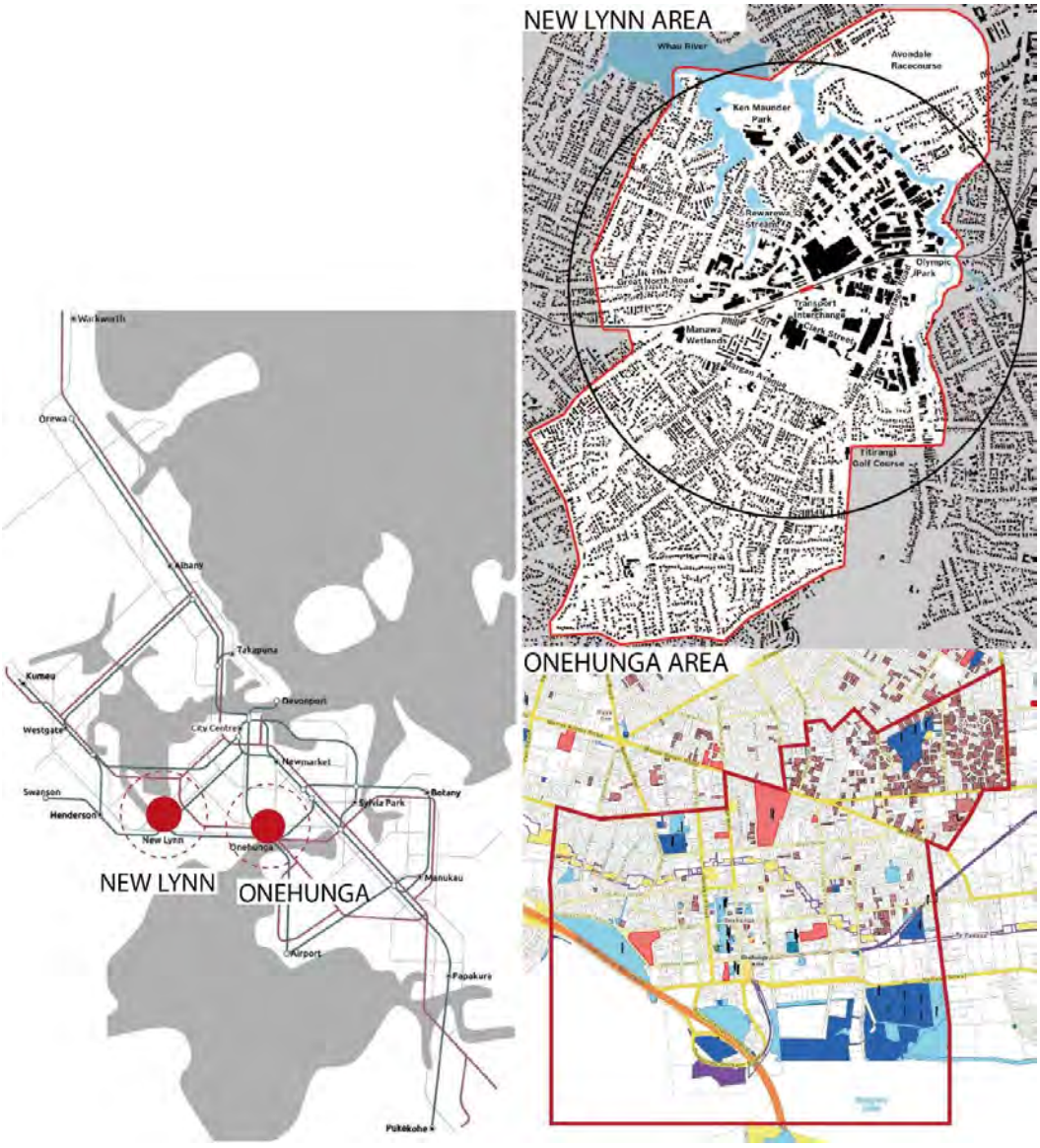


Figure 5 Auckland TOD Areas (New Lynn UrbPlan, 2010; Panuku, 2017)

TOD Strategies

The TOD strategies in both areas include (1) densification; (2) open space strategy, (3) movement and connectivity strategy, and (4) social and economic strategy. The densification strategy starts with planning priority sites for development and dividing them into precincts according to the timeline, such as high priority sites, medium-term opportunities, and longer-term opportunities. There are 10 precincts in New Lynn and five precincts in Onehunga. The densification focuses on providing mixed-use development, high-density housing, and redevelopment of the existing industrial block. In New Lynn, the densification can be seen from mixed-use development in Merchant Quarter, Crown Lynn and The Mall

precincts accommodating 12 ha business area, more than 2000 new residential units, and 9-ha new retail area which located within 400-metre radius from the transit interchange. In terms of housing, the development uses a 'carrot and a stick' approach, which limiting the suburban-style development and transforming it into a compact urban living. The densification aims to create New Lynn as an urban place centred on a transit interchange, accommodating 20,000 residents and 14,000 workers in 2030 (New Lynn Urban Plan, 2010).

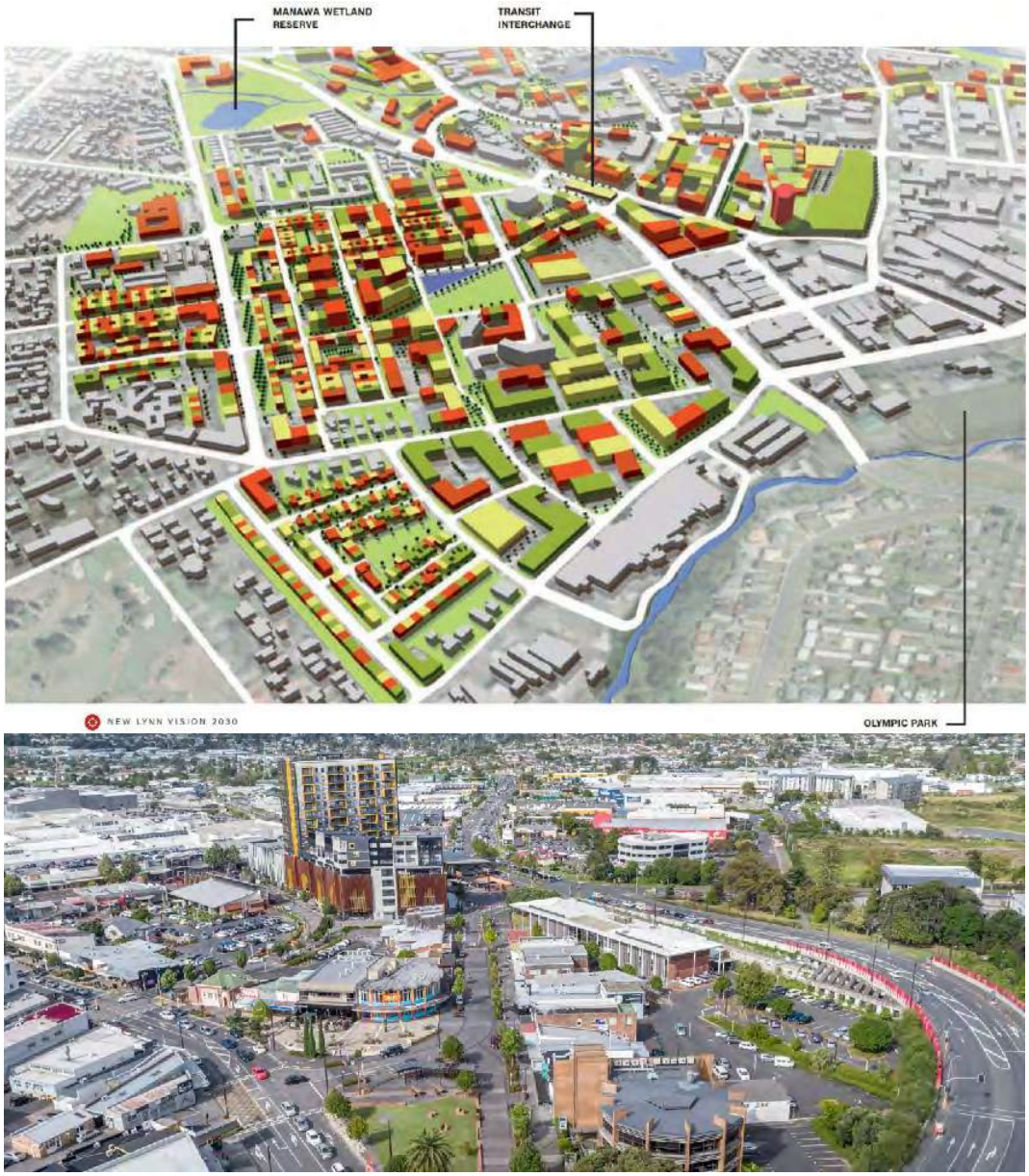


Figure 6 New Lynn densification area (New Lynn Urban Plan, 2010)

In Onehunga, the densification is planned to address the growth projection and the changing market demand from predominantly conventional freestanding family housing into medium-density housing. Similar with New Lynn, densification in Onehunga is also providing various mixed-used developments integrated with public transport and concentrated in town centre core precinct for short to medium term. The precinct has existing potentials including retail, businesses and train station, in addition to which are planned 650 new dwellings and more than 15 ha of new commercial and businesses spaces area (Panuku, 2017). In terms of

housing, there are several Special Housing Areas (SHA) sites in Onehunga. SHA is a housing development policy which establishes fast-track housing development sites and encourages private sectors to develop. Both in New Lynn and Onehunga, densification focused in the town centre is expected to be the catalyst for future developments due to land ownership. The development in town centre is expected to be easier and faster, since most of the council's land is located there.

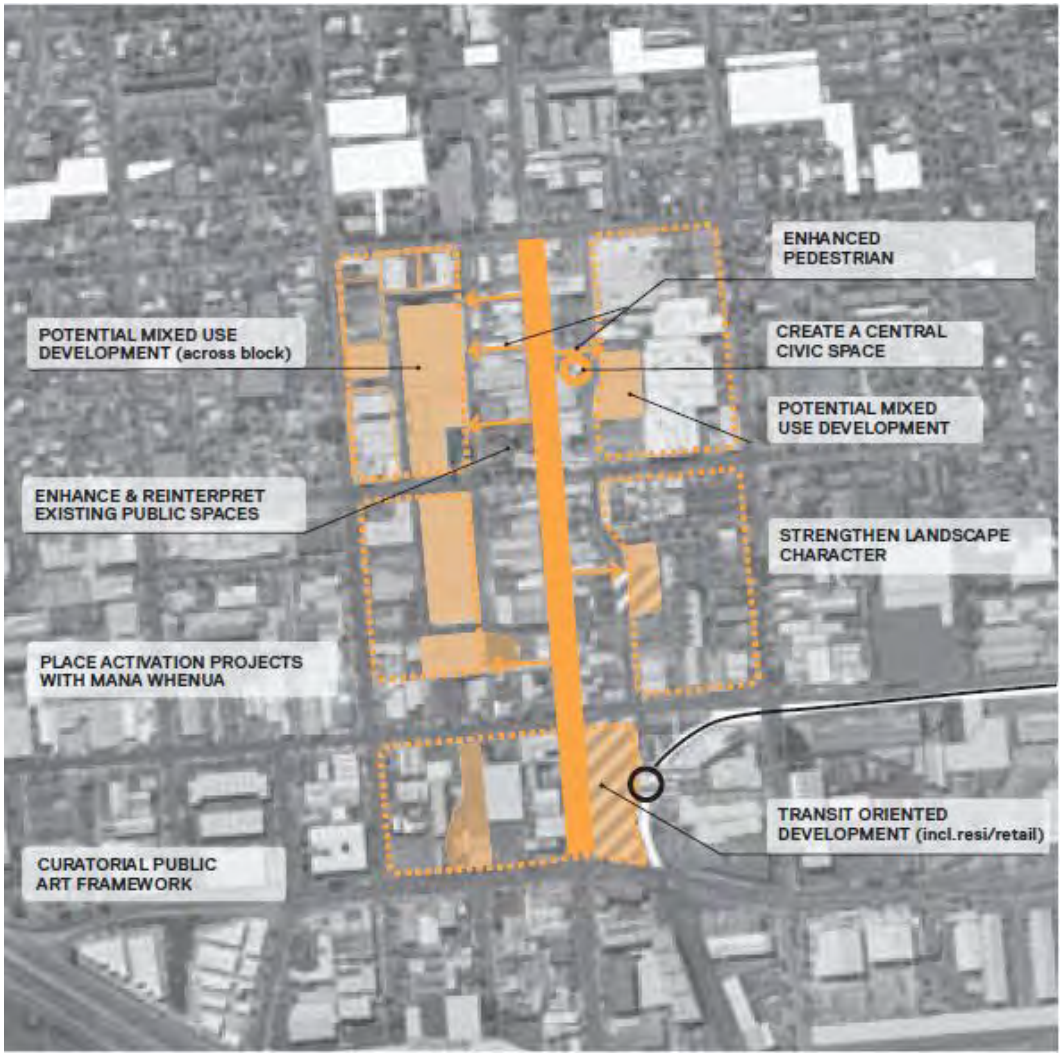


Figure 7 Onehunga densification area (Panuku, 2017)

The next important strategy in both areas is the open space provision, since Auckland is a coastal city abundant with natural heritage. In New Lynn, the open space strategy is called the 'power of ten' which includes the preservation of five 'hard' and five 'soft' spaces within 500-metre radius from the transit interchange. This strategy is implemented through maintenance and improvement of the existing open spaces. This approach also aims to improve the connection between open spaces through high-quality pedestrian areas which are centred in New Lynn Park, a large (one hectare) urban park in the Crown Lynn precinct.

The next open space strategy is to create a green-blue loops and links which link river streams to green open spaces and open the river corridors for public activities. Besides open spaces, the Whau River and the Rewarewa Stream are another important natural features which are often neglected. In addition to this strategy, streets in New Lynn are also designed to be green streets lined by trees with generous footpaths widths and cycle way. These open

space strategies are also being included in the development design guidelines. For example, all new housing developments will be required to front onto the river or green streets. Also, housing development more than 10 units shall be located within 200-metre radius from public open space.

Figure 8 New Lynn Open Space Strategy (New Lynn Urban Plan, 2010)

The open space strategy in Onehunga is heading to the same direction with New Lynn, it aims to improve people's well-being through the enhancement and restoration of the natural environment. The strategy includes the improvement of green-blue networks enhancing the value of Manukau Harbour and its foreshore through the redevelopment of Onehunga's waterfront as public open space. The waterfront is planned to be the new recreational and cultural destination promoting ecological corridors for public use.

The third strategy is about movement and connectivity which are fundamental to the success of TOD project. According to the New Lynn 2030 vision, the area aims to be a showcase of pedestrian and cycle friendly place. The framework plan established a transport hierarchy to place pedestrians as the top priority together with cyclist and public transport while private vehicles become the least priority. The walkability is planned through a detailed design guideline including the 1.8m minimum width, crossing facilities every 100 metres, and the street lighting improvement. This strategy is also the continuation of the green street strategy to improve pedestrians by planting trees along the footpaths and providing street furniture.

The cycling network is planned to be integrated within two km of the transport interchange. The existing street transformation was done into 3 different types such as shared path, slow street and calmer street. The cycling plan is complemented by the provision of cycle stands and storage lockers with 1:4 ratio (one cycle stand for four car parking space). The cycle racks also planned to accommodate rentable bikes offering cycling opportunities for visitors arriving in New Lynn by train or New Lynnians who do not own a bike. In order to be a sustainable TOD area, the movement strategy also manage the limited car parking provision in the area using 1:40 ratio (1 car park space per 40 sqm of floor space). Onehunga also planned similar initiatives with New Lynn by targeting key streets to be transformed into

pedestrian and cyclist friendly environment, and reduced vehicle movements. The recent investment of cycling facilities can be seen in the cycle lane in Onehunga Mall. The cycling network is also planned in the foreshore, connecting the town centre to the Onehunga Wharf.

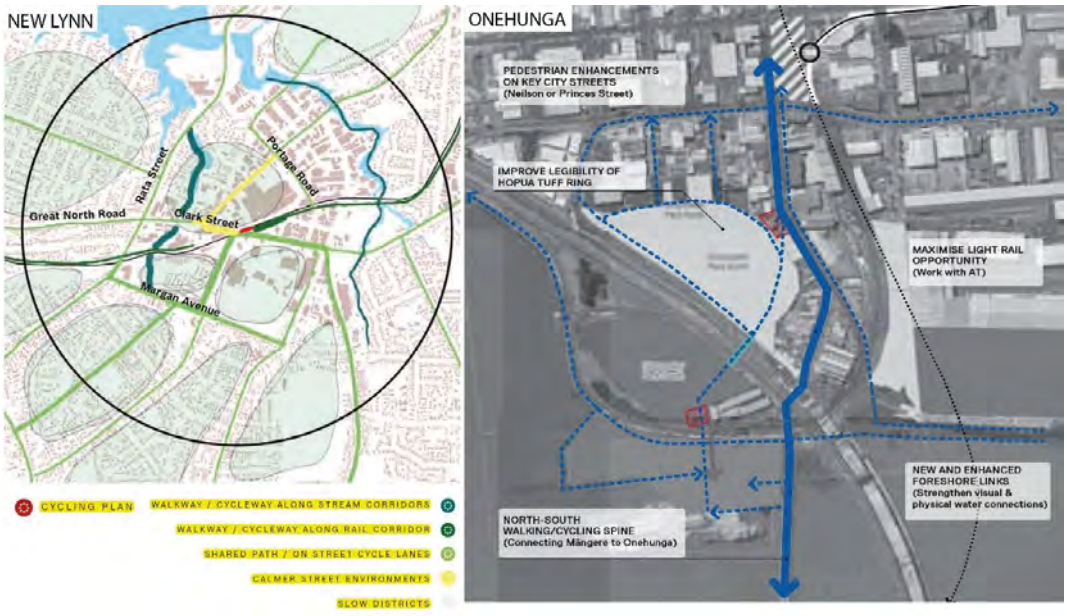


Figure 9 Movement and connectivity strategy (New Lynn Urban Plan, 2010; Panuku, 2017)

The last TOD strategy is regarding social and economic aspect. Part of the New Lynn 2030 vision is to improve the social and economic conditions through the provision of affordable housing integrated with community facilities and a high-density employment hub. To achieve the affordability, housing development in New Lynn is planned to have a mix of quality housing size and form to retain the current diversity of the existing community. The next step of providing affordable housing integrated to the community facilities such as primary schools, local shops and civic anchors. Strong economic base is also the critical part of the successful TOD in New Lynn and this is planned to be achieved with the creation of new employment and commercial hub focused on precincts close to transit interchange: Merchant Quarter and Crown Lynn. In Onehunga, the social and economic strategy focuses on retaining the existing commercial activities around the town centre and revitalising the existing industrial area to be a mixed-use employment precinct.

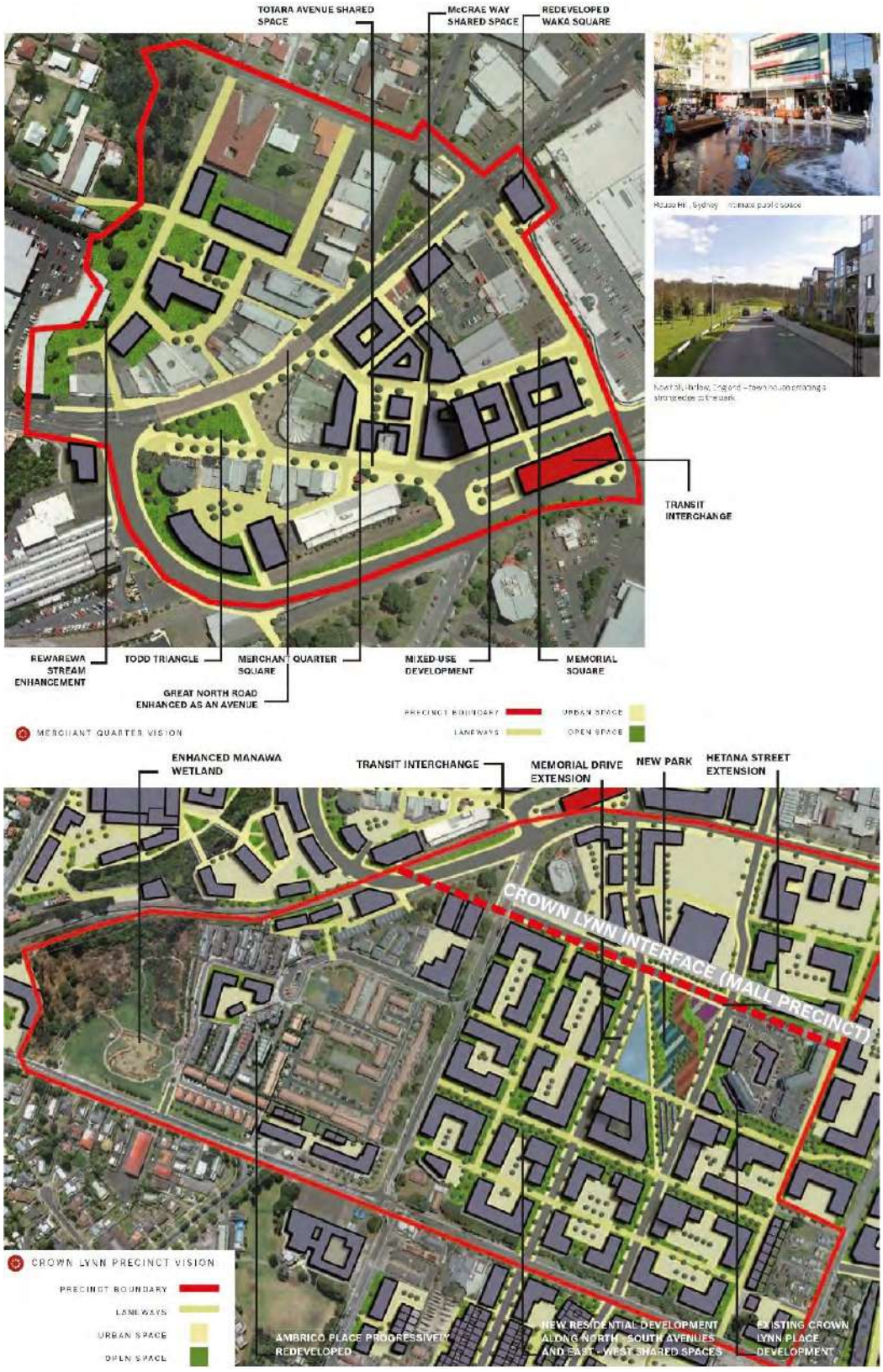


Figure 10 New Lynn social economic strategy (New Lynn Urban Plan, 2010)

4.3. Comparative Assessment

The Liveability

To understand the extent to which TOD strategies in Jakarta and Auckland are achieving the liveability, the research focused on the walkability, densification, diversity, and public space provision.

Jakarta

In Jakarta, pedestrian networks in TOD areas have been planned in detail to improve pedestrian accessibility and provide shorter trips. However, implementation will be constrained by the fact that the development will be done on the existing, active built environment and overlaps with other projects. For example, in Dukuh Atas, the transit stops have been fully in operational while the pedestrian facilities are still under construction. The same thing happened in Lebak Bulus, since the MRT station is fully operated but many complaints that pedestrians to the station and park and ride facilities are currently inadequate. The cycling facilities, which are should come as one package with the pedestrian networks, will also need more detailed planning in a macro scale providing the ratio of bike rack and storage, and the continuity of bike lanes outside the 500-metre radius from the station.

The next issue relates to land-use planning in Dukuh Atas TOD, which is still predominantly segregated between residential and public amenities, similar to the existing condition (Figure 11). While some of the existing residential areas on the west side of Sudirman Street are being transformed into a mixed-use zone, the remaining residential areas are still located behind the business zone and outside the 400-metre radius from transit stops. The segregation of residential area and public amenities can reduce liveability and exacerbate social injustices, which may also lead to the Jakarta-typical slum problems in future developments. The TOD area also need a sufficient amount of high-quality public space to be successful. The TOD strategies of Dukuh Atas and Lebak Bulus usually integrate public space with the transit-hub and green open spaces. The new Dukuh Atas Garden above the underground MRT station is a good example of public space in TOD area. This example should be used as a reference in other TOD areas.

Figure 11 Dukuh Atas land-use plan transformation (Jakarta Spatial Plan, 2011)

In terms of densification, the strategy to verticalize and intensify are constrained by land acquisition, because most of the land in Jakarta is under private ownership. In Dukuh Atas, for example, the government is currently own the green open spaces and the existing market in Blora Street only, which resulted in slow progress of development since the land acquisition process usually take a long time. The densification is also sensitive to vertical transformation since culture and lifestyle preferences in Indonesia are still not adjusted to vertical living. Failed verticalization can be seen from the previous attempts by the government to relocate the people living in low-rise high-density residential settlements, known as *kampong* into affordable vertical housing. In 2015, people who live in Kampung Pulo were evicted and moved into vertical housing development called Rusunawa Jatinegara Barat. However, public news reports based on interviews with residents stated that they now face numerous problems in the vertical housing contexts, such as poor building quality, lack of living space, unaffordable rent; and decreased income due to lack of space for their kiosks. This evidence shows that there is a lack of specific design guidelines and monitoring function of the vertical housing development.

Auckland

In Auckland, pedestrian networks in TOD areas also have been planned thoroughly encouraging people to walk and cycle. The robust planning shown in New Lynn 2030 vision is the showcase of pedestrian and cycle friendly place. The vision is followed by various strategies like transport hierarchy prioritising pedestrian and cyclist, green streets, cycling infrastructure, also bike renting. The pedestrian networks also completed by the right amount of diversity of land uses, for example, Merchant Quarter and Crown Lynn precinct in New Lynn. For the public space provision, both New Lynn and Onehunga have large amount of existing open public space that can be improved, since the current conditions have been neglected.

In terms of densification, Auckland is facing a similar problem with Jakarta which is land acquisition. The limitation of land owned by government resulted in the slow progress of urban development, while the housing crisis in Auckland keep getting worse. This is also the reason behind the emerge of SHA policy encouraging fast-processed developments. The other issue of densification is regarding the people's traditional lifestyle. Most Aucklanders prefer to live in a free-standing family housing, rather than in a high-rise apartment. The verticalization of housing is a new concept in Auckland, since the urban intensification has just started in 2003. One of the strong public reaction towards the verticalization is called 'not in my back yard' (NIMBYism), where people usually rejected higher-density development near their area. This public pressure made AC reducing height limits and density in new housing developments (Blakeley, 2015). The NIMBYs also caused many proposed development projects never took off (Donovan, 2013) and show the low ability to integrate new people into the existing community as the area intensifies.

Singapore

Singapore was able to create dense developments that were both functional and liveable as the result of integrated master planning and development and dynamic urban governance (CLC, 2014). The city provides ease of travel by walking and cycling through detailed and continuous strategies like "Walk2Ride" programme which integrate 88 MRT and 38 LRT stations with high-quality pedestrians and Walking and Cycling Plan (WCP) that must be included in each new development (LTA, 2018). The built structure also designed according

to the measure of comfortable walking distance - for example - in Marina Bay, blocks are designed in a grid structure with manageable size and underground walkways between buildings (Ollivier and Djalal, 2017).

Regarding land acquisition, the government approach that can be learned from Singapore is the integration of land ownership since 1966, through its "1966 Land Acquisition Act", from which it now owns more than 90% of land in the country. Dominating urban land ownership has enabled the Singaporean government to coordinate multiple urban developments. This can be a good example for urban development in Jakarta and Auckland. The verticalization was done in accordance with "Housing & Development Act of 1960" which succeeded in achieving that 82% of Singaporeans lived in HDB apartments in 2015 (HDB Annual Report, 2015). This policy sets up design guidelines in providing a liveable vertical housing, setting standards for water supply, sanitation, building materials, and access to public amenities.

In terms of land use, planning guidelines in Singapore consistently co-locate residential areas with public amenities within a 400-metre radius of the neighbourhood centre, so they can easily be reached by walking. Land in Singapore, especially in CBD areas, was parcelled to provide flexible developments. In Marina Bay, for example, land-use planning also provided a clear urban grid framework, which enabled a mix of housing, commercial and business activities within close walking distance of the CBD area (CLC and ULI, 2013) (Figure 6b). Aside from these issues, the planning of pedestrian networks in Dukuh Atas TOD is considered to have a high level of success in improving the liveability of the neighbourhood.

Figure 12 Singapore land-use plan (CLC and ULI, 2013)

The Affordability

To understand the extent to which TOD strategies in Jakarta and Auckland are achieving the affordability, the research focused on the affordable housing development and long-term planning.

Jakarta

The most prominent challenge of affordability in Jakarta is the lack of housing options regarding types and tenure. Also, the allocation of affordable housing in new developments is considered inadequate. According to UU 20/2011 regarding vertical housing called "*rumah susun"*, the minimum allocation of affordable housing is 20% of the total floor area. It is not clear yet the ratio of affordable housing allocated in Dukuh Atas and Lebak Bulus TOD will be achieved since the master planning is currently in the early stage. However, we can refer to Pasar Senen and Tanjung Barat TOD which planned to be built around the existing train

station. The development aims to provide 480 out of 1,362 units of affordable housing in Pasar Senen, and 300 out of 1,232 units of affordable housing in Tanjung Barat. Both developments allocated 35% of the total unit for affordable housing. However, it is still considered insufficient as public media observed that there are almost 15,000 people wait-listed for the allocation in affordable housing, while there are only 9,000 of available units (Kompas, 2018).

Another issue of affordability is regarding the development stakeholders. Most of the vertical housing development in Jakarta was done by private developers, for whom the importance of these projects resides in more business opportunities, rather than the provision of affordable units (Sumandoyo, 2017). The lessons from past developments have not been learned - Kalibata City, which was originally declared as affordable housing in the built permit, was eventually built into a medium-high class apartment by private developers. This apartment complex is facilitated by parking lot, anchor retails from big brands and is located in the town centre area. This is in contrast with the affordable housing built by the government, which usually is located far from public amenities, had low qualities, and later grew into a 'vertical-slum' (Kresna, 2017). Since the TOD areas are mostly located on expensive land in the town centre, it is quite uncertain if the new housing development can be affordable. Also, TOD masterplans are focusing more on the catalyst projects and not providing the long-term planning especially for affected areas outside the TOD site.

Auckland

According to the Auckland Plan, the housing development planning already aimed to provide flexible housing options with variations of types and tenure due to the city's diverse community. The land use planning also covered the future development of areas outside the TOD site, which shows the long-term planning in the wider-context. However, Auckland is still having a housing affordability crisis. Affordable housing is generally achieve when the median house price is three to four times the median household income, but in 2015, the median house price in Auckland is almost ten times higher than the median household income (Blakeley, 2015). This has made home ownership becoming less likely for young generations.

The challenges come from the lack of land supply, private land ownership, and densification restrictions in the planning policies as the result of public rejections of high-density developments. The demand for housing in Auckland keeps on increasing while the housing supply is low, the unaffordability persists (Blakeley, 2015). The housing development is considered slow due to expensive construction and long consenting process. The emergence of SHA did bring improvement to the Auckland's housing development by putting several sites across the city for fast-track development, but it is not as fast as needed (Harman, 2016).

Singapore

Affordable housing supply in Singapore started from the initiation of Housing and Development Board (HDB) in 1960. The main purpose of HDB is to provide public housing which affordable and yet has a high-quality. In 1959, only 9% of Singaporeans live in the public housing, but today more than 80% of them resided in HDB apartment. Each year the government sells the un-built apartments predominantly to first-time buyers which price are lower than the market price. The public housing in Singapore was designed with flexibility of types and tenure. The unit types range from two types of one-bedroom apartment, three

types of two-bedrooms apartment, five types of three-bedrooms apartment. There is also a medium-high class unit called "Executive Condominiums" (EC) which were allocated for private developers.

The affordability is also achieved through variation of home ownership schemes to give citizens the flexible purchasing method, such as Additional CPF Housing Grant (AHG), Special Housing Grant (SHG), and Parenthood Priority Scheme (PPS). Singaporean also helped by the low instalment interest which resulted in 90% people who resided in the public housing actually owning the unit (HDB Annual Report, 2015). The housing development planning is also complemented by the public housing quota system which ensures the balanced mix of ethnicities to address the diverse community in Singapore. In addition to the housing affordability, the government also located hawker centres which is famous of the cheap price in a close proximity to the housing blocks.

Another interesting concept from planning policies in Singapore are "white sites", which are areas allocated to developers for future developments that can have flexible functions to match changing market demands. This policy helps to maintain the liveability and economic value of the sites, also encourages developers to analyse the market based on people behaviours. The fast and affordable development of public housing in Singapore is the result of long-term planning combined with responsive land-use policies and development monitoring. City planning in Singapore is based on a 50-year period of concept planning, translated into detailed masterplans for each project with a shorter time frame (CLC and ULI, 2013). Also, with 90% of the land owned by government, the affordable rent becomes feasible.

The Sustainability

To understand the extent to which TOD strategies in Jakarta and Auckland are achieving the sustainability, the research focused on the open space, resilient infrastructure, and carbon reduction.

Jakarta

Open space strategy in Jakarta can be optimized to achieve the sustainability since it has the potential to form the centre of a TOD area where public activities take place. This can be seen from citizens' positive reactions for the recently completed Dukuh Atas Garden. However, when looking at the future plans, the public open spaces are concentrated in the MRT station and along the river, while the rest of the area has an only small portion of it. The greenery strategy should be taken seriously since Jakarta has less than 13% green surface area (Jakarta Spatial Planning, 2011). The renewable river corridor which is also included in the open space strategy is a good initiative. However, based on the master plan, the renewal of river corridors is based on more on economic development than ecological restoration. It can serve multiple functions if the restored river corridor can be also an element in resilient infrastructure needed for addressing Jakarta's vulnerability to flooding problems and protecting biodiversity.

Another sustainability constraint is the large amount of park-and-ride provided in the transport hub plan. This is a typical of mixed-use development in Jakarta, where the area will be car-oriented with a large parking structure and usually has no integration with public transport (Adi, 2010). While future transport hubs are considered to have a high chance of solving the problem of disconnected public transports, the park and ride facilities seem to

contradict the purpose of TOD itself. The weakness of park and ride as stated by Laconte (2011: 180) is that "Park-and-ride consumes a huge amount of urban land that could be used more efficiently". The planning should provide a detailed approach to the change expected of the people in the way they travel by restricting car usage and integrating transport hubs with pedestrian and cycling networks. Aside from reducing carbon emission, restricting car usage can also help to solve the congestion problems in Jakarta.

Auckland

Both areas in Auckland have great natural assets that are planned to be improved through various strategic approach adjacent to the "Low Carbon Strategic Action Plan" policy established by AC. The plan also aims to reduce carbon emission through strategic approach for walking and cycling, combined with the use of public transport. Auckland has problems regarding the high auto-dependency and poor patronage of PT since its networks do not cover the whole areas. Similar with Jakarta, there is no congestion pricing or other policy to reduce the car usage. However, the TOD plans have already shown the initiative restricting car usage through limited provision of park-and-ride facilities.

Singapore

Singapore managed to allocate more than 46% of its land for green surface area (Singapore Stats, 2012) through the 'pervasive green' approach, making nearly half of all urban areas green open spaces, despite its limited land area. Another strategic planning policy called 'Park Connector Network' has enabled the Singaporean government to establish a multi-functional infrastructure network which connects open spaces within the city and accommodates walking, cycling, and non-recreational functions like storm water drainage system (Chan, et al., 2011). Furthermore, there is also regulation regarding the density of trees and green buildings to complement the open space preservation.

Learning from Singapore, the government chose to switch to sustainable mobility in order to preserve liveability and reduce air pollution from private vehicles. The transit system in Singapore is designed to provide seamless connectivity through integrated and affordable public transportation, which is the same direction as Jakarta and Auckland. However, Singapore has complemented its transit system with policies that discouraged the use of private vehicles. With its policy called 'Singapore Area Licensing Scheme 1975-2000', the city-state become a pioneer in restricting car ownership, introducing congestion pricing, and encouraging the use of public transport (Laconte, 2011).

Another important aspect of Singapore's sustainability is the resilient infrastructure addressing flood problems. Singapore is a coastal city, similar with Jakarta and Auckland, and therefore has integrated the disaster risk management with its urban planning. Singapore's drainage system is a multi-function infrastructure - it also serves as parks. These parks then become the flood retention areas. Another example of this resilient infrastructure is the Marina Barrage which serves three main functions: storm water drainage system, water resource, and outdoor recreational space (Brecht, 2016). These infrastructures are the result from detail design guideline called "Active, Beautiful, Clean Waters Design Guidelines".

Table 2 Comparative Assessment Summary

Goals	Singapore (SGP) BENCHMARK	Jakarta (JKT)	Auckland (AKL)
Liveability:	• "Walk2Ride" programme • Walking and Cycling Plan (WCP) for every new development • Public housing Renewable programme • 1966 Land Acquisition Act • Design guidelines for vertical housing • Easy access to public spaces	• Late development of pedestrian network • Need detailed planning for cycling facilities supporting pedestrian • Segregated land-use leads to slum problems • Successful civic plaza in Dukuh Atas Garden • Land acquisition causing slow development • Verticalization constraints by current culture & lifestyle preference	• Robust planning of walking and cycling • Large amount of existing public space to be improved • Dividing areas into precincts according to the timeline • Special Housing Area (SHA) • Land-use is planned with the right amount of diversity but constrains by land acquisition • Verticalization constraints by current suburban-lifestyle
		Recommendation: • More detailed planning for walking and cycling • Integration of land ownership under the government for future developments • Providing vertical housing guidelines to preserve the liveability	**Recommendation:** • Integration of land ownership under the government for future developments
Affordability:	• Public housing developed by the government • Flexibility of housing types and tenure • Variations of purchasing method with low interest • Affordable rental price • Quota for racial diversity • "White sites" policy	• Lack of housing options of types and tenures • Low percentage of affordable housing development • Affordable housing development by private developers in town centre areas resulted in unaffordability • TOD masterplans need to consider the long-term planning outside TOD area	• Housing development planning already provides housing options with variations of types and tenures • Land-use accommodating long-term plan • Affordable housing crisis due to lack of land supply, private land ownership & densification restriction • Housing developments

			constraint by expensive construction and long consenting process
		Recommendation: • Providing flexibility of housing types and tenures • Consider increasing the ratio for affordable units provided in TOD housing development and enforce them • TOD housing development under government monitoring • Providing long-term planning for areas affected by TOD projects	**Recommendation:** • Allowing more high-density housing development near PT and public amenities to reduce the high PIR • Considering planning policies to maintain land values and encouraging new developments in addition to SHA
Sustainability:	• 'Pervasive green' approach allocating half of the area for green space • Green building regulation • Sustainable mobility • Policy restricting car usage and ownership • Resilient and multi-functional infrastructure integrated with disaster management	• Open space strategy can be optimized to solve the lack of green surface area • Renewable river corridor has potential for resilient infrastructure addressing flood problems • Large amount of Park and Ride facilities tend to support car-oriented travel mode and discourage the use of PT • No policy to reduce car usage	• Low Carbon Strategic Action Plan to maintain existing natural assets • High auto-dependency due to poor patronage of PT • Limiting park and ride facilities (1:4 ratio) • No policy to reduce car usage

		Recommendation: • Optimization of open space to encourage public activities in the TOD area • Space allocation for Park and Ride can be used for other facilities like multi-function public open spaces • Considering planning policies to reduce car usage and encouraging the use of PT	**Recommendation:** • Improve the patronage of PT • Considering planning policies to reduce car usage in addition to limited park and ride

5. Conclusion

Similar with many growing cities in the world, Jakarta and Auckland adapted the TOD strategy in facing the challenge of rapid population growth and land shortage, and the desire to build a more compact city. But the compactness is not an aim in itself – the aim is quality of life, at a reasonable price, in balance with the nature's capacity to support the urban way of life of the millions. We have termed these three goals for short – Liveability, Affordability and Sustainability (L-A-S). This paper investigated to what extent TOD strategies can achieve the L-A-S in both cities using four redevelopment areas: Dukuh Atas and Lebak Bulus in Jakarta, New Lynn and Onehunga in Auckland, as the relevant case studies.

According to the literature of TOD and compact city, the compact urban form is considered liveable, affordable and sustainable when it comprises of mix of uses within the walking distance from supporting extensive transit systems. The concept of TOD is relatively new in both cities and the outcomes are still questionable with respect to the L-A-S criteria. Drawing examples from Singapore as one of the most successful compact cities in the world, this paper offers recommendations for TOD projects in Jakarta and Auckland to achieve the L-A-S goals.

In the case of Jakarta, TOD concept policy can actually achieve the L-A-S subject to the following conditions: that the extensive transit system is complemented with robust planning of walking and cycling; land integration under the government enabling long-term planning; verticalization framed by vertical housing guidelines providing variations of types and tenures; open spaces optimised for human comfort while also creating resilient infrastructure; and the limitation of car usage to encourage the use of PT.

Likewise, in the case of Auckland, TOD concept policy can actually achieve the L-A-S subject to the following conditions: that the transit interchange is supported by extensive walking and cycling networks; integration of land ownership for long-term developments; high-density housing and mixed-use developments; improved patronage of PT; and planning policies to reduce car usage.

It is also clear that there are other factors influencing the success of TOD projects such as the synergy between planning policies and TOD; active public-private partnership for TOD developments; community engagement; and government support for the vision stability.

Considering the limited scope of this paper, further study is required to analyse the implementation of TOD concept policy in a bigger sample of projects if we are to assess comprehensively the L-A-S outcomes. Also, the research into case studies cannot limit itself to the analysis of master plans of projects currently under construction - future research must investigate the completed, post-occupancy outcomes too. Finally, there should be a finer level of detail on this type of research, assessing the urban design, landscape and architectural solutions at the level at which they actually touch the lives of residents.

Bearing in mind the relentless expansion of cities worldwide and the popularity of the TOD approach as a chief policy for moderating that expansion, it is fair to say that monitoring and investigating the actual L-A-S outcomes of this policy is one of the most important avenues in the 21th century urban planning research agenda.

6. References

Adi, P., 2014. *Next Level - Public Transport and Density Metropolitan Jakarta.* Shanghai, Council on Tall Buildings and Urban Habitat.

Alexander, H. B. & Haryanti, R., 2018. *TOD Pasar Senen dan Peluang Mengembalikan Kejayaan.* [Online]
Available at: https://properti.kompas.com/read/2018/12/19/231020821/tod-pasar-senen-dan-peluang-mengembalikan-kejayaan?page=all
[Accessed 05 2019].

Anon., 2010. *New Lynn Urban Plan 2010-2030,* Auckland: s.n.

Apinino, R., 2017. *Mereka yang Tersingkir Karena Proyek MRT.* [Online]
Available at: https://tirto.id/mereka-yang-tersingkir-karena-proyek-mrt-cyNq

Auckland Council, 2019. *About the Auckland Plan 2050,* s.l.: s.n.

Auckland Transport;, n.d. *New Lynn Transit-Oriented Development.* [Online]
Available at: https://at.govt.nz/projects-roadworks/new-lynn-transit-oriented-development/
[Accessed 05 2019].

Blakeley, R., 2015. The Planning Framework for Auckland 'Super City' an insider's view. *Policy Quarterly,* pp. 3-14.

Bogunovich, D., 2009. From planning sustainable cities to designing resilient urban regions. In *WIT Transactions on Ecology and the Environment*, Vol 120, Southampton: WIT Press.

Bogunovich, D., 2012. Urban Sustainability 2.0: Resilient Regions, Sustainable Sprawl and Green Infrastructure. In *WIT Transactions on Ecology and the Environment*, Vol 155, Southampton: WIT Press. Online:

https://www.witpress.com/elibrary/wit-transactions-on-ecology-and-the-environment/155/23097

Brecht, H., 2016. *Can Singapore inspire Laos to build water-smart cities?.* [Online]
Available at: https://blogs.worldbank.org/water/can-singapore-inspire-laos-build-water-smart-cities
[Accessed 09 2019].

Calthorpe, P., 1993. *The Next American Metropolis. Ecology, Community, and the American Dream.* New York: Princeton Architectural Press.

Calthorpe, P., 2011. *Urbanism in The Age of Climate Change.* Washington: Island Press.

Carina, J., 2018. *Warga Umum Bisa Sewa Rusunawa, Ini Syarat yang Harus Dipenuhi....* [Online]
Available at: https://megapolitan.kompas.com/read/2018/10/17/21025311/warga-umum-bisa-sewa-rusunawa-ini-syarat-yang-harus-dipenuhi
[Accessed 06 2019].

Center for Liveable CIties and Urban Land Institute, 2013. 10 Principles for Liveable High-Density Cities. Lessons from Singapore..

Chye, B., 2019. *Transit-Oriented Development in Emerging Cities: Principles from Singapore.* [Online]
Available at: https://www.oxfordurbanists.com/magazine/2019/3/9/transit-oriented-development-in-emerging-cities-principles-from-singapore

Dittmar, H. & Ohlan, G., 2004. *The New Transit Town: Best Practices in Transit-oriented Development.* Washington: Island Press.

Governor of DKI Jakarta, 2017. *Governor's Regulation of DKI Jakarta Number 44: Transit Oriented Development Area,* s.l.: s.n.

Hidayat, R., 2017. *Proyek Rusun di Stasiun Kereta yang Panen Masalah.* [Online]
Available at: https://tirto.id/proyek-rusun-di-stasiun-kereta-yang-panen-masalah-cAcq
[Accessed 05 2019].

ISOCARP Review 07, 2011. *Liveable Cities: Urbanising World.* Hague: ISOCARP.

Jabareen, R. Y., 2006. Sustainable Urban Forms. Their Typologies, Models, and Comcepts.. *Journal of Planning Education and Research,* pp. 38-52.

Jakarta Capital City Government, 2012. *DKI Jakarta Spatial Planning 2030,* s.l.: s.n.

Jakarta Capital City Government, 2012. *Urban Guide Line Design, Development of MRT Jakarta,* Jakarta: Jakarta Capital City Government.

Jakarta Capital City Regional Development Planning Board, 2013. *Republic of Indonesia Jakarta Integrated Urban Transport Hub Development Final Report,* s.l.: JAPAN INTERNATIONAL COOPERATION AGENCY (JICA).

Japan International Cooperation Agency (JICA), 2015. *Preparatory Survey for Lebak Bulus Station Area Development Project in Indonesia,* Jakarta: Tokyu Land Corporation.

Jha, A., 2018. *"But what about Singapore?" Lessons from the best public housing program in the world.* [Online]
Available at: https://blogs.worldbank.org/sustainablecities/what-about-singapore-lessons-best-public-housing-program-world
[Accessed 06 2019].

JICA, 2011. *Commuter Survey final report of Jabodetabek urban transport policy integration. ,* Jakarta: Coordinating Ministry of Economic Affairs Republic of Indonesia.

JICA, 2012. *Greater Jakarta Metropolitan Priority Area (MPA).* [Online]
Available at: https://www.jica.go.jp/french/news/press/c8h0vm00001ner7c-att/121009_01.pdf

Katz, P., 1993. *The New Urbanism: Toward an Architecture of Community.* New York: McGraw-Hill, Inc..

Kresna, M., 2017. *Beda Nasib Penghuni Rusun Bersubsidi.* [Online]
Available at: https://tirto.id/beda-nasib-penghuni-rusun-bersubsidi-cfDM
[Accessed 05 2019].

Le, L. X., 2016. *What Vietnam can learn from Singapore about flood risk management.* [Online]
Available at: https://blogs.worldbank.org/sustainablecities/what-vietnam-can-learn-singapore-about-flood-risk-management
[Accessed 06 2019].

L, M., 2013. *More new apartment developments appearing.* [Online]
Available at: https://www.greaterauckland.org.nz/2013/10/02/more-new-apartment-developments-appearing/
[Accessed 06 2019].

L, M., 2018. *The First CRL Breakthrough.* [Online]
Available at: https://www.greaterauckland.org.nz/2018/12/10/the-first-crl-breakthrough/
[Accessed 06 2019].

Mariani, E., 2010. *Jakarta 2030? Draft plan not looking good.* [Online]
Available at: https://www.thejakartapost.com/news/2010/01/08/jakarta-2030-draft-plan-not-looking-good.html
[Accessed 05 2019].

Marks, M., 2016. *People Near Transit: Improving Accessibility and Rapid Transit Coverage in Large Cities.* [Online]
Available at: https://www.itdp.org/

Newman, P. & Kenworthy, J., 1999. *Sustainability and Cities: Overcoming Automobile Dependence.* Washington: Island Press.

OECD, 2012. *Compact City Policies. A comparative Assessment. OECD Green Growth Studies.* s.l.:OECD Publishing.

Ollivier, G. & Djalal, D., 2017. *Transit-oriented development and the case of the Marina Bay area in Singapore.* [Online]
Available at: https://blogs.worldbank.org/eastasiapacific/transit-oriented-development-and-case-marina-bay-area-singapore
[Accessed 06 2019].

Panuku Development Auckland, 2017. Auckland: s.n.

PDW Architects, 2019. *Laporan Final Dek Pejalan Kaki Dukuh Atas,* Jakarta: PDW Architects.

PT MRT Jakarta, 2017. *Achieving The Milestones. Annual Report 2017,* Jakarta: PT MRT Jakarta.

Rodrigues, A., 2018. *Transit Oriented Developments and some of the underlying factors influencing them.* [Online]
Available at: https://www.greaterauckland.org.nz/2018/07/10/transit-oriented-developments-and-some-of-the-underlying-factors-influencing-them/
[Accessed 05 2019].

Singapore Housing and Development Board ;, n.d. *Public Housing – A Singapore Icon.* [Online]
Available at: https://www.hdb.gov.sg/cs/infoweb/about-us/our-role/public-housing--a-singapore-icon
[Accessed 06 2019].

SOM, n.d. *MRT JAKARTA TRANSIT-ORIENTED DEVELOPMENT MASTER PLAN.* [Online]
Available at: https://www.som.com/projects/mrt_jakarta_transit-oriented_development_master_plan
[Accessed 05 2019].

Thomas, R. et al., 2018. Is transit-oriented development (TOD) an internationally transferable policy concept?. *Regional Studies,* Volume 52, pp. 1201-1213.

TOTALINDO;, n.d. *TRANSIT ORIENTED DEVELOPMENT (TOD) LEBAK BULUS – JAKARTA SELATAN.* [Online]
Available at: http://totalindo.co.id/portfolio-items/transit-oriented-development-tod-lebak-bulus-jakarta-selatan/
[Accessed 06 2019].

W, Budiati et al, 2018. Determining the potential for Transit Oriented Development along the MRT Jakarta corridor. *IOP Conference Series: Earth and Environmental Science.*

Wang, X., 2018. *Livability to start with the neighborhood – Singapore's stories (Part 2/2).* [Online]
Available at: https://blogs.worldbank.org/sustainablecities/livability-start-neighborhood-singapore-stories-part-2
[Accessed 06 2019].

Wang, X., 2018. *Livability to start with the neighborhood – Singapore's urban practice (Part 1/2).* [Online]
Available at: https://blogs.worldbank.org/sustainablecities/livability-start-neighborhood-singapore-urban-practice-part-1
[Accessed 06 2019].

Widhana, D. H., 2016. *Balada Korban Penggusuran yang Tinggal di Rusun.* [Online]
Available at: https://tirto.id/balada-korban-penggusuran-yang-tinggal-di-rusun-ccoQ

Widhana, D. H., 2016. *Balada Korban Penggusuran yang Tinggal di Rusun.* [Online]
Available at: https://tirto.id/balada-korban-penggusuran-yang-tinggal-di-rusun-ccoQ

Widhana, D. H., 2016. *Penghuni Rusun: "Harapan Saya Punah".* [Online]
Available at: https://tirto.id/penghuni-rusun-harapan-saya-punah-ccoU

Wijaya, C. A., 2018. *Expert urges Jakarta to focus on adding more green spaces.* [Online]
Available at: https://www.thejakartapost.com/news/2018/03/08/expert-urges-jakarta-to-focus-on-adding-more-green-spaces.html
[Accessed 05 2019].

Research Paper

The application of micro-regeneration strategy in urban renewal in northern Lima, Peru

Bo Bian, School of Architecture, Southeast University; China

Abstract

Lima, the capital city of Peru, is situated within the country's desert region on the Pacific coast and bordered by the Andes Mountains to the East. It is one of the most fast developing city shifting from both formal and informal urban construction. While traditional renewal model and strategy cannot deal with new situation and complex urban problems of this mega city due to its inner and outer contradictions and complexity.

This paper analyses the current situation of San Martin de Porres, a typical district in the northern part of the city, which grew towards the Chillon river corridor mainly during the second half of the twentieth century. It conducts investigation and analysis on the current situation related to social, economy and infrastructure system in this district. It shows that from the perspective of planning and design, urban scale top-down interventions have little positive impact on individual realities. On the opposite, much of the society's knowledge and useful space are created by the residents' active behaviour and informal activities, which belong to the bottom-up strategy, and they provide the source for urban vitality.

Based on the above content, the paper puts forward the micro-regeneration strategy based on the theory of organic renewal and daily life, which mainly includes three aspects: urban catalysts, space design and corporate mechanism construction.

The paper investigate different potential urban catalysts based on the feature of different functional space. It includes the most symbolic area that the latter design would applied to the whole province practically. Space design consists of four aspects: riverbank reuse, street renovation, community building and neighbourhood space transformation. The paper introduces community-based organization and governmental structure based on current top-down model and residents' activities in order to push on the practical work that all the other area could follow.

It tries to stimulate the improvement of the current situation and hopes to provide a new mode for the development of this mega city and similar practice.

Keywords

Lima, micro-regeneration, urban renewal, bottom-up

1. Introduction

Globalization and neoliberalism have caused dramatic changes in urban labor market, leading to the rapid development of informal economy and houses in developing countries, which formed the informal city (Hansen & Vaa, 2004). Normally it comes from small scale activities for the purpose of survival that are self-conducted by the poor people whose needs

that the government could not meet of (Hernando, 1989). Although the majority of informal activities are classified as illegal because they lack governmental control, these activities are considered normal rather than exceptional since informal employment take up more than half of employment in developing countries. At the meantime, some scholars use the concept of informal sector in the area of ethnic groups and activities (Kate, 2009). The urban poor who want to improve their living conditions conduct these activities. They volunteered to organize groups to mediate or confront with government or other interest groups. As a result, a self-determined informal social network was formed (James, 2011).

Lima is the capital city of Peru, a typical developing country that informal economy, informal houses and informal social groups are important parts. While most research on informal sector that have been done are focusing on economy and policy, little have been done on urban planning and design. We have to admit that we do not achieve desired effect by using policy-making tools to control the informal city. While it is great opportunity to reorganize and improve the informal city from the perspective of space planning and design. This paper proposes to use micro-regeneration strategy in terms of space design to provide a sustainable method for northern Lima based on our research.

2. Current condition

2.1. Basic information

Lima is situated within the country's desert region on the Pacific coast and bordered by the Andes Mountains to the East with the Rimac River flowing through its center towards the Pacific just north of La Punta in Callao. Modern Lima connects multiple historical centres: the colonial city centre (and the government seat of Lima) was established inland on the Rimac River but later expanded towards the Pacific coast connecting to the towns of Callao to the west, Magdalena del Mar, Miraflores and Chorrillos to the south. The city also grew northward towards the Chillon river corridor mainly during the second half of the twentieth century (Marwan, 2017).

(a) (b) (c)

Figure 1 Basic location; (a) Peru in Latin America; (b) Metropolitan Lima in Lima city; (c) Lima district

Source: www.mapsofworld.com/south-america/

2.2. Problem

Unlike the centre area and the southern area, which already have been preserved and renewed to some extent, the northern area is suffering from unlimited urban sprawl and

low-quality urban renewal. As a result, the northern area appears inequality and geographically segregation in different fields such as social level, working opportunity, infrastructure provision etc. In the northern area, much of the formal workers and formal houses are near the main north-south road and the city center, where there are more high quality educational and health institution, as well as better transportation, electricity and water facilities. In addition, the average income of informal workers (take up 2/3 of all workers in metropolitan Lima) is less than 1/3 of that of formal workers.

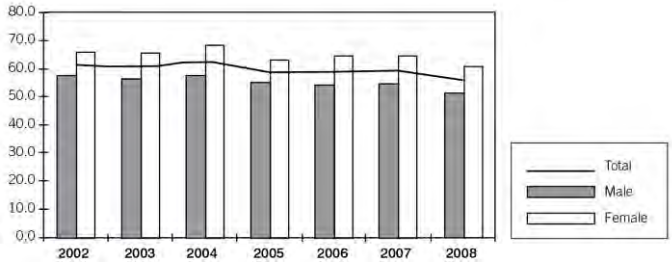
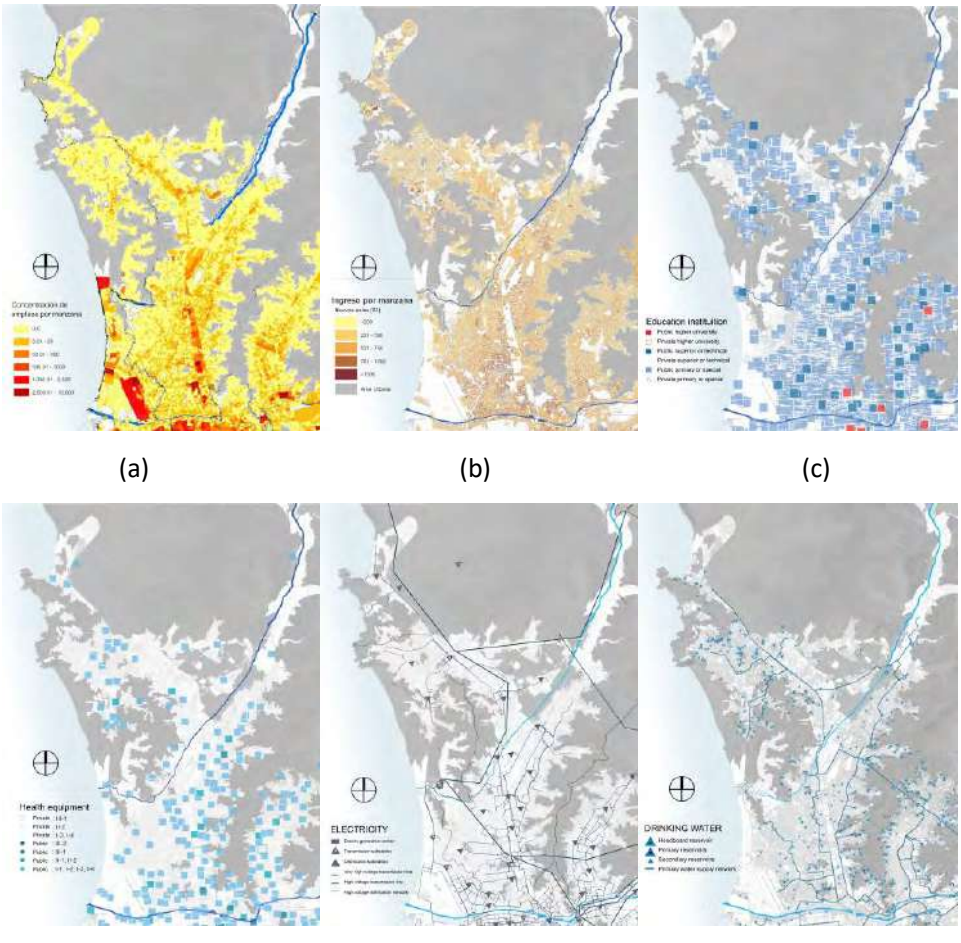


Figure 2 Informal Sector Labour Participation by Gender, Metropolitan Lima 2002–2008

Source: Own calculation OLA raw estimates



(a) (b) (c)

(d) (e) (f)

Figure 3 Maps of distribution; (a) Formal employment opportunity; (b) Average income; (c) Educational institution; (d) Health equipment; (e) Electricity; (f) Drinking water;

Source: INEI (2007), PLAM

2.3. Cause

2.3.1 Government's oppression on informal sectors

The Metropolitan Municipality of Lima is the utmost authority of the entire city while each district has its own local government and local political leaders. What makes things worse is that, since Lima is the capital of the country, the central government often contravenes its urban planning. This three-tier government system creates high negotiation costs in infrastructure-building programs in Lima and lowers the efficiency of government bureaucracy. The municipalities have only paid attention to the need for urbanization land, but not to the provision of services and equipment, such as housing production, issues which are principally in the hands of the central government (Li, 2014). It does not construct a reasonable top-down governmental system, nor a rational mass basis. The district government usually puts money in the formal area where there are more high-income residents to achieve high profit instead of improving the living environment of low-income residents, thus increasing the gap between the formal and informal, as well as the high-income and low-income residents.

Informal economy is one of the main working patterns in metropolitan Lima, and it is the choice of the majority of low-income workers. This kind of economy are well received in the informal area and the informal system are complete enough to run by themselves. However, the government controls the overall system of the city. As a result, informal economy does not occupy position in formal economy; some informal workers with high education level cannot get chances in formal working. The government is fears that the grassroots' nature of informal economy will overthrow the formal economy (Hernando, 2010).

2.3.2 Low quality of informal groups

The government controls the construction of infrastructure in Lima, any organizations and individuals as well as local administrations and groups are unable to provide necessary infrastructure. Thus, informal residents can only get access to the infrastructure by illegally connecting themselves to the infrastructure in formal area. This inefficient and illegal activity is the main way for many informal residents to obtain public facilities includes water and electricity, as well as education and medical facilities, which are at relatively low level.

Economic crisis from 1973 has caused the cut of formal jobs; many highly educated and skilled workers lost their original jobs and entered informal jobs. People with low educational level and low working skills are losing opportunities to compete in the increasingly fierce job competition. A growing number of people are becoming unemployed residents or even vagrants (Gustavo, 1996).

2.4. Cause

Urban scale top-down interventions have little positive impact on informal individual realities. On the opposite, much of the informal society's knowledge and useful space are created by the residents' active behaviour and activities, which belong to the bottom-up strategy, and they provide the source for urban vitality. In addition, informal sector has long been considered as illegal while the type and scale of informal sector is huge enough that it benefits the development of the whole city. However, the barriers between formal and informal sectors result in inability of informal activities and growing gap between them. This will make the inequality problems between formal and informal groups even worse. We should manage to give suitable rights to informal groups and place them in the right position to solve the problems we are facing and let them play effective roles in the future.

3. Exploration and practice on informal sector

Based on the above studies, this paper hope to review the research on informal sectors, especially the various theory of policies and practices, looking for the opportunity to promote the urban renewal and urban development of informal area in a positive way.

3.1. Need for space design

In early stages, policies and related research are mainly focus on informal houses. The majority believe that the urban poor who live in the informal houses are rational actor. It means that they build these houses because the government and market did not provide enough suitable houses for them. As a result, they build these cheap and simple houses to meet their demands.

In 1976, World Bank published a report (George, et al., 1976) on developing countries and it tells that governments in Asia, Africa, and Latin America have implemented a range of policies to integrate informal settlements—spatially, economically, and politically—in the overall management of cities (Angel, et al., 1993). It was popular for architects and urban designers to use planning and design methods to improve the physical environment. However, those plans ignored the social reality of informal communities and it turned to be ineffective (UNHCR, 2010).

At the same time, the World Bank proposed an In-situ upgrading strategy under the resistance to moving out from informal residents. In addition, it continued to proposed service-sites plan, which was very attractive to the local people (Bishwapriya, 2014). However, in early 1980s, it proved to be not sustainable because it required too much subsidies and public organizations could not earn from it (Michael, et al., 1983).

3.2. Inefficient policies

From the 1980s, the government started to turn from a few projects into comprehensive management as well as public policies and it provide better markets for land, housing and commercial functions (Michael & Robert, 1984). However, many of the reform programs were difficult to be put into effect because those programs were not practically relevant to the residents. On the opposite, residents were still willing to accept the specific community plans made by developers (Mukhija, 2016).

In addition to the top-down strategies, bottom-up process was also of vital importance. While informal residents had their own groups, they were not free from political and economic power. The organizations that wanted to get rid of governmental control still needed to receive support from the higher authorities or folded into government organizations (Elliott, 1984) and the government still needed to maintain its status and manage the community resource (Elinor, 2000).

3.3. Reform of informal sectors

Scholars such as De Soto held the view that informal residents should receive legal rights of their houses. While it was difficult to form such a complex system, De Soto thought that suitable reform of the system could help to promote the building of the whole system (Hernando, 2000). As a result, public organizations and informal residents who received legal rights could quickly put the system into effect at a lower cost, which was similar to the process of promotion between democracy and capital system. Other organizations such as NGOs could get involved and act as mediators between government and residents to cut the

cost and speed up the formation of the informal community system (Ruth & Esther, 2009). De Soto's concept of legalization was a tentative idea and the International Labour Organization in the conference responded this concept in 2014 and 2015. It called on that the existing informal lifestyle should be preserved and improved. Public space could become the working space for informal workers and suitable regulations should be made to guarantee the rights of using the public space and resources (ILO, 2015).

3.4. Conclusion

The consequence that informal urban sprawl caused in Lima cannot be reversed while the gap between formal and informal sectors is widening because of the de-legalization of informal sectors and government's focus on formal area. The voice of constructing informal legalization system in metropolitan Lima is getting higher while it is difficult to predict and control the consequences caused by major changes in policy and system based on past events. It is more acceptable for informal residents to receive the changes of surrounding space and daily activities in relatively small scale. It is impossible for the government to provide countless affordable houses or to reform the fundamental informal policies rapidly. On the opposite, it is practical to form a system controlled and financially supported by government, led by residents' association, mediated and invested by non-government associations to renew the informal communities and to improve the informal activities in a relatively small scale. Therefore, the paper proposes to use micro-regeneration strategy in focusing area in northern Lima.

4. The concept of micro-regeneration and its application

4.1. Origin and definition

The concept of "micro" originated from the "Internet plus" period in China. With the development of internet, cost of acquiring resources for the individuals become cheaper, which means that it is easier for individual development and exchange of knowledge. As a result, there exist a variety of idea and product taking the concept of micro as core idea. Micro-regeneration is the application of micro concept in urban planning and design and it was first applied to old building renewal in historic cities. Nowadays, it is difficult to use traditional planning methods to solve all the city problems at one time. With the popularity of urban renewal, professional teams and organizations started to use micro-regeneration strategy in community and city level.

Micro-regeneration strategy is based on the theory of organic renewal, keeping the overall city structure and cityscape. At the same time, it emphasizes the bottom-up process and encourages residents' association to take part in urban renewal process. As city is a complex system, the strategy follows the developing order to avoid unpredictable consequences. It renews part of local site to stimulate continuing self-regeneration process and it hopes that this small-scale renewal will have positive effect on local residents that they would like to follow. As a result, micro-regeneration will achieve influential and sustainable changes that would solve the city problems. This strategy may be suitable for the social and space renewal in informal area.

4.2. Form and mode

Under the influence of early renewal methods, traditional urban renewal lacked consideration of the public interest. Urban renewal a tool to reflect the will of the

government, realize the personal values of designers and profitability of developers. With the development of society, the urban organic renewal model began to pay attention to two important topics of public participation and non-material environmental protection. Compared with the urban renewal under the intervention of external forces, the micro-renewal concept advocates the development model based on endogenous power, and the public's renewal demand is the core.

Under the influence of the early renewal methods, traditional urban renewal lacked consideration of public interest. It usually became tools to show the authority of government and to realize the personal values of designers and profitability of developers. With the development of society, organic renewal method started to pay attention to public participation and intangible environment protection. Compared to traditional urban renewal that was under the intervention of external forces, the micro-regeneration strategy follows the core idea of organic renewal and advocates the method based on endogenous power from the residents.

Overall, micro-regeneration mainly includes three aspects.

(1) The development mode is based on the residents' interest. Traditional urban renewal is top-down mode, which is too simple that residents could only observe or even resist. On the opposite, micro-regeneration pays much attention on residents' needs and emphasizes on following the inherent characteristic and of the area to increase the continuity of urban renewal in time. As a result, residents will initiate to form self-renewal system based on the bottom-up community cultivation.

(2) Source of funds become wider. Source of funds in traditional urban renewal are mainly from governmental subsidies and developers' investment. While trustworthy groups' funds from community residents and NGOs can guarantee the reliability of the use of funds in micro-regeneration.

(3) Organizational structure changes from top-down mode to bottom-up mode. The government dominates traditional urban renewal with developers putting it into effect. Designers only exist in the initial stage and residents can hardly participate in the process. While residents are at the core in micro-regeneration process and they raise their needs and goals. Developers become professional advisers with designers helping the work. Government will do the managing works with NGOs act as mediators between different groups to achieve multi-party services and protect every groups' interest.

4.3. Operation process

Micro-regeneration mainly includes three operation stages: urban catalysts selection, space design and corporate mechanism construction.

(1) Micro-regeneration manages to choose suitable urban catalysts based on current situation. In 1989, Wayne Atton and Donn Logan put forward the idea of urban catalysts (Wayne & Donn, 1989). It tells that urban catalyst is not the final product of simple urban renewal while it can stimulate and lead the follow-up development. This action is aimed to promote the development of the area in a continuous and gradual way.

(2) Space design not only focus on the practical plan of public space, but also emphasize on the implementation on stages. It changes current static planning into dynamic planning and it combines planning-making with management and construction action. By doing so,

government and residents can work together to manage the area from target setting to strategy practicing and space renewal. At the same time, it can adjust the plan based on the change of political, economic and social factors at any time to renew the area in the most realistic and suitable way.

(3) Corporate mechanism mainly includes two aspects. On one hand, it guarantees that the developing mode, resources of fund and main body of responsibility are shown clearly to the public in every steps of the construction. On the other hand, bottom-up feedback mechanism can be formed among the residents to keep the sustainable renewal after the initial project at the center public space.

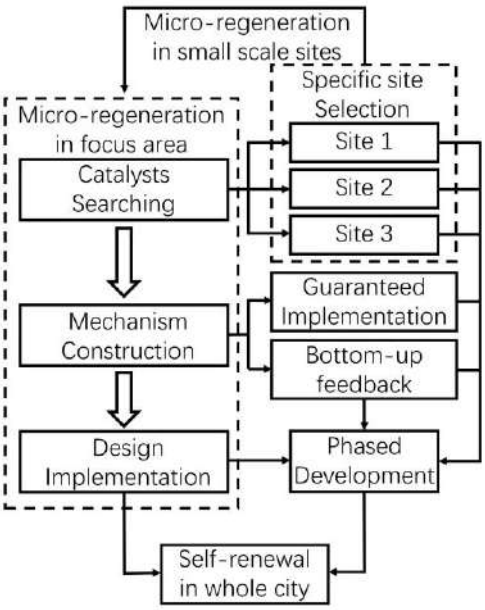


Figure 4 Process of micro-regeneration strategy

5. Proposal of micro-regeneration in northern Lima

5.1. Selection of focus area

Based on the above research, the focus area in San Martin de Porres near Los Olivos is the place where the gap between rich and poor is the greatest. It is practical that we use this most typical area as an example to get involved.

Another reason why we choose this area is that the proximity of space to wealthy area brings certain opportunity to the informal area (Janice & Fernando, 2011). Perman's research shows that poor residents who live near the rich area have higher possibility of improvement in living conditions than those who live in the periphery area. More working opportunities, closer distance between working place and residence, gaining more knowledge and information through contact with employers, better education for child are all reasons that lead to the result. As a result, in-place renewal and upgrading residential area are highly supported by the public.

Figure 5 Location of focus area

5.2. Planning and design process

Based on the operational strategy of micro-regeneration concept, this paper summarizes the specific planning and design process into three parts.

(1) Classify the whole area into different semi plots according to the space, social, cultural and economic characteristics. Summarize the core problems and feature of different plots.

(2) Search for potential catalyst sites different plots that ensure the representativeness and typicality of the selection. Guarantee that the planning and design methods can be applied to other sites.

(3) Study the characteristics and needs of different political bodies. Design a complete and renewal mechanism to provide sustainable space update guidance and political system.

5.3. Catalyst design

Based on the above analysis of current problems and concept of micro-regeneration, this paper finds three typical catalyst sites as listed below, aiming at the problem such as poor operating of social environment, disordered informal market, insufficient supply of public facilities, and low quality of public activities' space. The paper discusses the design and planning potential and formulate corresponding renewal mechanism based on current conditions.

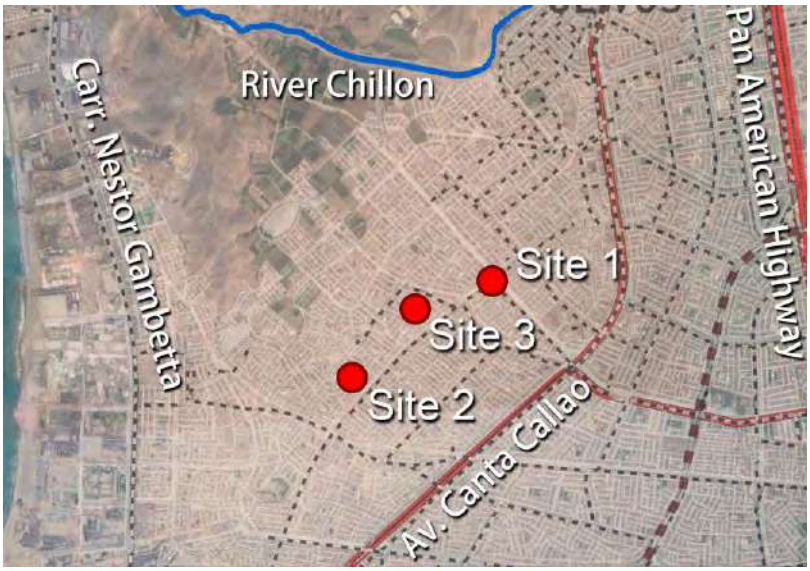


Figure 6 Map of selected sites

5.3.1 Site 1: Main street and central market

This site is located at the intersection of two major streets in the district; the planning area is about 24,000m2. The east-west street is the widest in the site while the north-south road is just a secondary road. Most cars pass through the east-west street to reach the expressway on the east. However, all the roads are in low condition with too much dirt. Residential houses and some undeveloped open ground take up most of the space in this area.

It is a region with a large population but lacking enough infrastructure and basic central markets. While the location and commercial environment of this area make it have the potential to become the public center of leisure and business function. At the same time, not only vendors or market sellers that need the public space, but also the pedestrians, vehicles and people doing recreational activities. Normally, planning and design are based on land use zoning that one particular area of land can only have one single category of use. But in Lima, various people and activities, as well as function space should be adapted to each other. It is because that mixed, flexible land use and eclectic management by free and active idea are the characteristics of informal society. Therefore, this paper hopes to use the core functions of commercial and daily living activities to form a cluster space of multiple functional activities in district level. The renewal process is divided into three stages.

(1) Early market formation period.

The government seldom understands the specific and differentiated location and service requirements of informal residents. They also do not know the informal activities match the local, national and even international value chains (Rosemary & Peter, 2009). Therefore, informal groups formed by experienced residents should lead the informal sellers to gather and conduct their activities especially the informal economy activities, forming a preliminary business and activity environment. Then the sellers together with developers and NGOs can form a market committee to decide how to use the public space and unused houses, and to build a central market or even commercial complex. At the same time, the committee act as supervisor to manage and control the operation of the market.

(2) Market upgrade period

The government can intervene appropriately to provide part of funds, and they can call on the local experienced developers and designers of mega projects to help to build the central market or to transform and rebuild the existing buildings. As a result, central market with elements of informal sectors as the core can be formed, and a variety of commercial and leisure activities can be conducted at this site to improve the social, cultural and economic environment.

(3) Complete development of market leisure area

In order to avoid the negative effect caused by informal activities that was popular in other area, residents' association and the government as well as other interests' groups are involved in the management and supervision of the site. It is important to change the existing chaos of the streets but also to maintain the social vitality of informal activities.

It hopes to form a self-renewal mechanism led by the residents' association and supported by the government and other interest groups. Integrate informal economy carriers such as vendors or retailers in bad business who do not have suitable physical space and provide them with an area to play a role of informal sectors. At the same time, it will improve the upgrading of the physical public space in the surrounding area, realizing the sustainable renewal of this commercial and leisure center.

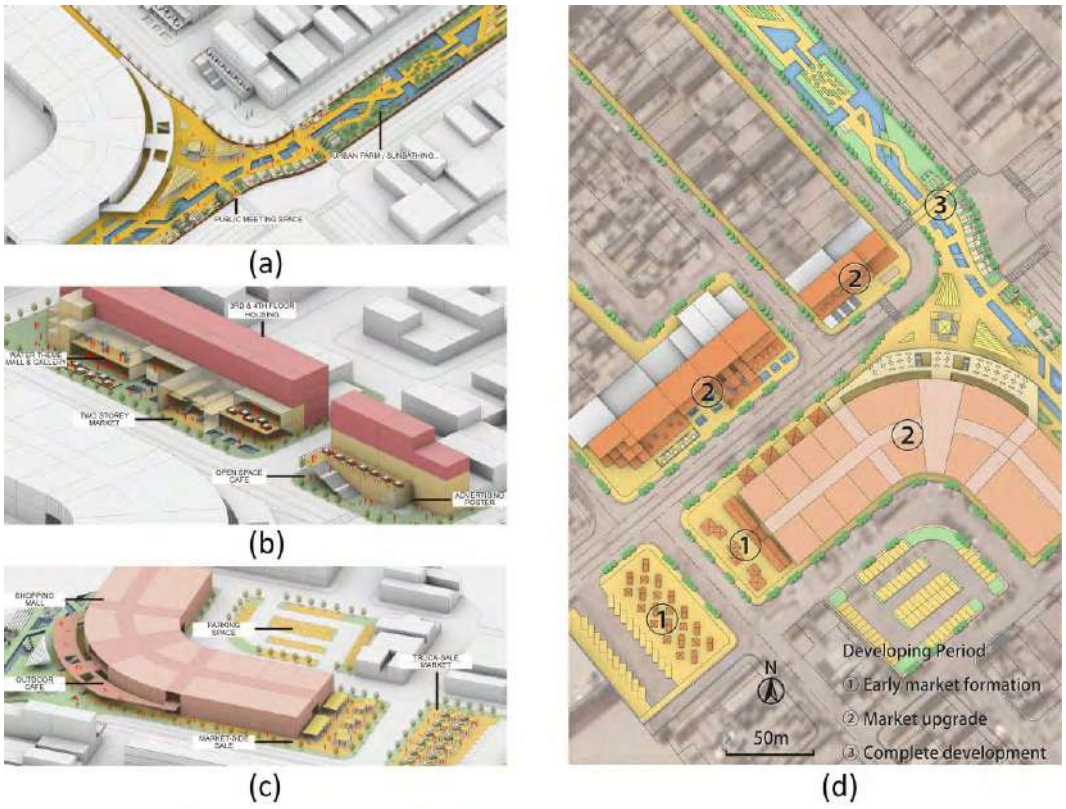


Figure 7 Space design in market renewal; (a) Street leisure area; (b) Building transformation; (c) Market transformation; (d) Plan of market renewal

Figure 8 Map of market renewal mechanism

5.3.2 Site 2: Community center

This site is located near the secondary road inside the main community; the planning area is about 24,000m2. This site is one of the typical undeveloped area that is in large scale within the community. On one hand, its location is good for the internal and external exchanges of various activities. On the other hand, large area undeveloped space has the potential to supplement the infrastructure of nearby communities. Moreover, the renewal process is divided into three stages.

(1) Early community center formation period

The formation of community center needs the gathering of public enthusiasm, increasing of public activities as well as building of community social networks. We encourage vendors and informal market sellers to conduct their selling here, but in small scale that take up only part of the space. Once the accessing to public space is guaranteed, basic infrastructure such as running water and toilets, as well as services such as garbage removal, are urgently needed, which is generally beneficial to all users, including residents (Sally, 2014). This is the starting point of improving infrastructure quality for the whole community. The funds of early improvement should come from residents themselves and reliable residents' association, as well as local developers. When small shops and enough power supplies are in in place, vendors will carry out more profitable and more valuable business activities such as sewing and repairing (Richard, et al., 2009). It provides great opportunity for daily gathering and other activities.

(2) Community management upgrading period

With the daily gathering of residents and the availability of basic infrastructure, residents' association and other community groups can form a community agency and start to manage and coordinate among the community. During this period, the community agency leads investigate and record the basic information of residents, forming a file management system. On one hand, it is easy to find and to try to solve the core problems in community. On the other hand, multi-groups formed by residents and various local groups can prevent from single organizational structure and the inequality of interests' distribution. As a result, the overall quality of social and living environment can be improved.

(3) Community training maturity

When infrastructure quality and social networks are relatively mature, what still need to be addressed is the quality and ability of residents and government's knowledge of informal sectors. On one hand, it is important to provide more education agencies to increase the knowledge level and thus increase the working opportunity for informal residents. On the other hand, government staff should come to informal communities and learn about the specific needs of the informal society. It provides the fundamental opportunity to build up connection between informal and formal sectors in the future.

On the whole, based on the current situation that existing informal groups have their own social networks but are unable to improve their social level, the paper attempts to use the undeveloped area in the site to improve the infrastructure level, to cohere the informal community, and to build better managing groups. Thus, it hopes to achieve an overall improvement of the informal community.

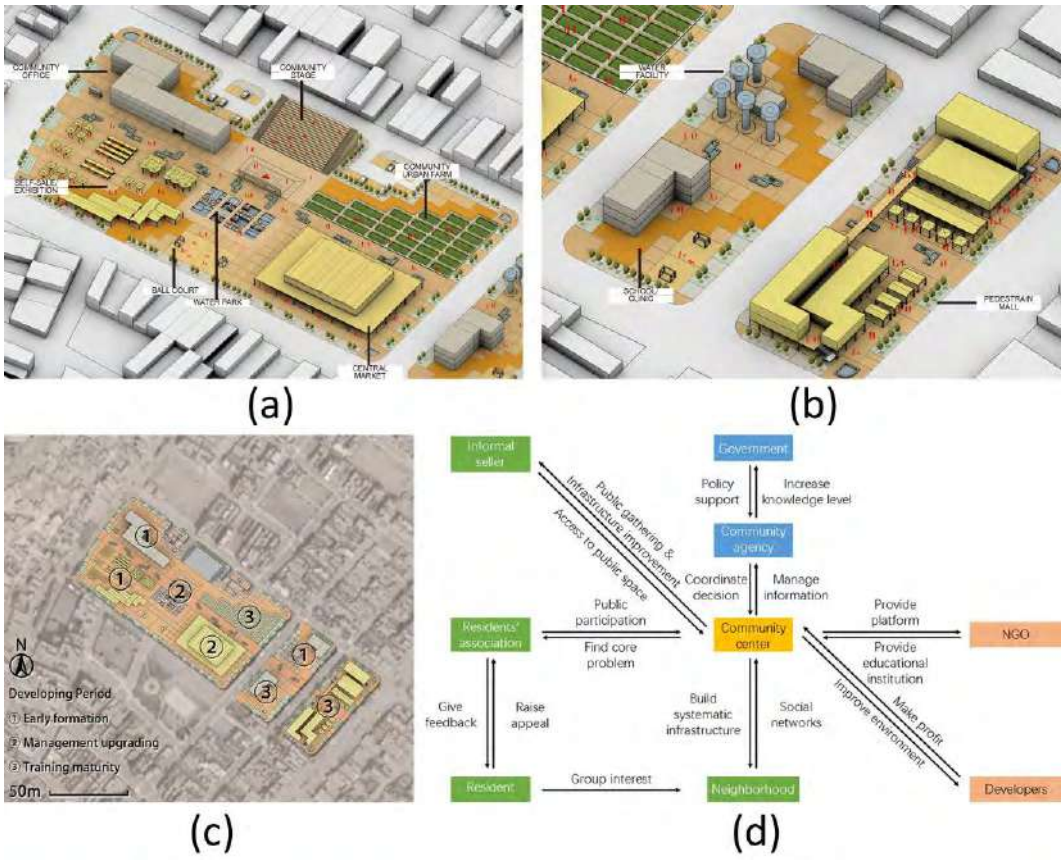


Figure 9 Maps of community center renewal; (a) Space design 1; (b) Space design 2; (c) Plan of community center; (d) Corporate mechanism of community center renewal

5.3.3 Site 3: Neighborhood public space

This site is located in one of the common neighborhoods; the whole planning area is about 75,000m2. The specific design plots are the undeveloped area and demolition space between the residential houses. It is common that it lacks activity space and physical contact in the neighborhood. Based on this situation, the design hopes to increase the possibility of daily activities inside the neighborhood and to interact formal and informal sectors by the connection of space.

(1) Partial transformation period

The initial space utilization mainly focuses on local intervention to avoid interference to the residents. Compared with traditional neighborhoods, the organic combination of low-level and medium-density buildings in informal area is similar to the new urbanism advocated by planners (Janice & Fernando, 2011). The renewal should retain this kind of urban form while meeting the needs of residents. Evaluate existing neighborhood structure and poor-quality buildings as well as unused public space, sort out the space available for renewal operation, and determine the links between possible resources and functional area.

(2) System formation period

In terms of choosing potential public space, the levels should be clearly graded, and the size of each level should be relatively average. Residents in a particular small area can organize together to manage the investment and use of nearby public space through neighborhood raising and introducing of NGOs. It is even possible that developers can engage to invest in the public space managing and transformation. As a result, residents will be provided with more suitable activity venue through the installation of functional facilities and components. They will also be guided to more open space though the path, thus forming a multi-level activity space system and providing residents with multiple choices in daily life. Through the "street eye" mentioned by Jane Jacobs, the coherence and mutual care of the neighborhood guarantee the safety and enhances the overall comfort of the neighborhoods (Jane, 1992).

(3) Systematic connection period

Historically, it is difficult to integrate informal area with a high degree of identity directly into formal cities, because this kind of integration means that urban informality is replaced by urban formality within a certain space. Therefore, it is reasonable and effective to conduct spatial, social and cultural connection between the urban informality and formality, in order to bridge the gap. However, the residents themselves control this kind of connection and communication. They determine the function and continuous direction of the public space. At the same time, formal sectors need to value the informal sectors, thus bring the downward connection so that two separated groups can create useful communication and connection.

Finally, this paper hopes to promote the connection between formal and informal area through the gradual construction of public space system and to encourage the bottom-up renewal of the informal area from the perspective of spiritual and institutional support.

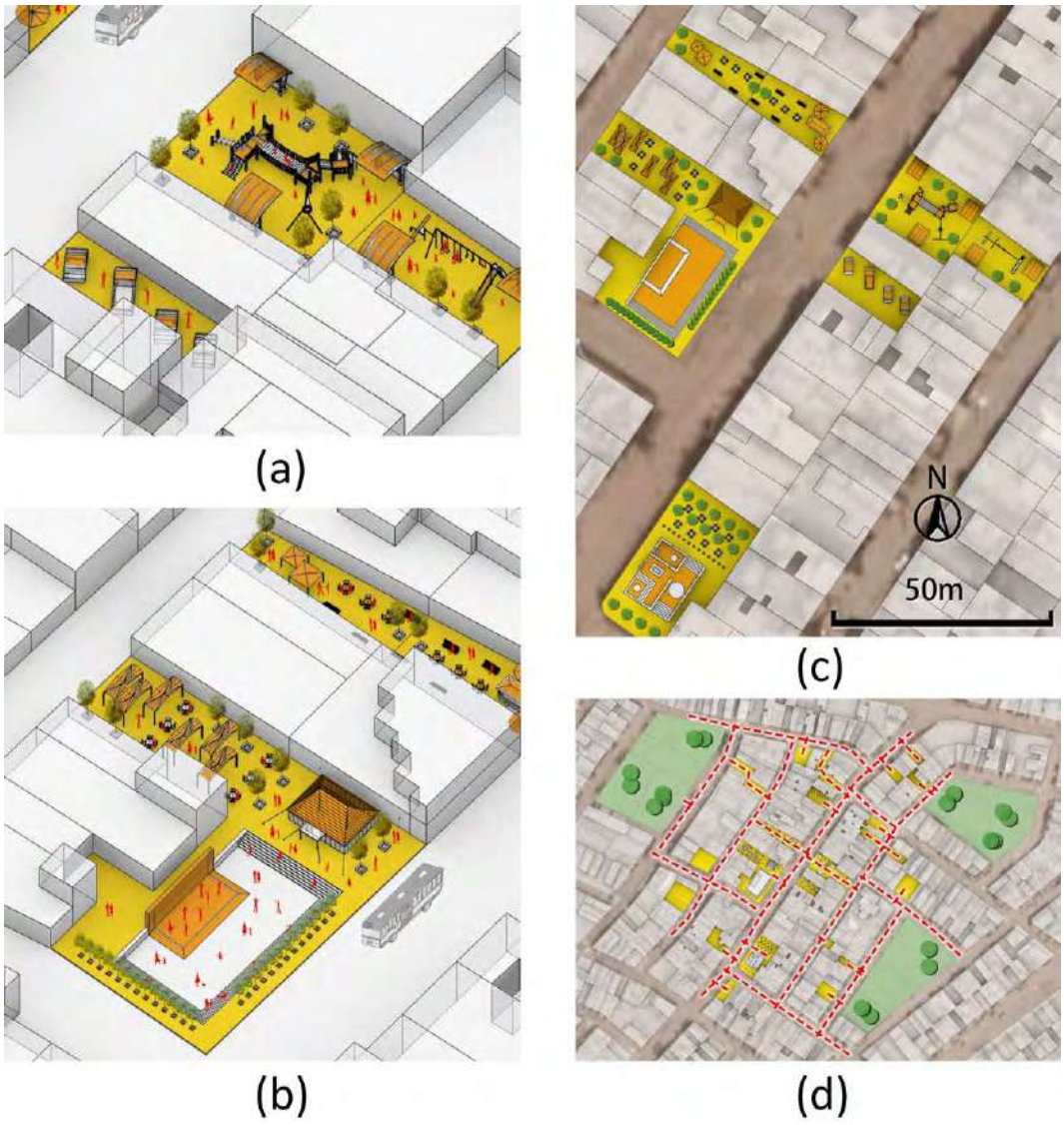


Figure 10 Maps of neighbourhood renewal; (a) Space design 1; (b) Space design 2; (c) Plan of neighbourhood space; (d) Connection system of community

6. Conclusion

The informal sectors constitute one of the dominant factors in metropolitan Lima and they are highly embedded in urban politic, economy, and culture. They actually have the potential to help the city to develop in a better way. However, recognizing informal factors and establishing their status should not be dramatic and rapid. On one hand, slight changes in policies have proved that it is difficult to have positive effect on informal factors. On the other hand, informal residents tend to accept space plan and suitable legalization. Planners and designers as well as policy makers can work together to use micro-regeneration strategy, taking informal residents as main body to renewal the unequal informal area.

Based on fully recognizing the situation in the informal area, it is realistic to construct the space and policy action mechanism. It hopes that the informal residents have the ability to

gradually renew by themselves and form an independent system, thus promoting the better development of the informal area and the whole city.

The application of micro-regeneration has some successful cases in China and Europe, but this paper is only a theoretical discussion and proposal on the renewal in a specific area in Lima. Whether the concept can be implemented and promoted is unknown, more practice is needed to verify in the future.

Acknowledgment

The work is supported by the Chinese Scholarship Council (Grant No.201606090340).

The work is part of an urban design course taught by Marwan Ghandour in Iowa State University, U.S. in 2017.

References

Hansen, Karen Tranberg; Vaa, Mariken (2004) Reconsidering Informality: Perspectives from Urban Africa, Uppsala: Nordic Africa Institute.

Hernando De Soto (1989) The other path: the invisible revolution in the Third World, London: B. Taurus.

Kate Meagher (2009) “The informalization of belonging: Igbo informal enterprise and national cohesion from below”, Africa Development, Vol.24 No.1.

[4] James Duminy (2011) "Literature survey: informality and planning”, Urban policies programme of the policy-research network women in informal employment globalizing and organizing (WIEGO), available at http://www.inclusivecities.org/wp-content/uploads/2012/07/Duminy-Planning-Lit-Review_FINAL.pdf.

Marwan Ghandour (2017) “Urban regeneration in Lima, Peru”, Course syllabus of Urban design global studio, Master of urban design program, College of Design, Iowa State University.

Li Yuanxin (2014) “Lima’s city planning”, Public Policy Peru 2014, School of Public Policy, University of Maryland, available at umdpolicyperu2014.wordpress.com.

Hernando De Soto (2010) “Latin America: Looking north or south? Bringing wealth to the poor: A deed for every home”, New Perspectives Quarterly, Vol.18 No.1.

Gustavo Riofrio (1996) “Lima: mega-city and mega-problem”, In: The mega-city in Latin America, edited by Alan Gilbert, Tokyo, Japan, United Nations University Press.

George Beier; Anthony Churchill; Michael Cohen; Bertrand Renaud (1976) “The task ahead for the cities of developing countries”, World Development, Vol.4 No.5.

Shlomo Angel; Stephen K. Mayo; William L. Stephens Jr (1993) “The housing indicators program: a report on progress and plans for the future”, Netherlands Journal of Housing and the Built Environment, Vol.8 No.1.

UNHCR (2010) “Update on UNHCR’s global programs and partnerships”, available at http://www.unhcr.org/4ca5deb59.pdf [accessed 20 July 2014].

Bishwapriya Sanyal (2014) "Informal Land Markets--Perspectives for Policy" In Birch, Eugenie; Chattaraj, Shahana; and Wachter, Susan (eds.) (2015) Informal Real Estate Markets (Forthcoming, University of Pennsylvania Press).

Michael Cohen; Callisto E Madavo; Harold Dunkerley (1983) “Learning by doing: World Bank lending for urban development, 1972-1982”, Washington, DC: World Bank.

Michael Mastanduno; Robert L Ayres (1984) Banking on the poor: The World Bank and world poverty, Cambridge, Mass: MIT Press.

Mukhija, Vinit (2016) “Rehousing Mumbai: Formalizing Slum Land Markets Through Redevelopment" in Slums: How Informal Real Estate Markets Work, edited by Eugenie L. Birch; Shahana Chattaraj and Susan M. Wachter, available on University of Pennsylvania website.

Elliott R. MORSS (1984) “Institutional destruction resulting from donor and project proliferation in Sub-Saharan African countries”, World Development, Vol.12 No.4.

Elinor Ostrom (2000) “Collective action and the evolution of social norms”, Journal of Economic Perspectives, Vol.14 No.3.

Hernando De Soto (2000) The mystery of capital: why capitalism triumphs in the west and fails everywhere else, New York: Basic Books.

Ruth Meinzen-Dick; Esther Mwangi (2009) “Cutting the web of interests: pitfalls of formalizing property rights”, Land Use Policy, Vol.26 No.1.

International Labour Organization (2015) “Transition from the informal to the formal economy in Africa”, ILC 104/2015, Report V (2B), ILO Publications.

Wayne Attoe; Donn Logan (1989) American urban architecture: Catalysts in the design of cities, Berkeley: University of California Press.

Janice E Perlman; Fernando Henrique Cardoso (2011) Favela: four decades of living on the edge in Rio de Janeiro, Don Mills: Oxford University Press.

Rosemary D.F. Bromley; Peter K. Mackie (2009) “Displacement and the new spaces for informal trade in the Latin American city centre”, Urban studies, Vol.46 No.7.

Sally Roever (2014) “Informal economy monitoring study sector report: street vendors”, Report of Women in Informal Employment Globalizing and Organizing (WIEGO), available at http://www.wiego.org/sites/wiego.org/files/publications/files/IEMS-Sector-Full-Report-Street-Vendors.pdf.

Richard Dobson; Caroline Skinner; Jillian Nicholson (2009) Working in Warwick: including street traders in urban plans, Durban: School of Development Studies, University of KwaZulu-Natal.

Jane Jacobs (1992) The Death and Life of Great American Cities, New York: Random House.

Case Study / Project

How Big Is Auckland:

Planning a City-Region for Resilience and Regeneration

Dushko BOGUNOVICH

Abstract

New Zealand's local authorities and planners have embraced the 'compact city' model as the magic formula for the livability-sustainability agenda. Yet, the evidence is weak that policies of stopping urban expansion and densifying the exiting urban fabric deliver better quality of life or lessen impacts on the ecosystem. Overall, compact city policies have been more effective in aggravating the housing land price inflation and irritating local residents in intensification zones, than in actually containing urban sprawl. On the other hand, as global warming is accelerating, the risk of urban disasters and crises threatens to affect high density areas more severely, due to their high dependency on traditional, centralized urban infrastructure.

Auckland, New Zealand's largest metropolitan area, illustrates these dilemmas very poignantly. Its recent tumultuous process of preparing and adopting the new long term plan has shown that the politics of compaction and intensification is divisive and expensive, while the economic and ecological efficiency gains are uncertain, if not meager. The city keeps growing through market-driven and opportunistic development, mostly ignoring the arbitrary Rural Urban Boundary which was supposed to arrest urban sprawl. The centrifugal forces which fuel the horizontal growth of the metropolitan area range from technologies of transport and telecommunications, to energy generation and waste disposal. At the same time, climate change trends suggest that the resilience agenda (adaptation) is now more pressing than the sustainability agenda (mitigation) and that further concentration of people and assets is unwise.

We suggest that Auckland Council has failed to recognise and acknowledge the unstoppable forces of regional decentralization and polycentric metropolitanisation, while at the same time underestimates the threat of climate change and Auckland's overall exposure to hazards of various kind. The Plan must be based on a more realistic concept of the size, extent and influence of Auckland. Auckland is no more a'city'; it is a 'city-region'- a linear city-region. It is emerging and should be planned as a linear conurbation, with one major central spine of key transport systems (motorway and railway) and many nodes of density. In fact, Auckland is even bigger than that, as its influence affects the entire upper, northern North Island. Auckland is at the centre of a triangle of three smaller cities: Hamilton, Tauranga and Whangarei. It is also a part of a 300 km coastal arc of development along the northern, Pacific edge of New Zealand, ruled by four regional councils: Northland, Auckland, Waikato and Bay of Plenty. In Europe, planning authorities have long ago realised the inevitability of urban sprawl, and of neighbouring cities and towns coalescing into conurbations. But they have strived to steer growth, rather than contain it, resulting in strategies is decentralised, polycentric, development which cover large areas, while including plenty of open space.

We suggest that the Auckland City-Region could do even better and by 2040 become a metropolitan conurbation with high quality of life, a high level of resilience to a range of climate-triggered events and significant regenerative capacity in the peripheral, low density areas. The conclusions - and dilemmas - presented in this paper have global significance in the light of worldwide problems of rapid urbanization, urban sprawl, metropolitan governance, social exclusion, infrastructure capacity and cost, resource depletion and climate change.

Research Paper

MACHINE LEARNING FOR BUILDING EXTRACTION AND INTEGRATION OF PARTICLE SWARM OPTIMIZATION WITH SLEUTH FOR URBAN GROWTH PATTERN VISUALISATION FOR LIVABLE CITIES

Chandan Mysore Chandrashekar, Research Scholar, RCG School of Infrastructure Design and Management, IIT Kharagpur; India

Aadithyaa J S, Undergraduate student, Department of Architecture and Regional Planning, IIT Kharagpur; India

Prakash P S, Research Scholar, RCG School of Infrastructure Design and Management, IIT Kharagpur; India

Bharath Haridas Aithal, Assistant Professor, RCG School of Infrastructure Design and Management, IIT Kharagpur; India

Abstract

Rapidly increasing population and migration from rural areas to nearby urban agglomerations develop tremendous pressure on system of the existing cities without compromising socio-economic and cultural linkages. Policy interventions, both at global and local scale, have created newer avenues for the researchers to explore real-time solutions for problems world-wide. For instance, the outcome of 2015 United Nations agenda for the achievement of the Sustainable Development Goals (SDGs) by the year 2030 primarily focuses on urbanization issues and probabilistic modelling of future scenarios to obtain a robust alternative for resource utilization and further for maximizing sustainability through land use pattern analysis. This is the clear indication toward the very important role of "ever dormant" urban planning, especially in the case of a rapidly developing country such as India. Remote sensing and geo informatics along with Machine learning can provide extremely relevant information about the pattern change in cities and as input to visualize the future growth pockets. In this context, potential of cellular automata (CA) in urban modelling has been explored by various researchers across the globe. In the recent past, models have been drawing majority of the attention along with geographic CA processes about urban growth and urban sprawl studies. Most recent approaches include optimization of transition rules based on machine learning techniques and evolutionary algorithms that follow nature-inspired mechanism such as Genetic Algorithm, Ant colony optimization, Particle Swarm Optimization (PSO), simulated annealing, Grey Wolf optimizer etc. Irrespective of any modelling technique, model calibration remains one of the challenging and most crucial steps towards obtaining realistic results. This research communication tries to demonstrate a novel idea of integrating PSO with SLEUTH post calibration of the spatial-temporal footprint of urban growth from the year 1990 to 2017 for Kolkata, a historical megacity of Eastern India. Results were evaluated and validated using statistical fit measures reveals PSO-SLEUTH performed substantially better compared to traditional Brute Force calibration method (BFM). Another significant development was in terms of

computation time of optimized values from days (BFM) to hours (PSO). The study identifies Kolkata region to be sensitive to spread and road gravity coefficients during calibration procedure. Results indicate growth along the transport corridors with multiple agents fuelling the growth. Further, with the aid of high spatial resolution data, buildings were extracted to understand the growth parameters incorporating neural networks. Using the results, renewable energy aspects were explored to harness and provide a suitable local solution for energy issues in energy gobbling cities. Pattern of landscape change, development of better process of modeling and extraction of building from machine learning techniques for planning smart cities with self-sustaining energy is presented in this research work.

Keywords

Cellular Automata, Particle swarm optimization, SLEUTH, Urban modeling, Pattern recognition

1. Introduction

Asia alone is projected to house 54% of total world urban population (6.3 billion) by the year 2050 against 50% in the year 2010 (UNDESA, 2015) indicates the need for liveable cities that are more likely urban areas. Urban areas, over years have been reorganised and are reorganising due to increased population mostly migration. This ever increasing and irreversible urban growth has given impetus to understand urban morphology in depth and its implications on surrounding nature. Rapid urban growth in Indian scenario can be attributed to rural to urban migration, re-classification of cities, availability of improved health facilities, jobs, improved living, availability of essential amenties etc. in urban areas (Bharath et al., 2018). With the commencement and successful implementation of urban development policies and schemes such as Smart Cities, AMRUT, JNNURM, etc. have promoted migration from rural area to urban core (Shaw & Das, 2017). In 2010, India accounted for 30% of urban areas with 367.5 million people residing within. A clear jump in can be observed in urban population post 2000 (figure 1).

An important decision was taken during September 2015, UNSDS with title “Transforming our world: the 2030 Agenda for Sustainable Development” in thinking of global community in adopting the Agenda for Sustainable Development (SD) through vision 2030. Goal number 11 of 17 Sustainable Development Goals (SDG) elaborates ‘Sustainable Cities and Communities’ and guidelines to meet these criteria. In addition, article 76 of 2030 agenda pronounces use of geospatial data for tracking and monitoring the progress of various projects under the umbrella of SDG’s. In this regard, the creation of big data pertaining to cities, specifically the buildings that are the significant portion will be of paramount importance. The recent development of machine-learning algorithms coupled with geospatial data are among the front-runner technological tools, expected to play a crucial role. Geospatial data sets provide the means to study large area of the earth surface and helps to generate necessary data from complex urban surface features. Geospatial data majorly comprises of satellite data and GIS data. Satellite remote sensing (RS) has been credited for its quickest and lesser cost available method of mapping large areas. The availability of high resolution and multi-spectral satellite imagery provides the best accuracy needed for assessing urban growth pattern (Bharath et al., 2014). Satellite technology and data analysis are adopted by both regional and national governments (Chen et al., 2000; Ji et al., 2001). It helps to map urban areas at finer scales,

both temporally and spatially with consistent images of Earth surface. Remote sensing, its analysis and integration with geographical information systems (GIS) forms a robust technology to monitor temporal urban growth. GIS platform has entered majority of the service sectors by providing facilities to capture, manage, store, retrieve, analyze and display geospatial data on a real-time basis. Further strength to GIS comes from its distinguished built-in database, decision support system and application-specific plugins, makes more reliable tool for urban studies (Tran et al., 2015; Boori et al., 2015).

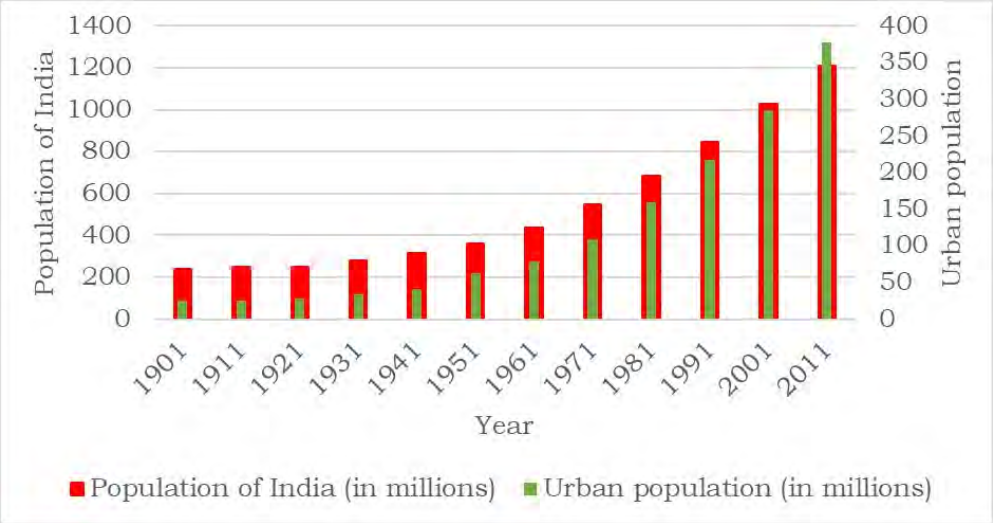


Figure 1 Trends of urbanization in India 1901-2011

Recently, machine learning techniques for building extraction information from remote sensing images has become easier with the advent of integrating various approaches on the same platform. Speed and accuracies of digital image processing have improved significantly with the use of several machine-learning algorithms. Random forest (RF) and Support Vector Machine (SVM) methods of learning algorithms proved efficient in information extraction from satellite imagery (Thanh & Kappas, 2018). Having previous and present years' temporal data, it is necessary to have a vision of development for the near future in terms of urban modeling. It is the process of identifying a theory, could be translated into a mathematical model as well as developing specific computer-aided programs to feed the model with data to calibrate, validate, verify and predict future urban trends (Verburg et al., 2002; Batty, 2009).Theoretical assumptions, method followed, spatial, temporal aspects and geographical extents might vary from each model types, but the final outcome of these models are to understand the complex interrelationships between natural ecosystem and urban environment by observing irreversible heterogeneous patterns of change (Li & Liu, 2006; Crooks, 2010). Wu and Silva, 2010 reviewed urban land dynamics and related models, depicted in figure 2. They highlight the significance of artificial intelligence (AI) and its deep theoretical understanding of urbanization process and relative pressure on land use pattern change. Figure 2 shows broad categories of AI systems used in urban models. In this research paper we discuss briefly about cellular automata (CA), SLEUTH model, optimization techniques such as genetic algorithm (GA) and particle swarm optimization (PSO), its application to urban growth models. The structure of the paper is organized as follows: sub sections 1.1-1.3 provides a brief overview, literature review of Cellular automata and SLEUTH urban growth model, its improvement over last two decades, integration of stochastic optimization

techniques to SLEUTH and building extraction for urban growth application. Section 2 describes the study region selected to implement modeling and extraction of building information along with data sources. In section 3 we describe the novel integrated method adopted to solve time-consuming conventional modeling problem countered with PSO-SLEUTH. Results are discussed with statistics and visualization in section 4. Finally, conclusions are given in section 5.

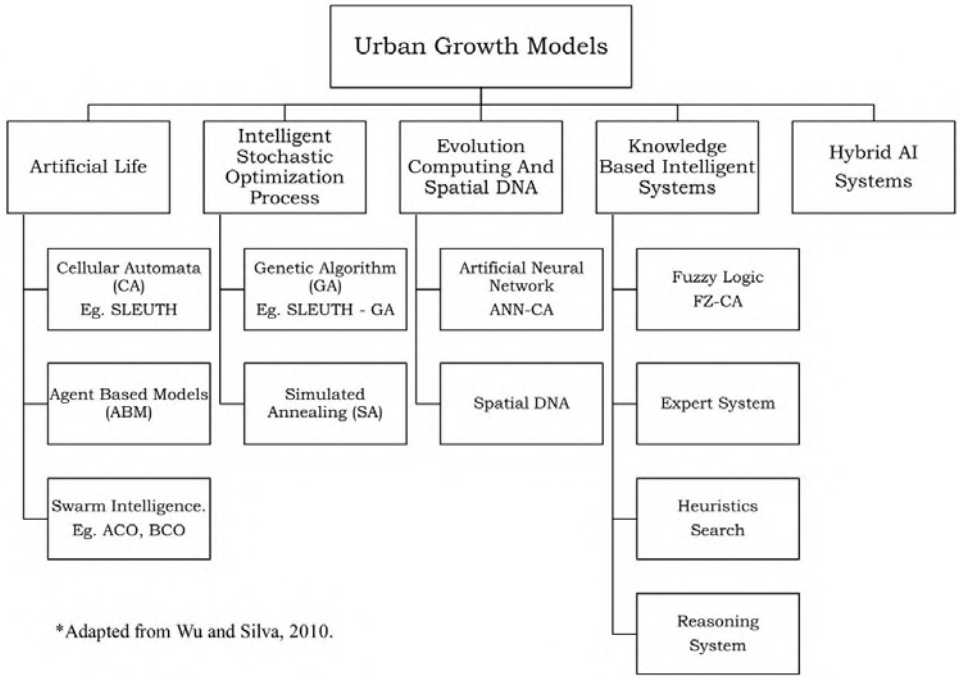


Figure 2 Types of urban growth models

1.1. Cellular automata and urban growth models

Wolfram, 2002, defined CA as discrete two dimensional dynamic systems in which local interactions among components generate global changes in space and time. Torrens, 2000 explains CA is composed of the below four components:

1. Cell space represented by an array of cells
2. Several finite states that qualifies the state of each cell
3. Neighborhood
4. Transition functions, define the next state of the cell in the next period, based on the given state of the cell itself and its neighborhood cells

Standard cellular automata apply a “bottom-up” approach. The approach argues that local rules can create complex patterns by running the models in iterations (Batty & Xie, 1994). Itami, 1994 states that CA are seen not only as a framework for dynamic spatial modeling but as a paradigm for thinking about complex spatial-temporal phenomena and an experimental laboratory for testing ideas. Researchers have successfully used CA in urban modeling over the decades and now have tried to address various related research questions with the help of CA-based models (Alves & Albrecht, 2010; Yang et al., 2012; Torrens & Benenson, 2005).

SLEUTH is a CA-based urban growth model, started as open source, has witnessed numerous applications over different parts of the world. The acronym of SLEUTH stands for slope, land use, excluded, urban, transportation and hillshade, the layers used as input for the model, consists of C-language, using UNIX or UNIX based operating systems (Nimish et al., 2018; Chandan et al., 2019). It has an ability to predict urban/non-urban land use dynamics based on two sub models: urban growth model (UGM) and Deltron land model (DLM) (Dietzel & Clarke, 2004). Model is dependent on five factors controlling the behavior of growth: diffusion, breed, spread, slope resistance, and road gravity. It also considers four growth rules: spontaneous growth, new spreading center growth, edge growth, and road-influenced growth. Best set of coefficients are derived for the five factors using these four rules. Traditional brute force method (BFM) takes days together to arrive at three phases of calibration i.e., coarse, fine, full and shortlisted values for prediction. Most researchers have made successful attempt to reduce SLEUTH computation time and therefore to increase its efficiency. The original version includes SLEUTH UGM and DLM. To reduce computation time, Dietzel and Clarke, 2007 worked on the development of optimization of SLEUTH metric called optimal SLEUTH metric (OSM). OSM narrows down the parameter range and returns a single goodness of fit metric. OSM is the product of various individual metrics like compare, population, edges, clusters, slope, X-mean and Y-mean providing reliable calibration results. The source code for OSM is also available in Project Gigalopolis website and one can readily implement OSM technique. Sakieh & Salmanmahiny, 2016 explored OSM and implemented to Gorgan area of Iran. Authors have mentioned the term “cancer-treating” to understand and predict the urban spread in three different scenarios: afforest protection, rangeland protection and historical growth (without any restrictions). They have also adopted a comparative assessment to measure association between landscape metrics and land suitability values using Spearman correlation to address cancer-treating urban growth pattern. Other improvements of SLEUTH include pSLEUTH, SLEUTH-3r and SLEUTH-Genetic Algorithm (GA) (Guan & Clarke, 2010; Jantz et al., 2010; Clarke-Lauer & Clarke, 2011). GA returns a single best fit statistic for the entire dynamic range consisting of several Monte Carlo iterations. Research in the area of improving run time and various variable optimisation in SLEUTH model is yet unexplored by scientists and this paper presents this novel technique of integrating PSO rules with existing sleuth model to improve its run time by optimising the initial set of variables.

1.2. Integration of genetic algorithm and particle Swarm optimization techniques with SLEUTH

GA includes heuristic search algorithms based on natural selection and natural genetics using the key concept of simulating, imitating or mimicking evolution process to obtain optimized results (Holland, 1975; Goldberg, 1989). It adopts Darwinian “Survival of the fittest” theory, only the fittest shall survive, reproduce and successive generations shall become superior compared to older generations (Mayer et al., 1999). Developed by Holland in early 1970s, the central theme of GA is robust optimization technique which considers independent variables of the model and converts them into genetic pairs (binary).

SLEUTH-GA is adopted to improve calibration process and to obtain optimized values in less computation time. Figure 3 shows SLEUTH-GA model calibration approach. Coarse, fine and final calibration procedure employed in BFM is replaced by GA calibration, apart from which other procedure remains same. Strength of GA comes from its ability to explore search space with improved results after each iteration. GA applied to SLEUTH follows a four-step process:

Population initialization, Selection strategies, Crossover breeding and finally Mutation. In SLEUTH procedure, the minimum and maximum value for a gene is fixed as 1 and 100 respectively, defining the range of each coefficient. Overall GA analysis involves calibration of metric values, number of iteration needed for calibration and assessing forecasting behaviour (Jafarnezhad et al., 2015).

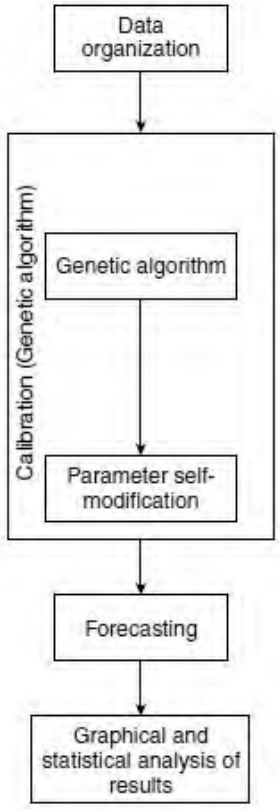


Figure 3 Genetic algorithm and SLEUTH model calibration approach (a Proposed approach based on Goldstein, 2004)

PSO is a population-based stochastic optimization technique inspired by social behaviour of birds flocking and fish schooling (Eberhart & Kennedy, 1995). Each solution to a problem is considered as a bird called particle. All particles have fitness values, and these values are calculated from objective function. Each particle has personal best and global best performance; velocity of the group is adjusted based on best performer in the group. While the advantage of PSO is that complex problem can be solved cost effectively with improved performance whereas unlike several Swarm intelligence-based optimization techniques, PSO also has limitation of particles escaping local optimum and decreased chances of finding global optimum (Shi et al., 2011). Feng et al., 2011 conducted a study to explore advantages of integrated CA and PSO approach. Objective of the study was to stochastically optimize transition rules and therefore reduce computation time, prediction uncertainties as well as improving location accuracy, a case of Fengxian District, Shanghai, China. Authors claim similarity between PSO and CA drives to search global optimum parameters of CA rules. Further, this concept can be applied to SLEUTH-PSO spread optimization to reduce computation time and predict accurate transitions. PSO optimizes allocation of pixels by

considering 3 x 3 kernel and returns a set of eight values that represent Moore neighborhood as illustrated later in figure 10.

1.3. Urban building structure extraction

Machine learning techniques such as Random Forest (RF) and Support Vector Machine (SVM) are employed by scientists to extract buildings in urban areas. Random forest classifier is made up of an ensemble of multiple decision trees, here majority voting from the decision tree classifiers with 'yes' or 'no' outputs are used to classify the data (Breiman, 2001). The outlier in training is well handled by RF is advantageous in classifying spatial data efficiently (Horning, 2010). SVM works on the principle of identifying right hyperplanes that maximizes the distance to the closest data points on both sides of the classes (Vapnik, 1995; Dixon, 2008; Das et al., 2018). SVM is a supervised learning technique and it can be applied to a multiclass classification. In SVM classification, four kernel functions could be used based on the transformation needed, namely sigmoid, radial basis function, linear and polynomial. Previous studies showed that radial basis function performs best for binary classification from satellite images (Prakash et al., 2018).

There currently exists a gap in planning and visualization of urban structures at metropolitan scale and beyond, that modeling can fulfill with agenda of developing sustainable smart cities. It is also necessary to have insights through dynamic integrated urban growth models. Based on above discussion and detailed literature survey, we have identified the research gaps, aiding in forming major objectives of this research communication as: a) Extracting building from high-resolution satellite imagery, b) Analyzing spatio-temporal changes in urban land use for Kolkata Metropolitan Area, c) Modeling future trends of urban growth using an integrated CA-based SLEUTH-PSO approach.

2. Study area and data

Located at the eastern part of India, Kolkata has been considered for study is also famously known as "The city of Joy" or "Calcutta" during the British rule in India. The city is built on the banks of River Hooghly. The geographical extents of Kolkata metropolitan area (KMA) are (depicted in figure 4) 22°19'59" - 23°0'20" N and 88°4'23" - 88°32'37" E. Kolkata lies about an average of 3-9m above the MSL and situated very close to Ganges delta and Bay of Bengal. The city served as former capital of British India from the year 1772-1911 and presently it is the capital of West Bengal state. The region is also famous for numerous number of wetland ecosystem, natural tanks and lakes. Taking advantage of all four transport modes i.e., road, railway, airway and waterway, Kolkata has emerged as one of the dominant urban centers of Eastern India. Metropolitan urban agglomeration has an area about 1886 km^2 (KMA) with population of 14,035,959 (Census of India, 2011), makes it to the 3rd rank in metro cities of India after Mumbai and Delhi. Currently the physical infrastructure, services, planning and development of the region is administered by Kolkata Metropolitan Development Authority (KMDA).

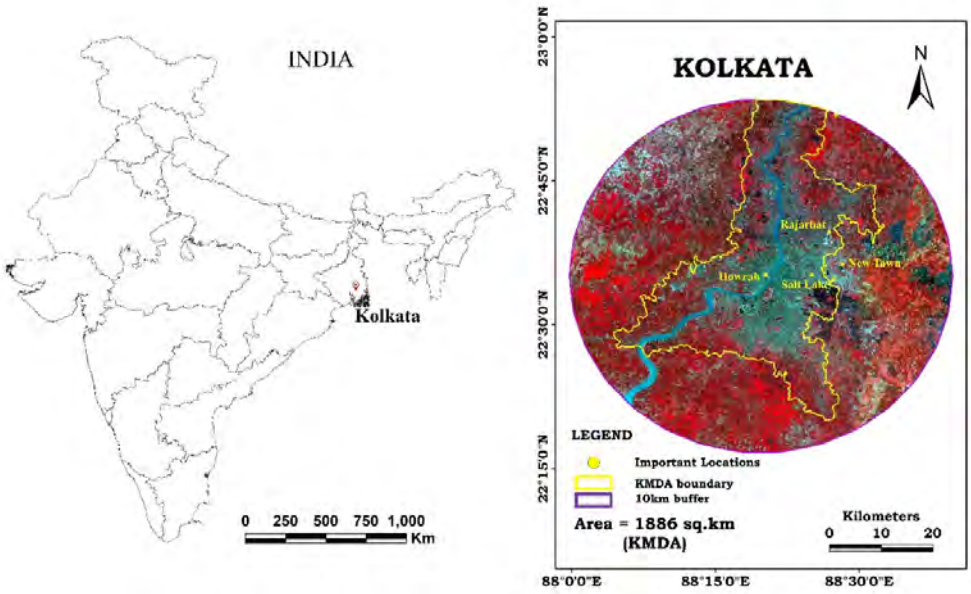


Figure 4 Location map of Kolkata with false color composite as background derived from IRS LISS4 satellite data (Bands: 2,3 and 4)

Stable and floating population can be attributed to a majority of people commuting as tourists, state and central governmental office affairs, academia, healthcare, economy-oriented conferences and so on. Apart from these, region is a commercial hub of East and North-East India with Rs 1.84 trillion GDP in 2014. Figure 4 illustrates the KMDA with 10 km buffer to understand the influence of expanding urban trends, its influence on environment, and future scenario on the periphery. Data required for the study are listed in table 1.

Landsat series (5 and 8), ASTER, Indian Remote Sensing LISS 4 and Cartosat satellite data were obtained from United States Geological Survey (USGS) and National Remote Sensing Center (NRSC). During field visit (figure 5), GPS was used to collect ground truth data of various points and polygons, geo-tagged images were also obtained, aiding in validating land use maps. Toposheets from Survey of India online repository, of scale 1:25000 and 1:50000 were also considered to delineate base layers of administration and other boundaries. City development plan maps obtained from governmental agencies helped in understanding and digitizing restricted areas of future urban expansion for instance: lakes, military area, reserve forest, parks, wetland regions etc. Google earth platform was used as ancillary data in places which were not accessible for GPS data collection. Road network was digitized directly from Google earth and open street maps (OSM).

3. Method

An integrated method adopted for building extraction and urban growth visualization is depicted in figure 6.

Table 1 Data and layers used for the analysis

Data/Layers		**Purpose/Source**		
Google earth		Geo-correction, classification and validation. Collection of point, line and polygon data.		
Boundary maps and raster layers		To create excluded maps or regions restricted from future development data sets based on City Development Plans.		
Survey of India Topographic maps, online portals (Google and Bhuvan data).		Base layers of the administrative boundary.		
Field data – Using GPS		Geo-correction, training data and validation data, Agents Extraction		
Slope and Hillshade		Processed from ASTER DEM (raster)		
Transportation (Roads)		Street data (OSM, Bhuvan and Google maps) updated with classified images (originally vector, rasterized).		
Satellite data		Land use analysis, slope, hillshade maps, building and urban data extraction		
Satellite/Sensor	Resolution (m)	Date	Path/Row	Remarks
Landsat 5 TM	30	06-Mar-1991 28-Mar-1999 07-Mar-2009	138/44	--
Landsat 8 OLI_TIRS	30	13-Mar-2017	138/44	--
ASTER GDEM	30	17-Oct-2011	N22E088	Reprojected to UTM
IRS LISS 4	5.8	17-Mar-2018	108/56	Reprojected to UTM
IRS Cartosat 2	1	02-Jan-2018	N. A	--

3.1. Pre-processing

To avoid inconsistency between different datasets, pre-processing of data along with geometric correction, resampling wherever necessary (to maintain similar resolution) and

image enhancement were conducted. Satellite images were geo-corrected using ground control points (GCP) collected during field visit and data pertaining to study regions were cropped according to buffer boundary. Contrast stretching was performed wherever necessary to maintain the dynamic range. Satellite data were registered to world geodetic system (WGS) 84, universal transverse Mercator (UTM) Zone number 45.

Figure 5 Data collection during field visit to Kolkata metropolitan area. A) Waypoints collected using GPS B) Wetland area and surroundings, Kamduni C) Hindustan motors industry (abandoned), Konnagar, Uttarapara and surrounding environs as seen from IRS LISS 4 FCC image (D) Panoramic view of Hindustan motors lake. (Date taken: 25 Aug, 2017, Source: Author)

3.2. Application of machine learning to extract buildings

The resourcesat LISS IV imagery of 5.8 meters multispectral is merged with the Cartosat 1.0-meter panchromatic image using Hyperspherical Color Sphere (HCS) method (Ghosh & Joshi, 2013). The resultant high-resolution color image is clipped for the study area KMDA with 10 km buffer. The training dataset is prepared for two classes; building and non-building category with the help of ground truth and observation from the spatial imagery. Machine learning classifiers (SVM and DT) are trained using the training data obtained from the multispectral image. The training set contains data from three bands that are labeled as '0' and '1' for non-building and building classes, respectively. The predicted output from the classifiers is divided into classes by judiciously identified threshold value to obtain a binary map containing building and non-buildings.

3.3. Land use analysis

Primary step of land use map generation is image classification. It involves various steps such as creation of FCC (false color composite) image directly helps in identifying heterogeneous patches in the landscape (Bharath et al., 2019). Bands green, red and near infrared are chosen to generate FCC image. Training polygons are digitized based on the spectral reflectance of

various features in FCC, covering the study area ensuring that polygons are well distributed throughout study region. These polygons and its coordinates are entered into GPS and ground truth data is verified during field visit to identify various land use types. A supervised classification technique famously known as Gaussian maximum likelihood classifier (GMLC) is adopted for the study. The classifier proves best amongst others because it takes into account variance, covariance and probability density contours to evaluate the land use class of every pixel under consideration (Duda et al., 2000; Ramachandra et al., 2012). Four land use classes were chosen for the study based on literature, they are: urban, vegetation, water and others (Anderson, 1976; Nimish et al., 2017).

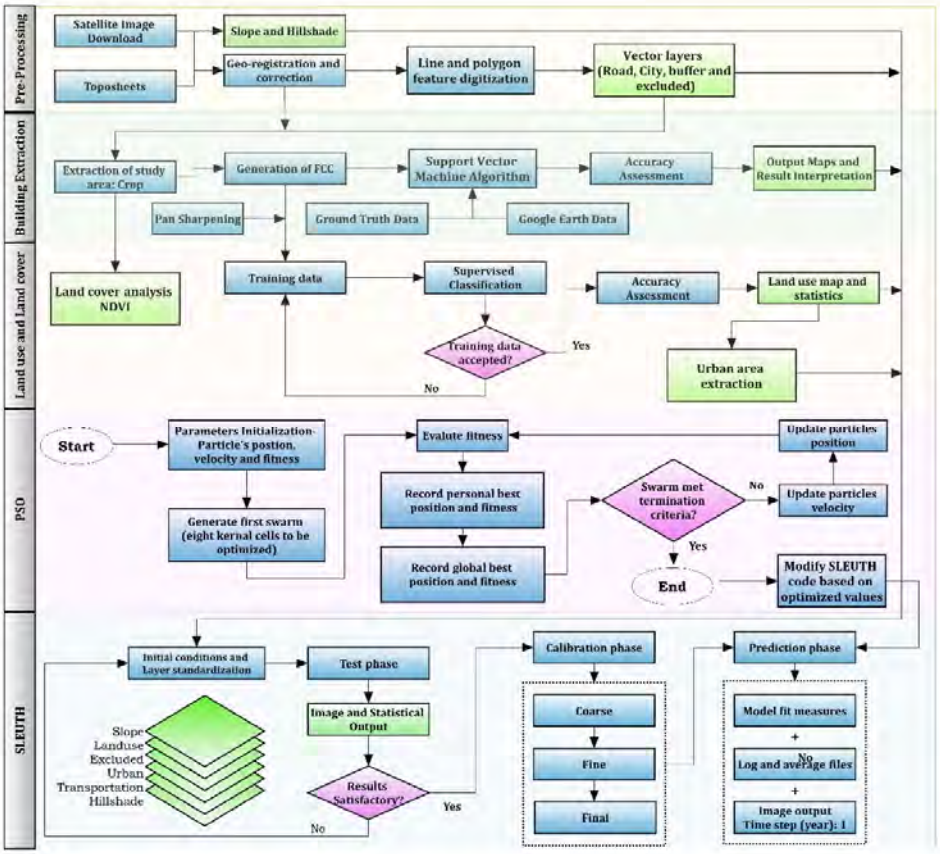


Figure 6 Integrated method adopted for the study

Accuracy assessment was performed in terms of overall accuracy and kappa statistic by comparing the classified map with the validation map. Error/confusion matrix generated helps to estimate producer's accuracy, user's accuracy, overall accuracy and kappa coefficient (Bharath et al., 2016).

3.4. Implementation of PSO and SLEUTH

PSO is popular among various nature-inspired techniques for its simplicity, minimum mathematical computation, achieving improved optimization in less computation time and ease of application to general engineering problems (Rabbani et al., 2011; Yao et al., 2015; Hu et al., 2018). PSO resembles the behaviour of a bird flock or fish school. PSO, in terms of bird flock can be understood as a) Search space of optimization can be treated as birds flying space

b) Every bird is treated as particle and has its own solution or its own space closer to food c) Optimum solution to the problem is considered as food to all birds d) Each bird will search for food, during this process one of the important strategy adopted is search for peripheral region very close to food e) All particles has fitness values f) Estimating position of food by personal flying experience, regarded as Pbest or pid g) All particles preserve their independent best performance h) Group adjusts their velocity based on best performer in the entire group, i.e. best value obtained at any time interval in the entire population is called as global best, gbest or pgd (Stephen et al., 2013). An assumption is made that in a D-dimensional search space with n particles includes possible personal best solutions and global best solutions. These are represented as given in equation 1.

$$V_{id}^{(t+1)} = WV_{id}^{(t)} + c_1 r_1 \left[p_{id} - x_{id}{}^{(t)}\right] + c_2 r_2 \left[p_{gd} - x_{id}{}^{(t)}\right] \quad (1)$$

Where,

i = Particle index; d = dimension/iteration

c_1 and c_2 are cognitive/social constants between 0 and 2

r_1 and r_2 are random numbers between 0 and 1, regenerated after every velocity update

p_{id} = population best or present best solution

p_{gd} = globally best solution

$V_{id}^{(t)}$ = particle's velocity at time t

$x_{id}^{(t)}$ = particle's position at time t;

Each particle keeps track of its coordinates in hyperspace which are associated with the best solution (fitness) it has achieved so far. The value of that fitness is also stored after every iteration. Each particle's position is updated using the equation 2.

$$X_{id}^{(t+1)} = X_{id}^{(t)} + V_{id}^{(t+1)} \quad (2)$$

Integrating concepts of PSO with SLEUTH includes creation of a new script (Script.sh) file containing eight Moore neighborhood cell values (as illustrated in figure 10) that are to be automatically updated after each swarm iteration and storing best values. PSO provides optimum spread solution ranging between 1 and 99 for these cell values. 1 indicating least chance of urban spread in that direction and 99 indicates highest chance. These best values obtained are then adopted in spread file of SLEUTH3.0 code with p01 patch. Standardized input layers (select) used for model is illustrated in figure 7. Routine full calibration was performed using brute force method (BFM), output controlstat.log file was carefully examined to obtain model fit statistics and optimum SLEUTH metric (OSM), calculated by multiplying metrics such as compare, population, edges, cluster, slope, X-mean and Y-mean. Best OSM was chosen and corresponding coefficient values were replaced in the scenario file during prediction phase.

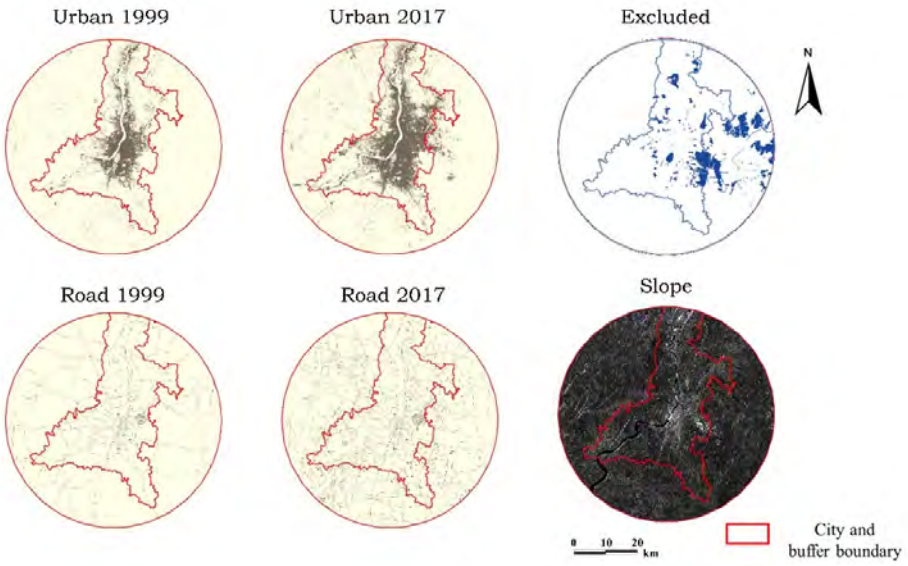


Figure 7 Standardized input layers used in PSO-SLEUTH model

4. Result and discussion

4.1. Building extraction

The data preparation for building extraction involves pan-sharpening of multispectral image using higher resolution panchromatic image. Figure 8, shows the subset of study area, Salt Lake, Bidhannagar, Kolkata, containing the dataset and extracted buildings. It is evident that from a closer look shows improvement in the quality due to image fusion in the picture (8C) and hence to obtain more detailed building information. In the binary output of reclassified image, white pixels represent the buildings and dark area corresponds to non-building class. Artifacts present in the output needs to be removed by performing morphological clean-up operations for further improvement of results. Outcome of this exercise is directly used in land use analysis and modeling as an ancillary urban dataset to describe the pace of urban growth as discussed over the next sections.

4.2. Land Use Analysis

For better understanding of the region, land use analysis was performed and results are as shown in Figure 9, corresponding statistics are tabulated in table 2. There has been significant increase in the urban areas consistently from 1990-2017. Strong economic and administrative base, high profile living, efficient service delivery mechanism, ease of access to public transport system and varied employment opportunities have been the major stimulators of urban growth in the study area. Nearby smaller villages have evolved into larger ones and many new settlements can be recognized along the transport corridors. Urban area saw an increase of 181% in just 27 years. Building extraction from high-resolution data also helps in quantifying urban growth on a microscopic scale. Water body has also seemingly increased in 2017, this can be understood on basis of visualization (temporal scale on Google earth) as well. Increase in water body, especially towards NE and SE directions are attributed to evolving aquaculture and pond ecosystem in the periphery of KMDA. However, significant waterbodies

in the form of ponds, lakes, wetlands, swamps, marshland etc. have been converted into other land use types or encroached over the period. Vegetation category shows consistent statistics, whereas other categories have decreased. Table 2 shows the kappa coefficient and overall accuracy of the classification.

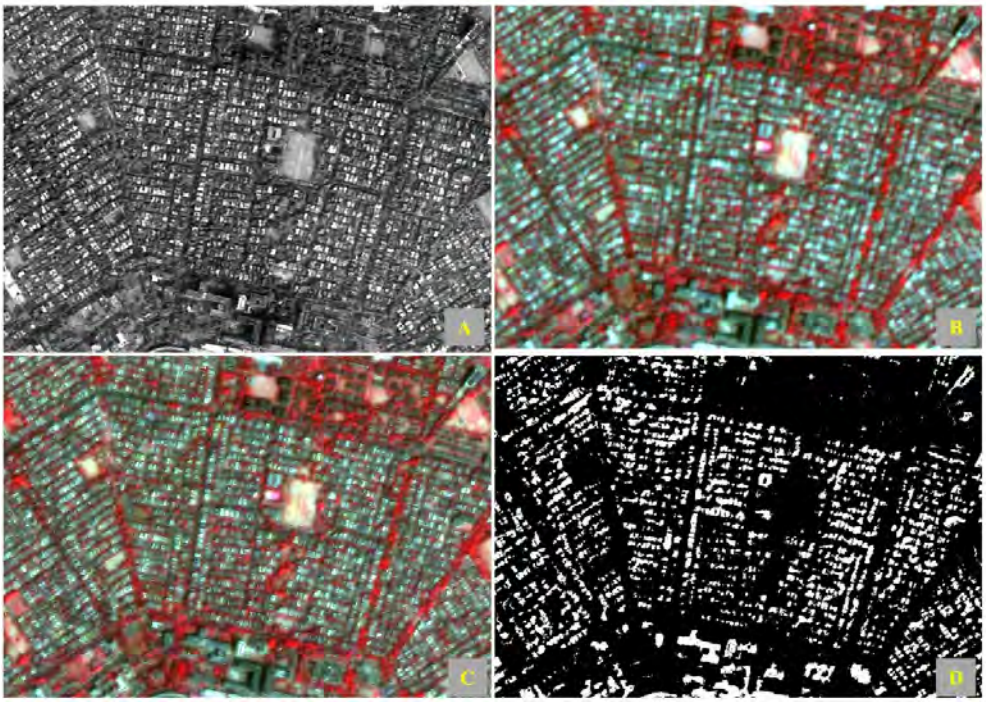


Figure 8 Data used and building extraction results for subset of study area, Part of Salt Lake, Bidhannagar, Kolkata: (A) Cartosat – 2, panchromatic, (B) LISS-IV multispectral, (C) Pan-sharpened image, (D) Extracted buildings

4.3. PSO-SLEUTH model

SLEUTH codes were modified with respect to spread optimization obtained from PSO. Spread optimization gave eight best fit values indicating eight directions of optimum growth as shown in Moore neighborhood network figure 10C. Best PSO results were achieved at run number 83 with an OSM value of 0.824. After adopting coefficients from BFM, the spread.c, script.c and scenario file were modified accordingly and routine run to obtain control stats and therefore model fit measures.

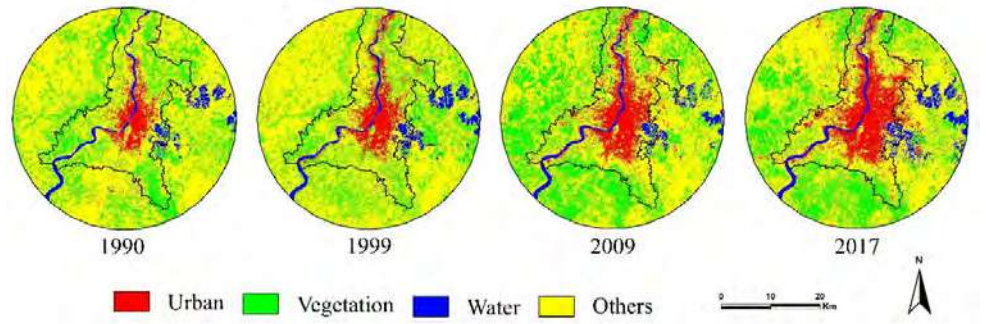


Figure 9 Land use results for KMDA region 1990-2017

Results obtained from PSO were compared with traditional brute-force method (BFM). Corresponding statistics are pictorially shown in figure 11. Substantial enhancement in terms of metrics such as Product, Compare, Edges, Clusters, Size, X-Mean and Y-Mean were observed by adopting PSO technique, while Population, Slope, % Urban and Rad showed minimum difference between these two methods. Leesalee metric was higher in BFM method with a value of 0.519 and lesser in PSO with a value of 0.480. OSM was calculated, achieved OSM was 0.0501 during BFM and 0.600 during PSO-SLEUTH. This clearly shows significant improvement in calibration of coefficients with PSO improvised spread optimized pixel values. Another important development was observed in computation time. Post full calibration process, PSO took 4hours, 12mins and 32 seconds to yield model fit statistics. These results not only indicate the model robustness by integrating PSO, but also it can deliver excellent fit statistics without compromising optimum coefficients.

Table 2 Land use and accuracy statistics

Year	Land use categories				Accuracy assessment	
	Urban	Vegetation	Water	Others	Overall accuracy (%)	Kappa statistic
1990	4.12	23.08	4.2	68.61	88	0.94
1999	6.45	21.17	4.7	67.68	93	0.96
2009	9.04	28.23	4.73	58	91	0.85
2017	11.58	22.18	6.24	60	91	0.89

Further, prediction for KMDA was performed using best-fit coefficients. After three phase calibration, optimum growth coefficients were derived. Of all the coefficients, breed (52) and spread (64) showed medium values whereas road gravity was the highest (80). This indicates Kolkata region has a significant influence of breeding a new urban site in the periphery or spreading type of urban growth from already existing core urban area, can also be referred to as sprawling at the outskirts. High values of road gravity reflect road acting as key urbanization factor. To name a few, Kolkata region has major connecting roads (AH1) towards NW direction, Bardhaman, Durgapur and Asansol; SW direction Kharagpur and further this road (AH45) connects to Orissa; NE direction, AH1 connects to Jessore (Bangladesh) and other important road network such as: Grand trunk road, NH 34, 35, 117, SH 1, 2, 3, 13 and 15. Diffusion and slope resistance showed the lower values of 8 and 16 respectively. Prediction was performed using PSO-SLEUTH to potentially visualize the scenario of urban growth and it was estimated to reach 757.91km^2 in comparison with 494.73km^2 in 2017, can be observed in figure 12.

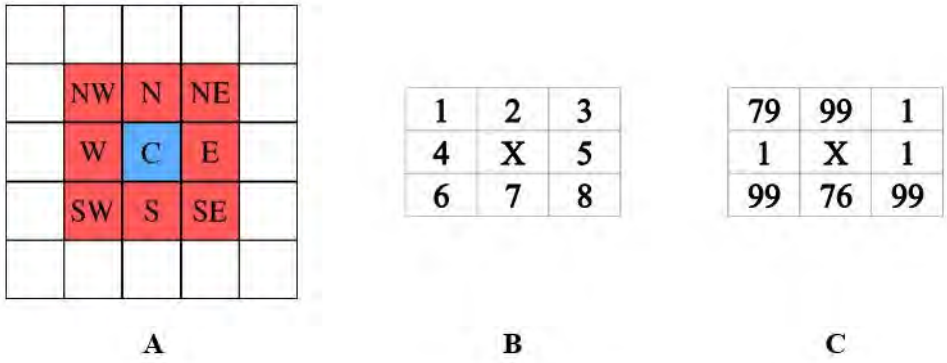
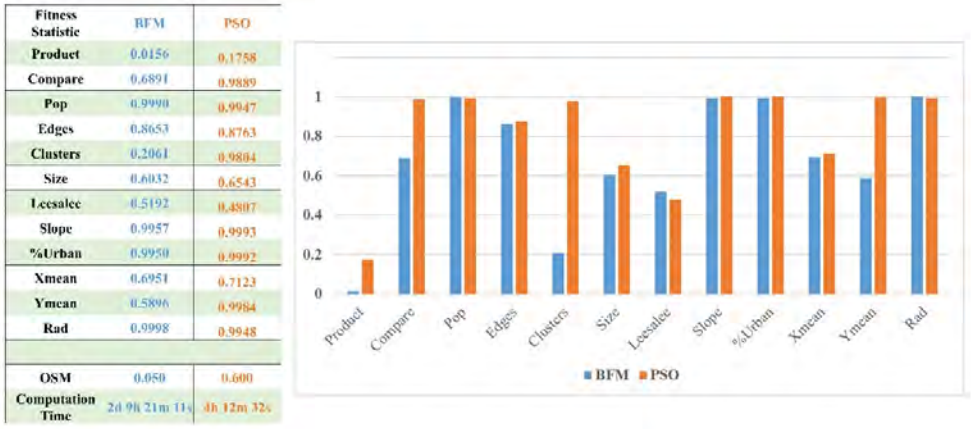


Figure 10 Optimization of pixel values based on Moore neighborhood. A) 3 x 3 kernel and directions B) Allotment pattern of pixel values in code C) Values achieved after running PSO



Fitness Statistic	BFM	PSO
Product	0.0156	0.1758
Compare	0.6891	0.9889
Pop	0.9990	0.9947
Edges	0.8653	0.8763
Clusters	0.2061	0.9884
Size	0.6032	0.6543
Leesalee	0.5192	0.4807
Slope	0.9957	0.9993
%Urban	0.9950	0.9992
Xmean	0.6951	0.7123
Ymean	0.5896	0.9984
Rad	0.9998	0.9948
OSM	0.050	0.600
Computation Time	2d 9h 21m 11s	4h 12m 32s

Figure 11 Summary of model fit statistics, comparison of metric values between BFM and PSO

5. Conclusion

Urban land use change is widespread, rapid and has direct effect on ecosystem and environment. It is mainly driven by human-induced activities carried out beyond limits and exploring natural resources to the fullest without any regard to concepts of sustainability. Extraction of building data from satellite imagery has always helped government agencies and planners to assess critical impacts of urban expansion on other land use categories. This research article highlights the significance of building extraction using high-resolution imagery and also discusses the potential of data merging, i.e., panchromatic image and multispectral image using pan-sharpening method to obtain binary classification of buildings, further this data can be used for modelling purpose as an ancillary dataset. This study also demonstrates the successful implementation and monitoring spatio-temporal urban growth using satellite data over a period of 27 years. Accuracies ranging from 88%-93% and kappa between 0.85-0.96 indicated excellent agreement between generated land use image and real-time dynamics.

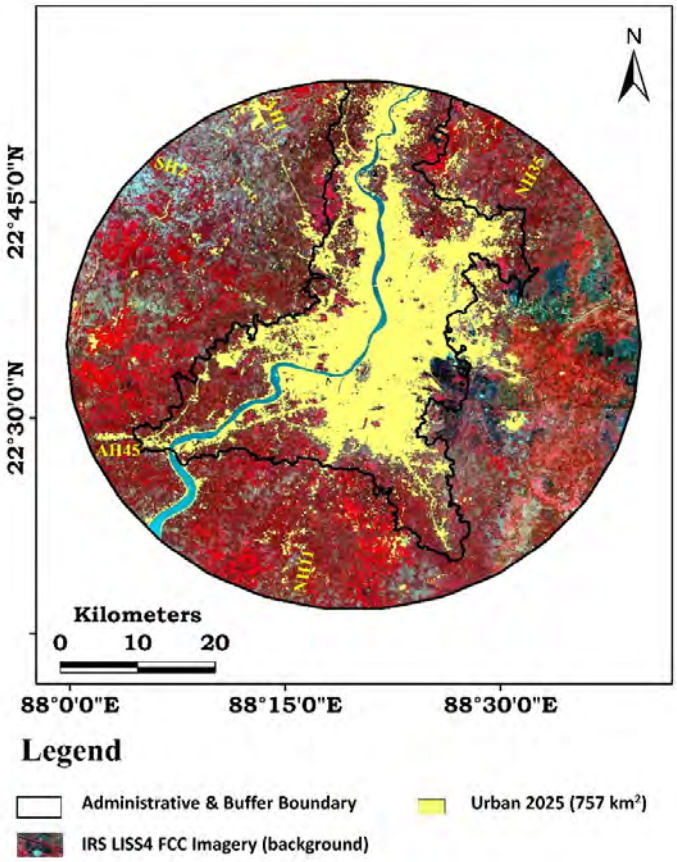


Figure 12 PSO-SLEUTH modeled output for the year 2025, KMDA region

Modeling and visualizing these changes have always been regarded, helps in formulating effective local, regional and national level sustainable environmental policies and management strategies. CA-based models, SLEUTH model in particular, its origins, theory behind, application and its strength when integrated with multiple tools, multi-disciplinary approach and recent advanced techniques such as genetic algorithm, particle swarm optimization, ant colony optimization etc. proves to be worthy urban models. In this study, we perform an integrated novel method of adopting PSO-SLEUTH to optimize spread using Moore neighborhood, calibration and prediction of urban expansion for the year 2025. Unlike other optimization techniques, PSO is faster in terms of computation time, efficient, reliable and has lesser parameters for human intervention. These advantages are explored in this paper, BFM based PSO-SLEUTH calibration saw excellent improvement in results and it can be realized by obtaining OSM of 0.6 using PSO in comparison with 0.05 using traditional BFM. Apart from OSM, other model fit statistics also showed satisfactory values suggesting the robustness of SLEUTH model to integrate with any other improvised algorithm. Visuals from model output suggests KMDA to have at least 757.91km^2 of urban land use by the year 2025, which is 53% increment from 2017. There appears to be a considerable gap in research when it comes to validation and accuracy of models. Adopting optimization techniques along with agent-based models seems to be governing aspects of future efforts. These statistics and findings insists administrators, planners and concerned government officials to focus on emerging land use issues and sustainable urban growth concepts.

6. Acknowledgment

We are grateful to SERB, India, the Ministry of Science and Technology, Government of India, Ranbir and Chitra Gupta School of Infrastructure Design and Management, Department of Science and technology, West Bengal (WBDST), Sponsored research cell Indian Institute of Technology Kharagpur, NRDMS for financial and infrastructure support. We are thankful to Project Gigalopolis for the source code of SLEUTH.

7. References

Alves, R.M. and Albrecht, C.H. 2010. The Use of Simulation in Urban Modelling. Methods and Techniques in Urban Engineering, 109.

Anderson, J.R., 1976. A land use and land cover classification system for use with remote sensor data (Vol. 964). US Government Printing Office.

Batty, M. and Xie, Y., 1994. From cells to cities. Environment and planning B: Planning and design, 21(7), 31-48.

Batty, M., 2009. Urban modeling. International encyclopedia of human geography. Elsevier, Oxford.

Bharath, H. A., Chandan, M.C. and Nimish, G., 2019. Assessing land surface temperature and land use change through spatio-temporal analysis: a case study of select major cities of India. Arabian Journal of Geosciences, 12(11), 367.

Bharath, H. A., Vinay, S., Chandan, M. C., Gouri, B. A. and Ramachandra, T. V., 2018. Green to gray: Silicon Valley of India. Journal of Environment Management, 206, 1287-1295.

Bharath, H. A. and Ramachandra, T.V., 2016. Visualization of urban growth pattern in Chennai using geoinformatics and spatial metrics. Journal of Indian Society of Remote Sensing, 44, 617-633.

Bharath, H. A., Vinay, S., Ramachandra, T.V., 2014. Landscape dynamics modelling through integrated Markov, Fuzzy-AHP and cellular automata. In: 2014 IEEE Geoscience and Remote Sensing Symposium, 3160-3163.

Boori, M.S., Voženílek, V. and Choudhary, K., 2015. Land use/cover disturbance due to tourism in Jeseníky Mountain, Czech Republic: A remote sensing and GIS based approach. The Egyptian Journal of Remote Sensing and Space Science, 18(1), 17-26.

Breiman, L., 2001. Random forests. Machine learning, 45(1), 5-32.

Chandan, M.C., Nimish, G. and Bharath, H.A., 2019. Analysing spatial patterns and trend of future urban expansion using SLEUTH. Spatial Information Research, 1-13.

Chen, S., Zeng, S. and Xie, C., 2000. Remote sensing and GIS for urban growth analysis in China. Photogrammetric Engineering and Remote Sensing, 66(5), 593-598.

Clarke-Lauer, M.D. and Clarke, K.C., 2011, July. Evolving simulation modeling: Calibrating SLEUTH using a genetic algorithm. In Proceedings of the 11th International Conference on GeoComputation, London, UK.

Cortes, C. and Vapnik, V., 1995. Support-vector networks. Machine learning, 20(3), 273-297.

Crooks, A.T., 2010. Constructing and implementing an agent-based model of residential segregation through vector GIS. International Journal of Geographical Information Science, 24(5), 661-675.

Das, S. K., Bharath, H.A. and Prakash, P.S., 2018. Automated building extraction using high-resolution satellite imagery though Ensemble modelling and Machine learning. Remote Sensing of Land, 1–14.

Dietzel, C. and Clarke, K.C., 2007. Toward optimal calibration of the SLEUTH land use change model. Transactions in GIS, 11(1), 29-45.

Dixon, B. and Candade, N., 2008. Multispectral landuse classification using neural networks and support vector machines: one or the other, or both? International Journal of Remote Sensing, 29(4), 1185-1206.

Duda, R.O., Hart, P.E. and Stork, D.G., 2012. Pattern classification. John Wiley & Sons.

Eberhart, R. and Kennedy, J., 1995, October. A new optimizer using particle swarm theory. In MHS'95. Proceedings of the Sixth International Symposium on Micro Machine and Human Science, IEEE, 39-43.

Feng, Y., Liu, Y., Tong, X., Liu, M. and Deng, S., 2011. Modeling dynamic urban growth using cellular automata and particle swarm optimization rules. Landscape and Urban Planning, 102(3), 188-196.

Ghosh, A. and Joshi, P.K., 2013. Assessment of pan-sharpened very high-resolution WorldView-2 images. International journal of remote sensing, 34(23), 8336-8359.

Goldberg, D.E., 1989. Genetic algorithms in search. Optimization, and MachineLearning. Addison Wesley.

Goldstein, N.C., 2004. Brains versus brawn-comparative strategies for the calibration of a cellular automata-based urban growth model. GeoDynamics, 249-272.

Guan, Q. and Clarke, K.C., 2010. A general-purpose parallel raster processing programming library test application using a geographic cellular automata model. International Journal of Geographical Information Science, 24(5), 695-722.

Holland, J.H., 1975. Adaptation in natural and artificial systems Ann Arbor. The University of Michigan Press, 1, p.975.

Horning, N., 2010, December. Random Forests: An algorithm for image classification and generation of continuous fields data sets. In Proceedings of the International Conference on Geoinformatics for Spatial Infrastructure Development in Earth and Allied Sciences, Osaka, Japan (Vol. 911).

Hu, W., Wang, H., Yan, L. and Du, B., 2018. A Hybrid Cellular Swarm Optimization Method for Traffic-Light Scheduling. Chinese Journal of Electronics, 27(3), 611-616.

Jafarnezhad, J., Salmanmahiny, A. and Sakieh, Y., 2015. Subjectivity versus objectivity: comparative study between brute force method and genetic algorithm for calibrating the SLEUTH urban growth model. Journal of Urban Planning and Development, 142(3), 05015015.

Jantz, C.A., Goetz, S.J., Donato, D. and Claggett, P., 2010. Designing and implementing a regional urban modeling system using the SLEUTH cellular urban model. Computers, Environment and Urban Systems, 34(1), 1-16.

Ji, C.Y., Liu, Q., Sun, D., Wang, S., Lin, P. and Li, X., 2001. Monitoring urban expansion with remote sensing in China. International Journal of Remote Sensing, 22(8), 1441-1455.

Li, X. and Liu, X., 2006. An extended cellular automaton using case-based reasoning for simulating urban development in a large complex region. International Journal of Geographical Information Science, 20(10), 1109-1136.

NASA, 2001. Satellite maps provide better urban sprawl insight. Science Daily. Accessed on May 3, 2019. Retrieved from https://www.sciencedaily.com/

Nimish, G., Chandan, M.C. and Bharath, H.A., 2018. Understanding current and future landuse dynamics with land surface temperature alterations: a case study of Chandigarh. ISPRS Annals of Photogrammetry, Remote Sensing & Spatial Information Sciences, 4(5).

Nimish, G., Setturu, B., and Ramachandra, T.V., 2017. Modelling Landscape Dynamics in Protected Areas, Karnataka. Paper presented at Indian Biodiversity Congress - Vol 4, Puducherry, India.

Prakash, P.S., Soumya, K.D. and Bharath, H.A., 2018, November. Urban building extraction using satellite imagery through Machine Learning. In 2018 IEEE Symposium Series on Computational Intelligence (SSCI), IEEE, 1670-1675.

Rabbani, A., Aghababaee, H. and Rajabi, M.A., 2012. Modeling dynamic urban growth using hybrid cellular automata and particle swarm optimization. Journal of Applied Remote Sensing, 6(1), 063582.

Ramachandra, T. V., Aithal, B. H., and Sanna, D. D. (2012). Insights to urban dynamics through landscape spatial pattern analysis. International Journal of Applied Earth Observation and Geoinformation, 18(1), 329–343.

Sakieh, Y. and Salmanmahiny, A., 2016. Treating a cancerous landscape: implications from medical sciences for urban and landscape planning in a developing region. Habitat International, 55, 180-191.

Shaw, R. and Das, A., 2018. Identifying peri-urban growth in small and medium towns using GIS and remote sensing technique: A case study of English Bazar Urban Agglomeration, West Bengal, India. The Egyptian Journal of Remote Sensing and Space Science, 21(2), 159-172.

Shi, Y., Liu, H., Gao, L. and Zhang, G., 2011. Cellular particle swarm optimization. Information Sciences, 181(20), 4460-4493.

Stephen, M.J., Reddy, P. and Vasavi, V., 2013. Fingerprint image enhancement through particle swarm optimization. International Journal of Computer Applications, 66(21), 34-40.

Thanh Noi, P. and Kappas, M., 2018. Comparison of random forest, k-nearest neighbor, and support vector machine classifiers for land cover classification using Sentinel-2 imagery. Sensors, 18(1), 18.

Torrens, P.M. and Benenson, I., 2005. Geographic automata systems. International Journal of Geographical Information Science, 19(4), 385-412.

Torrens, P.M., 2000. How cellular models of urban systems work (1. Theory).

Tran, H., Tran, T. and Kervyn, M., 2015. Dynamics of land cover/land use changes in the Mekong Delta, 1973–2011: A remote sensing analysis of the Tran Van Thoi District, Ca Mau Province, Vietnam. Remote Sensing, 7(3), 2899-2925.

UN DESA, 2015. World urbanization prospects: The 2014 revision. Accessed on February 25, 2019. Retrieved from URL of United Nations Department of Economics and Social Affairs, Population Division: New York, NY, USA.

UNSDS, 2015. New York Summit: Transforming our world: the 2030 Agenda for Sustainable Development. Accessed on April 7, 2019. Retrieved from https://www.un.org/

Verburg, P.H., Soepboer, W., Veldkamp, A., Limpiada, R., Espaldon, V. and Mastura, S.S., 2002. Modeling the spatial dynamics of regional land use: the CLUE-S model. Environmental management, 30(3), 391-405.

Wolfram, S., 2002. A new kind of science (Vol. 5, 130). Champaign, IL: Wolfram media.

Wu, N. and Silva, E.A., 2010. Artificial intelligence solutions for urban land dynamics: a review. Journal of Planning Literature, 24(3), 246-265.

Yang, X., Zheng, X.Q. and Lv, L.N., 2012. A spatiotemporal model of land use change based on ant colony optimization, Markov chain and cellular automata. Ecological Modelling, 233, 11-19.

Yao, F., Hao, C. and Zhang, J., 2016. Simulating urban growth processes by integrating cellular automata model and artificial optimization in Binhai New Area of Tianjin, China. Geocarto International, 31(6), 612-627.

Research Paper

URBAN PARAMETERS ANALYSIS AND VISUALIZATION

A Support to planning decisions for the definition of urban surface usages

Silvia CROCE, Institute for Renewable Energy, Eurac Research; Italy
Daniele VETTORATO, Institute for Renewable Energy, Eurac Research; Italy

Abstract

Several mitigation and adaptation strategies are proposed to tackle the environmental issues associated to massive urbanization and climate change. All these solutions are highly related to the utilization of urban surfaces (i.e. building envelopes, streets, public spaces, etc.). However, the existing trends demonstrate the lack of a systemic approach able to integrate multiple possible functions and avoid sub-optimal solutions. In this context, urban planning can play an essential role in managing conflicts among different surface uses and ensuring their integration. This involves making spatially explicit decisions about the types of surface use allowable, and their extent and location. The decision-making process needs to be supported by accurate and detailed knowledge about the spatial distribution of a variety of parameters that influence the surface uses in cities.
This study presents a systematic framework to support planning decisions based on accurate, diverse and spatially explicit information, and discusses its application in a residential district located in Bolzano (Italy). The proposed method implies the assembly of a multivariate spatial database of significant morphological and environmental parameters acquired through environmental simulation techniques and on-site data collection. The three-dimensional visualization of this database represents a solid base to relate urban planning decisions on surface uses to their effects in terms of microclimatic conditions, thermal comfort, and on-site renewable energy production.

Keywords

Urban surface use, urban microclimate, urban morphology, spatial information, data visualization

1. Introduction

Massive urbanization and rapid growth of urban population worldwide are exposing cities to several stressors, many of which are largely driven and intensified by global climate change. More than half of the world population and the majority of the economic activities are located in urban areas (World Bank, 2018); this makes cities among the major contributors to climate change as well as particularly vulnerable to its impacts, facing major weather and environment-related challenges (Baklanov et al., 2018). Therefore, it is becoming essential for cities to develop strategies for controlling local climatic and biophysical conditions, protecting inhabitants and infrastructures from extreme weather events, and using their resources

efficiently. In this context, city planning is emerging as a key practice to contribute to the well-being of the urban environment. Hence, one of the most effective ways to address the challenges posed by urban development and climate change is to include responsive resilience strategies into the current planning processes. This arises the need for sets of data and information able to support urban planners and decision makers in implementing effective measures to address the most critical issues and vulnerabilities (Giordano *et al.*, 2019).

Climatic conditions in cities constitute a relevant issue for urban design, as they affect human thermal comfort, impact the energy consumption for heating and cooling, and influence the use of open and public spaces. These conditions are determined by the physical and morphological features of each urban areas, such as the distribution and density of the buildings, the materials characterizing their surfaces, the presence of vegetation, etc. Hence, the analysis and understanding of this environmental and geometrical attributes is an important step to identify responsive solutions at the urban and building scale during the design process (Silva et al., 2018). In this scenario, urban design and urban planning play a key role. However, despite the development of numerous studies and scientific techniques, current city planning processes does not thoroughly make use of the knowledge generated by the available research on the field. Furthermore, current policies, such as those aimed at the reduction of urban heat island (UHI), are often applied uniformly to all the areas of a city, neglecting the spatial variation of climatic conditions in relation to the urban form (Danahy *et al.*, 2015). To address this lack of awareness, there is the need for going beyond both abstract analyses on single physical and atmospheric processes, and studies on single urban areas, by implementing an interdisciplinary approach to consider the interrelation of climate, city structure, and thermal comfort (Eliasson, 2000; Martinelli and Matzarakis, 2017). Two- and three-dimensional (3D) visualization processes can increase awareness of the role of urban and environmental features and their spatial variability. Moreover, they can support urban decision makers in investigating the local effects of general policies, in comparing several strategies, and in communicating the different options to the involved stakeholders and to the citizens (Danahy *et al.*, 2015).

This work proposes an approach to reduce the gap between scientific research and the real challenges of its integration into practice at urban scale by setting a framework to inform urban planners and decision makers about the relevant characteristics of each area, and the impact of their decisions on microclimate, human thermal comfort, and on-site renewable energy production.

1.1. Urban surface use definition: the role of urban planning

In the current scenario of urbanization, growth of urban population, and global climate change, several strategies are being proposed to tackle the correlated environmental issues. All these solutions are highly related to the utilization of urban surfaces, which are considered as key element in our approach. The term “urban surfaces” identifies all the surfaces that characterize physically and morphologically the three dimensions of the built environment, including the horizontal and vertical surfaces of the ground and of the building envelopes (Croce, Vettorato and Paparella, 2019). Ground surfaces comprise the road network and the urban open spaces, while building envelopes’ surfaces include façades and rooftops. Urban surfaces can be characterized by different materials and can host several functions. With “urban surface usage” we define the way a surface is deployed to address urban resiliency - protection of people and infrastructures from extreme climate events - and sustainability - efficient use of resources - objectives. The term encompasses all the materials and solutions

that can built-up the different surfaces or be applied on them. The main solutions, clustered in five main categories, are schematized in Figure 1.

Figure 1. Overview of the main categories of urban surface uses.

Once being seen only as a cost, due to their maintenance (Becchio *et al.*, 2011; Augeri, Greco and Nicolosi, 2019), urban surfaces are becoming a key opportunity for cities in latest years. Their exploitation offers the opportunity to increase resource efficiency, to exploit renewable energy sources, and to reduce the overall environmental impact (Kellett, 2011; Sadineni, Madala and Boehm, 2011; Toboso-Chavero *et al.*, 2018). However, the common approaches to urban surface use definition are still mainly focused on single solutions (e.g. urban vegetation, use of reflective materials, etc.), and on pursuing single objectives. Furthermore, these approaches are often bi-dimensional, still strongly connected to the concept of land use (Davoudi, Crawford and Mehmood, 2009; Yiannakou and Salata, 2017), disregarding the three-dimensional complexity of the build-environment.

The existing trends demonstrate the lack of a systemic process able to integrate multiple possible solutions, and to avoid sub-optimal solutions. For example, in cities, conflicts are arising between the surface uses for renewable energy production, urban agriculture, and green solutions (Penaranda Moren and Korjenic, 2017). Urban planning is essential to manage conflicts among different surface uses and ensure their integration in the process toward resilient and sustainable cities (Kellett, 2011). This involves making spatially explicit decisions about the types of surface use allowable, and the extent and location of these. This decision-making process needs to be supported by accurate and detailed information about the spatial distribution of a set of parameters. Indeed, many environmental and morphological features influence the distribution of surface uses in cities and affect the priorities for their definition. These parameters not only include the morphological and geometrical features of the urban areas, which can be easily assessed and are already part of traditional urban design processes, but also a variety of environmental and microclimatic parameters. Hence, a clear understanding of the physical interaction between the built environment and the climate boundary conditions is crucial to determine truly responsive strategies.

2. Morphological and environmental parameters

This study presents a systematic framework to support planning decisions about the mix of surface uses and their spatial arrangement in the urban environment, based on accurate,

diverse and spatially explicit information. The method implies the assembly of a multivariate spatial database of significant morphological and environmental parameters, obtained from environmental simulation techniques and on-site data collection. The three-dimensional visualization of this database represents a solid base to relate urban planning decisions on surface uses and their effects, e.g. in terms of microclimatic conditions enhancement and on-site renewable energy production. Furthermore, it provides an easily understandable way to recognize specific elements of the urban environment and orient the design process. This section presents an overview of the main parameters, their role, and characteristics.

2.1. Morphological parameters

Several studies have demonstrated that the urban spatial configuration can influence the local climate (Pisello *et al.*, 2018; Shooshtarian, Rajagopalan and Sagoo, 2018). Indeed, the replacement of natural, permeable surfaces, with mineral materials is the main responsible of both UHI and surface storm-water runoff problems. The low albedo of materials applied on the majority of the urban surfaces is cause of the increase of solar radiation absorption and consequent high surface temperatures. Furthermore, the territorial expansion produced by the urbanization increases the land consumption and causes relevant changes in the land use. Consequently, the reduction of green spaces due to the territorial expansion produces a serious environmental degradation with the loss of urban ecosystems. The increase of buildings heights and urban density is responsible for low induced wind velocities, which impede suitable heat removal rates. Therefore, the proper understanding of the site geometry and urban surfaces features is crucial.

Among the main parameters used to characterise the urban structure there are the building height, total height-to-floor area ratio, building volume density, the aspect ratio and the sky view factor (Oke, 1990). The aspect ratio (H/W) defines ratio of the mean building height (H) to road width (W). The larger is the H/W, the denser is the urban area. The sky view factor (SVF) is defined as the portion of sky visible from a specific point inside the urban area. Its values ranges from 0 to 1, which refer respectively to a completely obstructed and unobstructed sky. SVF has an important role in determining the receipt and loss of radiation in the built environment. During the day, a low SVF will result in less incoming solar radiation in the urban canyon, affecting the ground surface as well as the air temperature. While during nighttime, it reduces the loss of long-wave radiation to the sky and the turbulent heat transfer in the canyon air.

The urban built environment is constituted by a variety of surfaces, whose properties play a key role. The most relevant thermal and radiative properties of urban mineral surfaces include the type of material, its albedo, emissivity, and thermal conductivity. Albedo plays an important role in the surface energy balance; it is defined as the ratio of solar radiation reflected to the amount of radiation absorbed by a surface (Kotharkar, Bagade and Ramesh, 2019). With regard to natural, permeable surfaces, soil type, and vegetation type and species influence the variability in local urban climate (Vuckovic, Kiesel and Mahdavi, 2017).

2.2. Environmental parameters

Environmental parameters include the main physical quantities characterising the microclimatic conditions in an urban area, i.e. air temperature (T_{air}), surface temperature (T_s), mean radiant temperature (T_{mrt}), global shortwave solar radiation (Irr_{SW}), and wind speed (W_s) and direction (W_{dir}). These variables are also used to calculate the thermal environment by means of suitable indexes, such as the Universal Thermal Climate Index (UTCI), which

evaluates the human thermal perception and the correlated grade of physiological stress (Jendritzky, de Dear and Havenith, 2012; Pappenberger *et al.*, 2015).

2.3. Data sources

Access to spatialized data at the appropriate resolutions is important to correctly represent the distribution of morphological and environmental features, and to characterise urban phenomena, such as the microclimatic conditions. Figure 2 presents an overview of the main parameters and the main data sources.

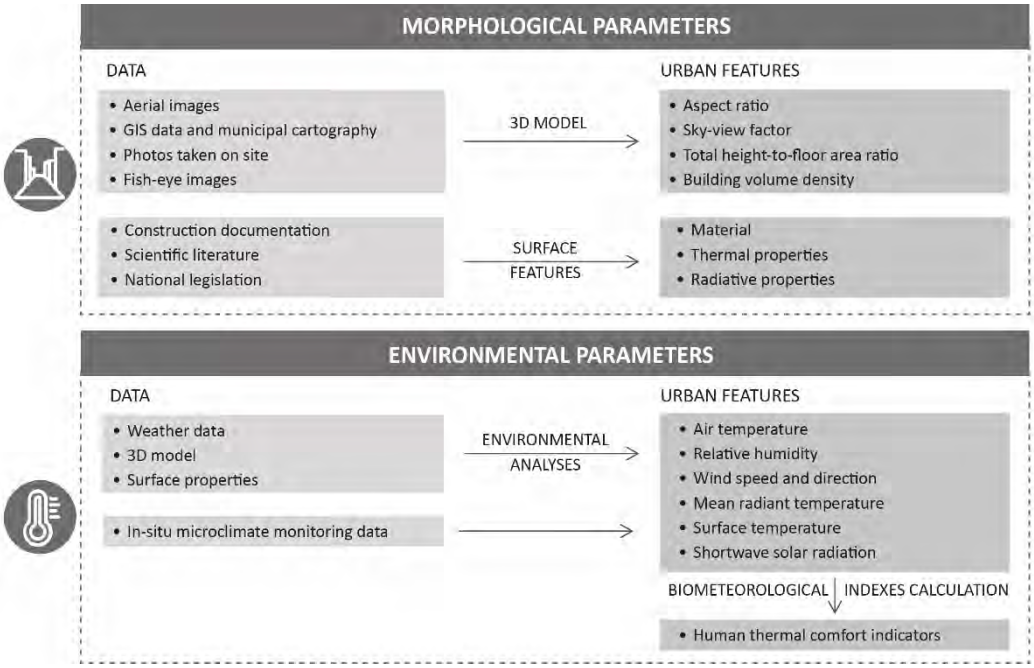


Figure 2. Parameters influencing the definition of urban surface uses, and main data sources.

A variety of data is suitable for the creation of the 3D model of an urban area. Aerial images and photos taken on-site are used to define the geometrical characteristics of the buildings, the finishing materials of the urban surfaces, and the presence and typology of the vegetation. Based on this, different methods and techniques are available to analyse urban morphological parameters, ranging from spatial metrics to the use of satellite images.

The local climate conditions can be assessed by measuring the main microclimatic parameters in-situ, with the use of weather stations (Pyrgou et al., 2017), extensive sensor networks (Tong et al., 2018), or mobile meteorological stations (Chokhachian et al., 2018). However, setting up and maintaining an in-situ monitoring network is resource and time consuming, and not always feasible due to technical reasons. However, the interactions between the built environment and the climate boundary conditions can also be modelled and evaluated by means of numerical simulations. Several models and tools allow to conduct environmental analyses. Depending on the selected tool, it is possible to calculate single variables, such as the incoming solar radiation, or complex atmospheric process, such as wind flow, turbulence, processes of heat and vapour exchange at urban surfaces, and exchanges of energy and mass between the vegetation and its surroundings (Lobaccaro *et al.*, 2018). In this study, different tools have been chosen depending on the aims of each investigation; an overview is presented in Table 1.

Table 1. Main typologies of environmental analyses, aims, and tools used.

Analyses *(Parameters)*	Aims	Tools
Solar potential *(Irr_{sw})*	Identify the most irradiated areas and the surfaces most affected by overshadowing	*Rhinoceros*, *DIVA-for-Rhino*, *Honeybee* for *Grasshopper*
Microclimate *(T_{air}, RH, T_{mrt}, T_S)*	Define local microclimate conditions and verify impacts of specific modifications of surfaces uses	*ENVImet*, *Ladybug* tools for *Grasshopper, Rhino-2-ENVI*
Urban airflow *(W_s, W_{dir})*	Evaluate the natural ventilation and identify the prevalent winds in the district	*Butterfly for Grasshopper, OpenFoam*
Thermal comfort *(UTCI)*	Assess the human thermal comfort conditions	*ENVImet - BioMet*, *Rayman*

3. Data analysis and visualization for urban surface use definition

The traditional products of environmental simulation tools, abstract climate maps or descriptive texts can be confusing to non-experts, and lack the flexibility necessary for informing planning decisions in complex urban environments with competing demands. Relating urban form to local climate conditions plays an important role when facing several urban issues, such as urban heat island, energy resiliency, water availability, etc. Visualization can be used to guide an effective decision making process and to effectively represent the effects of surface use choices in a 3D model, making them more tangible. Figure 3 schematizes the structure of the proposed framework.

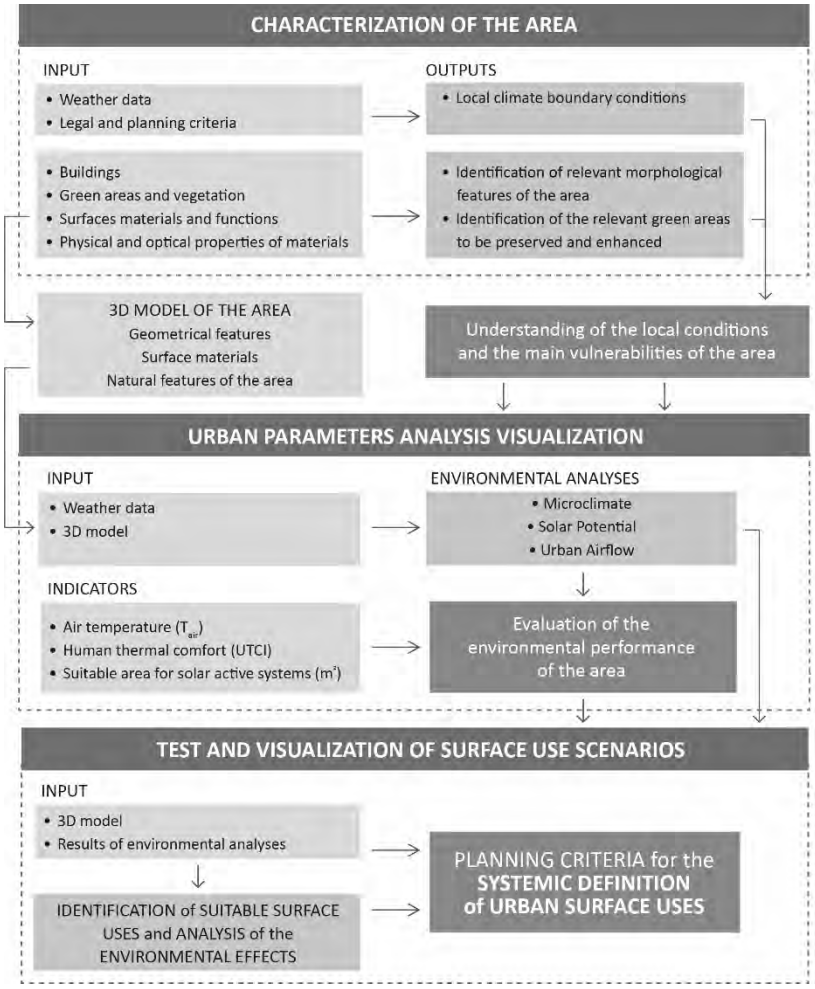


Figure 3. Scheme of the proposed process.

4. Application to a case study in Bolzano

In this section, the application of the proposed method is tested for the analysis of the current conditions and for the definition of suitable surface uses in an existing district in Bolzano.

The city of Bolzano (UTM 46°29'53.8" N, 11°21'17.1" E) is located in the north-east of Italy, at a height of 265 m above sea level; its climate is categorized as moist continental (i.e. “Dfb” Köppen-Geiger classification) and is characterized by strong seasonal fluctuations. The location of the city, which is situated in a basin surrounded by mountain ranges, often exacerbates high temperature and heat waves during summer, when T_{air} frequently exceeds 35 °C. In this context, the municipality of Bolzano is committed in mitigating the effects of climate change through several actions, such as the exploitation of RES, the energy retrofit of buildings, and the increase of urban vegetation by planting new trees and supporting the diffusion of green roofs.

The residential district selected as case study is one of the five areas in Bolzano taking part to the Smart Cities European project SINFONIA (SINFONIA, 2017); it includes two social housing blocks, being innovatively refurbished in the framework of the project, and the nearby buildings.

4.1. Characterization of the area under study

The area is characterized by the presence of five urban canyons: *Via Milano* and *Via Cagliari* from north to south; *Via Brescia*, *Garden*, and *Via Palermo* from west to east (Figure 4). *Via Palermo* is one of the main roads connecting the eastern and southern areas of Bolzano; due to its importance in the traffic network of the city, together with *Via Milano* and *Via Cagliari,* is considered as geometrical invariant. Therefore, the possible surface uses are restrained to the solely modification of the materials, while original geometrical and functional features are kept unvaried. On the contrary, *Via Brescia* and *Garden*, the central vegetated public area, are regarded as possible variants.

Figure 4. Aerial view, urban canyons, and morphological parameters in representative locations.

Being the mitigation of summer temperatures among the main objectives of Bolzano Municipality’s planning actions, the environmental characteristics of the area have been assessed for a typical hot summer day. Figure 5 visualizes the main surface uses in the district, together with the spatial distribution of some representative microclimatic parameters that have a major influence in defining the thermal conditions in the districts, i.e. Irr_{SW}, T_S, and T_{air}. The data visualized in 3D have been obtained from environmental analyses.

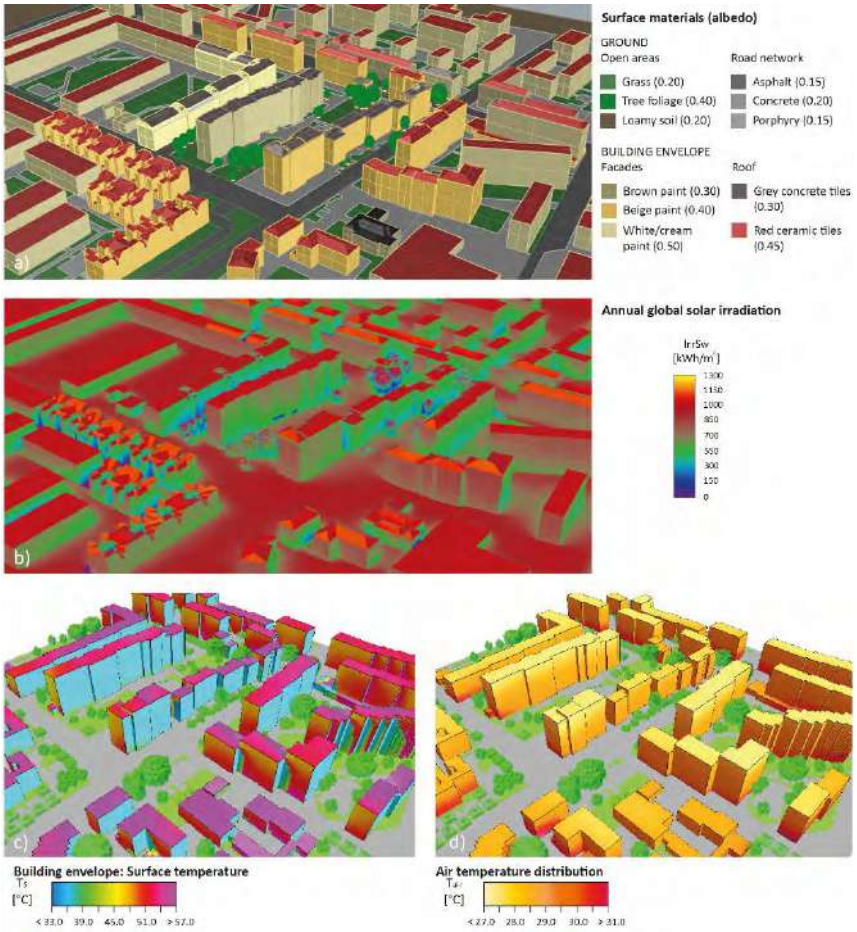


Figure 5. Surface uses (a), and spatial distribution of microclimatic parameters in the district.

The characterization of microclimatic conditions in the district is not only conducted through the use of tools for environmental analyses. Hence, since July 2019, the area is subject to an in-situ monitoring campaign, which will last for one year and collect data relatively to all the main meteorological parameters. The monitoring network is constituted by two high resolution weather stations, installed on *Via Brescia* Sinfonia building roof, and in *Garden*, and 15 custom made sensor nodes, which are positioned at different height on the external surfaces of *Via Brescia* Sinfonia building. The configuration of the network and its main characteristics are shown in Figure 6.

Figure 6. Sinfonia in-situ outdoor monitoring network.

4.2. Definition of surface uses

Some main evidences emerge from the analysis of the environmental parameters' spatial distribution: (i) the area is affected by summer overheating and the hotspots are localized in the urban canyons due to high asphalt T_s, (ii) T_{air} is mitigated in the green areas, and (iii) several surfaces present suitable Irr_{SW} levels for the integration of solar active systems. Based on the existing conditions in the district, several configurations have been analysed in order to evaluate the effects of applying different solutions for surface uses (e.g. green solutions at building scale, water surfaces, solar active systems, etc.). The main objectives defined for the area are: (i) mitigation of high summer temperatures, (ii) energy production from RES, and (iii) increase of green areas in the district for environmental enhancement and community well-being. Based on these, and on the results of several environmental analyses, a possible final configuration of the urban surfaces has been defined as schematized in Table 2.

Table 2. Final configuration of urban surfaces in the case study area.

Surface		Solution
Ground	Open areas	Increase of green areas of + 15% Water basin close to *Via Cagliari* hot spot
	Road network	Cool grey asphalt (albedo = 0.40)
Building envelope	Façade	Vertical greening on façades (i) exposed at south, (ii) along roads with high T_{air} BIPV on the surfaces with suitable solar potential
	Roof	PV panels on the most irradiated surfaces Cool paint on the remaining areas (albedo = 0.80)

The environmental analyses demonstrate the effectivity of this configuration. In terms of microclimate conditions, the air temperature is reduced in all the hot spots (Figure 7), with an average T_{air} decrement up to - 0.50 °C in *Via Cagliari* and *Via Milano*, and - 0.40 °C in *Via Palermo* and *Via Brescia*. Furthermore, the combination of increased relative humidity, and decreased surface and mean radiant temperature, produces an improvement of human thermal comfort. Hence, the UTCI is reduced on average of - 1.00 °C, decreasing the thermal stress from "very strong" to "strong" compared to the current configuration (Park, Tuller and Jo, 2014). Simultaneously, the production of renewable energy through solar active systems is guaranteed. The installation is possible on 6 500 m^2 of building envelope surfaces with suitable solar irradiation (i.e. $Irr_{SW} \geq 950$ kWh/m2), with a corresponding annual solar potential of 6 320 MWh/a.

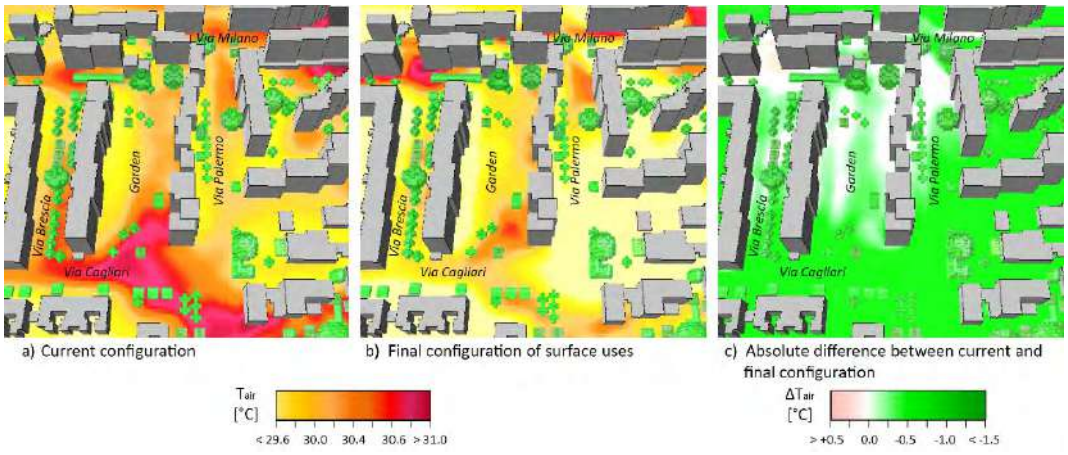


Figure 7. Distribution of air temperature at pedestrian level at 15:00 in summer conditions - Current (a) and final configuration (b); Absolute temperature difference (c).

5. Conclusions

This study presented a systematic framework to support planning decisions based on accurate, diverse and spatially explicit information. The method implies the assembly of a multivariate spatial database of significant morphological and environmental parameters that influence the distribution of surface uses in cities and affect the priorities for their definition.

The application of the proposed method to a case study in Bolzano demonstrates the importance of understanding the distribution of urban parameters for taking spatially explicit decisions about the types of surface use allowable, and the extent and location of these. The three-dimensional visualization of the morphologic and environmental variables represents a solid base to relate urban planning decisions on surface uses and their effects in terms of microclimatic conditions, thermal comfort, and on-site renewable energy production. This is demonstrated by the results obtained in the final configuration, in which several uses have been systematically integrated on the urban surfaces of the district. With regard to high summer temperatures mitigation, the air temperature is reduced on average of – 0.50 °C, and the outdoor thermal comfort in the district is improved, with an average decrease of UTCI of - 1.00 °C. Simultaneously, the production of renewable energy through solar active systems is guaranteed, existing green areas are preserved, and + 15% of new vegetation is added.

Future developments of the study will address the need for (i) a set of indicators and quantitative thresholds to identify the suitability of each surface to different uses, and (ii) more comprehensive criteria for the evaluation of the environmental effects of each use. Furthermore, the possibilities and potentialities for the inclusion in the current urban planning processes of the proposed framework and of indications on the surfaces uses will be investigated and tested in collaboration with the municipality.

Acknowledgments

The research leading to these results has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No. 609019. The European Union is not liable for any use that may be made of the information contained in this document, which is merely representing the authors view.

6. References

Augeri, M. G., Greco, S. and Nicolosi, V. (2019) 'Planning urban pavement maintenance by a new interactive multiobjective optimization approach', *European Transport Research Review*, 11(1), p. 17. doi: 10.1186/s12544-019-0353-9.

Baklanov, A. *et al.* (2018) 'From urban meteorology, climate and environment research to integrated city services', *Urban Climate*. Elsevier B.V., 23, pp. 330–341. doi: 10.1016/j.uclim.2017.05.004.

Becchio, C. *et al.* (2011) 'Whole Cost Analysis of Building Envelope Technologies According To the European Standard En 15459', (January).

Chokhachian, A. *et al.* (2018) 'Sensing transient outdoor comfort: A georeferenced method to monitor and map microclimate', *Journal of Building Engineering*. Elsevier Ltd, 20(July), pp. 94–104. doi: 10.1016/j.jobe.2018.07.003.

Croce, S., Vettorato, D. and Paparella, R. (2019) 'A Systemic Approach for the Optimization of Urban Surfaces Usage', *IOP Conference Series: Earth and Environmental Science*. IOP Conf. Series: Earth and Environmental Science 290, 290, p. 012113. doi: 10.1088/1755-1315/290/1/012113.

Danahy, J. *et al.* (2015) 'Multi-Scale 3D Geovisualization of Urban Heat Island Data for Planning Dialogue in Toronto', in Silva, C. N. (ed.) *Emerging Issues, Challenges, and Opportunities in Urban E-Planning*. IGI Global, pp. 166–187. doi: 10.4018/978-1-4666-8150-7.ch008.

Davoudi, S., Crawford, J. and Mehmood, A. (2009) 'Climate Change and Spatial Planning Responses', in Davoudi, S., Crawford, J., and Mehmood, A. (eds) *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners*. Earthscan, pp. 7–18.

Eliasson, I. (2000) 'The use of climate knowledge in urban planning', *Landscape and Urban planning*, 48, pp. 31–44.

Giordano, R. *et al.* (2019) 'Urban adaptation to climate change: Climate services for supporting collaborative planning', *Climate Services*. Elsevier, (April), p. 100100. doi: 10.1016/j.cliser.2019.04.004.

Jendritzky, G., de Dear, R. and Havenith, G. (2012) 'UTCI - Why another thermal index?', *International Journal of Biometeorology*, 56(3), pp. 421–428.

Kellett, J. (2011) 'More than a roof over our head: Can planning safeguard rooftop resources?', *Urban Policy and Research*, 29(1), pp. 23–36. doi: 10.1080/08111146.2010.514848.

Kotharkar, R., Bagade, A. and Ramesh, A. (2019) 'Assessing urban drivers of canopy layer urban heat island: A numerical modeling approach', *Landscape and Urban Planning*. Elsevier, 190(January), p. 103586. doi: 10.1016/j.landurbplan.2019.05.017.

Lobaccaro, G. *et al.* (2018) 'A holistic approach to assess the exploitation of renewable energy sources for design interventions inthe early design phases', *Energy & Buildings*. doi: 10.1016/j.enbuild.2018.06.066.

Martinelli, L. and Matzarakis, A. (2017) 'Influence of height/width proportions on the thermal comfort of courtyard typology for Italian climate zones', *Sustainable Cities and Society*. Elsevier B.V., 29, pp. 97–106. doi: 10.1016/j.scs.2016.12.004.

Oke, T. R. (1990) *Boundary layer climates*, *Earth-Science Reviews*. doi: 10.1016/0012-8252(90)90005-G.

Pappenberger, F. *et al.* (2015) 'Global forecasting of thermal health hazards: the skill of probabilistic predictions of the Universal Thermal Climate Index (UTCI)', *International Journal of Biometeorology*, 59(3), pp. 311–323. doi: 10.1007/s00484-014-0843-3.

Park, S., Tuller, S. E. and Jo, M. (2014) 'Application of Universal Thermal Climate Index (UTCI) for microclimatic analysis in urban thermal environments', *Landscape and Urban Planning*. Elsevier B.V., 125, pp. 146–155. doi: 10.1016/j.landurbplan.2014.02.014.

Penaranda Moren, M. S. and Korjenic, A. (2017) 'Hotter and colder – How Do Photovoltaics and Greening Impact Exterior Facade Temperatures: The synergies of a Multifunctional System', *Energy and Buildings*. Elsevier B.V., 147, pp. 123–141. doi: 10.1016/j.enbuild.2017.04.082.

Pisello, A. L. *et al.* (2018) 'Facing the urban overheating: Recent developments. Mitigation potential and sensitivity of the main technologies', *Wiley Interdisciplinary Reviews: Energy and Environment*, (June 2017), pp. 1–25. doi: 10.1002/wene.294.

Pyrgou, A. *et al.* (2017) 'On the effect of summer heatwaves and urban overheating on building thermal-energy performance in central Italy', *Sustainable Cities and Society*. Elsevier B.V., 28, pp. 187–200. doi: 10.1016/j.scs.2016.09.012.

Sadineni, S. B., Madala, S. and Boehm, R. F. (2011) 'Passive building energy savings: A review of building envelope components', *Renewable and Sustainable Energy Reviews*. Elsevier Ltd, 15(8),

pp. 3617–3631. doi: 10.1016/j.rser.2011.07.014.

Shooshtarian, S., Rajagopalan, P. and Sagoo, A. (2018) 'A comprehensive review of thermal adaptive strategies in outdoor spaces', *Sustainable Cities and Society*. Elsevier, 41(February), pp. 647–665. doi: 10.1016/j.scs.2018.06.005.

Silva, I. *et al.* (2018) 'Morphological indices as urban planning tools in northeastern Brazil', *Sustainability (Switzerland)*, 10(12), pp. 1–18. doi: 10.3390/su10124358.

SINFONIA (2017) *Sinfonia. Low Carbon Cities for Better Living.* Available at: www.sinfonia-smartcities.eu.

Toboso-Chavero, S. *et al.* (2018) 'Towards Productive Cities: Environmental Assessment of the Food-Energy-Water Nexus of the Urban Roof Mosaic', *Journal of Industrial Ecology*, 00(0), pp. 1–14. doi: 10.1111/jiec.12829.

Tong, S. *et al.* (2018) 'Study on correlation between air temperature and urban morphology parameters in built environment in northern China', *Building and Environment*. Elsevier, 127(November 2017), pp. 239–249. doi: 10.1016/j.buildenv.2017.11.013.

Vuckovic, M., Kiesel, K. and Mahdavi, A. (2017) 'Studies in the assessment of vegetation impact in the urban context', *Energy and Buildings*. Elsevier B.V., 145, pp. 331–341. doi: 10.1016/j.enbuild.2017.04.003.

World Bank (2018) *World Bank Urban Development thematic pages*. Available at: www.worldbank.org/en/topic/urbandevelopment/overview.

Yiannakou, A. and Salata, K. D. (2017) 'Adaptation to climate change through spatial planning in compact urban areas: A case study in the City of Thessaloniki', *Sustainability (Switzerland)*, 9(2), pp. 16–19. doi: 10.3390/su9020271.

Case Study Paper

Megacity – Mega Challenges:

A case of Dhaka City – Capital city of Bangladesh

Swarna Bintay KADIR, Lecturer, Institute of Disaster Management, Khulna University of Engineering and Technology (KUET); Bangladesh

Mohammed Hamidul HASAN, Executive Board Member, Bangladesh Institute of Planners (BIP); Bangladesh

Abstract

Bangladesh's capital Dhaka is the 7th largest megacity of the world having 20 million of the population with an annual growth rate of 3.60% and by 2030 it will be the fourth biggest city in the world with 28 million inhabitants. Like other megacities of the global south, Dhaka is facing the combination of high pressure of housing, high population density, and rapid population growth, consequences in urban growth taking place in natural hazard-prone areas. The city is characterized by rapid mass urban transformation, high level of social vulnerability and high level of poverty, shortage of infrastructure, housing and social services, poor quality of the social and physical environment, lack of urban governance and ineffective urban management. The paper aims to explore the physical, geographical and social characteristic of Dhaka city which transformed into a megacity in recent decades. This research is based on secondary data analysis and literature review and also highlights some recommendations.

Keywords

Dhaka City, Megacities, Climate Change, Population growth,

1. Introduction

The capital city of Bangladesh – Dhaka is one of the fastest-growing cities in Asia and by 2030 it will be the fourth largest megacity of the world (UN, 2008). This city consists of 38% of the whole country's urban population with an estimated number of 17.6 million which covers 1528 sq. km of land (area of Dhaka metropolitan) and by 2035 this number will be raised up to 28 million (The World Factbook, 2015; RAJUK, 2015; UN, 2016). Dhaka metropolitan comprises of six municipalities named as Dhaka North City Corporation (DNCC), Dhaka South City Corporation (DSCC), Gazipur City Corporation, Savar Paurashava, Kanchan Paurashva, Narayanganj City Corporation, and many other sub-district towns (known as 'Upazila') and rural areas as well (RAJUK, 2015). Geographically, Dhaka is located on the north bank of 'Buriganga River' and Geo-morphologically which is flood plain of the world's largest river system (Dewan, 2013).

In recent decades Dhaka has transformed into a megacity which is not proportionate with its development pattern. Hossain (2006) has highlighted four major characteristics of Dhaka. They are – 1) Shortage of housing, infrastructure, and social services. 2) High level of poverty and social vulnerability. 3) Poor quality of the physical and social environment. 4) Inefficient urban management.

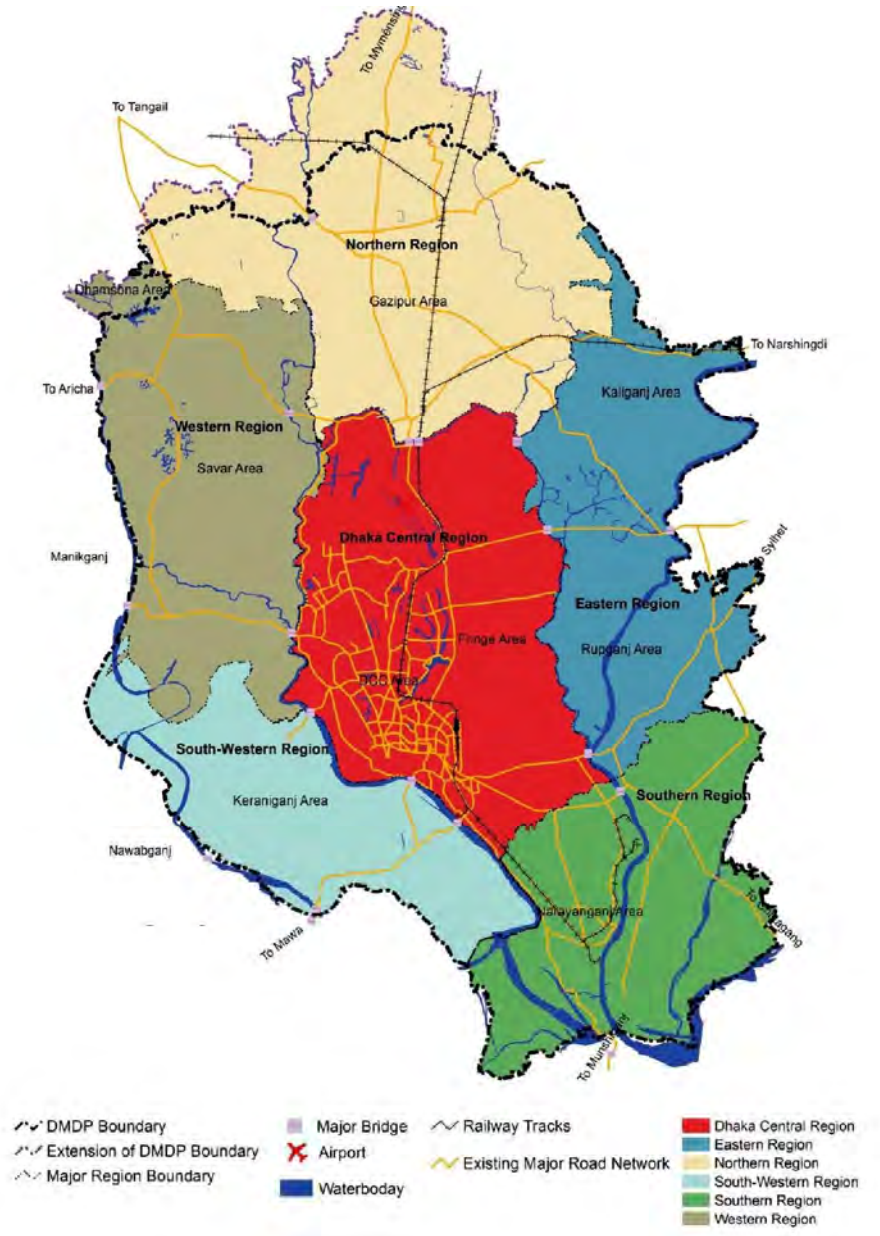


Figure 1 Map of Dhaka City **Source: RAJUK (2015)**

2. What is Megacity?

United Nations has defined a megacity as an urban area with a minimum population of 10 million. There is no standard of geographical area or population density to define a city as a megacity. In the current world, there are 37 megacities and by 2030 there will be 41 megacities (Omondi, 2018). Among these megacities, 80% are in Asia, Africa and Latin America (Kuo, 2016). According to Hossain (2006), these megacities, especially from developing countries, have some problems like – 1) High Population Growth 2) Urban

Poverty 3) Massive Infrastructure Deficit 4) Pressure on housing and land 5) Environmental Degradation 6) High risk on public health 7) Economic dependency on federal/state government and Capital scarcity.

3. Major challenges of Dhaka city

According to the Economist Intelligence Unit's (EIU) survey, Dhaka is the second least liveable city in the world (Mohiuddin, 2019). In recent decades, the overall condition of Dhaka is getting worse. The major challenges and problems of Dhaka city are described in this chapter.

3.1. Population growth and rapid urbanization

The estimated growth rate of Dhaka's urban population is 4% each year since 1971 whereas the national growth rate was 2.2% (World Bank, 2007). According to the Dhaka Structure Plan (2016-2035), there are three major reasons behind this high population growth rate of Dhaka city. They are – 1) Reclassification of rural areas into urban areas – 2) Natural urban population growth – 3) Rural to urban migration (Only 16% of the total population of Dhaka city is local people and rest of 84% is migrated from the other part of the country).

Dhaka has 400 years of history. In course of time, the geographical boundary of the city, population, and density has been changed. In last, 60 years Dhaka city is expanded geographically by 1.8 times and the population density is increased by 27 times. Some statistics are given below:

Year	Area (sq. mile)	Population (million)	Density(Person/sq. mile)
1956	320	0.40	1,250
2019	590	20.00	33,900
2035 (Projected)	590	28.00 (Projected)	47,457 (Projected)

Source: Mahmud (2017); World Population Review (2019); RAJUK (2016)

Rapid urbanization and population growth are one of the main reason for increasing land values of Dhaka which resulted in haphazard fillings of flood plains and low lands and sprawling peripheral land developments (Alam, 2011). The annual increase rate of the land value is 22.26% between 1990 and 2000. In the next ten years (2000 to 2010) the land values have increased by an average annual rate of 74% (Alam,2018) whereas, the price hike of land values of the neighboring cities are not that high. For example, The average increase rates of land price in Karachi (Pakistan), Kolkata (India), Kathmandu(Nepal) are 70%, 50%, and 50% respectively (Makathy 2008; Seraj 2007; Mayo 1998).

Rapid urbanization consequences environmental changes at multiple scales and like other big cities of developing countries, Dhaka has faced rapid urbanization due to land use change in large scale (Dewan et al. 2012). Persistent population growth creates extreme pressure on existing land use and land recourses. In the last few decades, Dhaka has been undergone break-neck and unplanned urban growth through expansion in adjacent low-lying areas. This kind of expansion has some negative impacts on the land market, socio-economic and environmental arena.

3.2. Traffic congestion

Traffic congestion is a curse for Dhaka city. A study of World Bank shows that the average traffic speed has dropped from 21 kmph to 7 kmph in last ten years. It is also predicted that the speed might be dropped to 4 kmph by 2035 which is slower than general walking speed. Traffic congestion also causes great economic loss. Another study by BRAC Institute of Government and Development mentioned that In Dhaka, the amount of loss of working hour is 5 million hours/day which costs 31.2 million USD. On the other hand, traffic jam can cause serious mental and physical problems (Haider, 2018).

The accident rate in Dhaka is also high. According to Bhuiyan and Islam (2018), more than ten thousand accidents occurred in Dhaka between 1998 and 2014 and around 4,514 pedestrian have died.

3.3. Hazards and Disasters

Dhaka is among the most vulnerable cities in the world with its high population density and rapid urbanization located in an area of valuable assets. Unplanned physical development and along with increased population has made it susceptible to diverse natural and manmade hazards like urban flood, earthquake and fire hazard. The unique geographic location and topographic condition also contribute to exacerbate the disaster situation. The city's exposure to hazard is often aggravated by the multitude pressure of climate change. Intense poverty and poor governance are also likely to amplify the impact of these disasters. Distinct urban characteristics of Dhaka associated with a various dimension of vulnerabilities has made its urban communities more fragile and sensitive to this adverse condition. Besides, there is no specific demarcation of duties and responsibilities among the authorities and agencies and there is negligence in duties as well. Lacks of co-operation among these organizations and misunderstanding between implementing agencies and local people make several policies unimplemented in the field.

The main natural hazards affecting Dhaka include floods, which are associated with river water overflow and rainwater stagnation. The city is endowed with a network of rivers, numerous 'khals' and canals: the 'Turag' on the west, the 'Buriganga' on the south, the 'Balu' on the east and the 'Tongi Khal' on the north (Faisal, 1999). On the other hand, the elevation of 70% of the total City varies within 0.5 to 5 m which is very low and act as a temporary detention basin for flood water (Rahman, 2006). The scenario of floods in Dhaka is most common during the monsoon season (June to September) due to water level rise in these rivers and trans-boundary flows. The City experiences about 2000 mm annual rainfall, of which more than 80% occurs during the monsoon season (Dewan et al, 2007). Flooding due to drainage congestion is also a regular phenomenon here. Encroachment of flood retention ponds and agricultural lands for constructing building and industries by land developers is leading to rapid loss of natural drainage system and severe drainage congestion in the city. According to the city development authority, 12% of the urban area should be set-aside as retention ponds Currently the total area of retention is about 365 ha which is only 4% of total DCC area and it is gradually decreasing with an increasing population (Faisal,1999). The problem is further aggravated by poor maintenance of the surface and underground drainage network of the city, inadequate embankment, culverts, and pumping facilities. In addition, lack of institutional coordination has significantly contributed to worsening the flood situation. (Faisal, 1999). Dhaka has experienced many disastrous floods in the past of which the 1998 flood is said to be the worst in memorable records (Dewan et al, 2007).

Floods in 1998 were caused by extreme river levels, 23% of the area of the western city was inundated. Other catastrophic floods hit Dhaka in 2004 and in 2007 mainly caused by prolonged seasonal rainfall overwhelming the capacity of the urban drainage system (Khan et al., 2018). Experts fear that the flood vulnerability of Dhaka is likely to exacerbate in the effect of the probable climatic change. (Dewan et al, 2007).In the past floods, people experience severe waterborne diseases caused major health impacts. Innundation of roads often causes traffic congestion and thereby massive economic losses. Although all parts of the urban area are distressed by these floods, dwellers of slums and squatter settlements are particularly vulnerable to flooding, because of inadequate provision of storm sewers in there (Rashis et al., 2007).

The city is one of the active seismic regions of the whole world for being located at the junction of several active tectonic plate boundaries: the Indian plate, the Eurasian plate, and the Burmese microplate. The city is believed to be awaiting a destructive earthquake at any time due to the shifting of or collision between these plates (Ahmed and Morita, 2018). Besides the locational disadvantage, the city is poised to more threat due to its enormous population, highly dense structure, unplanned growth, and poor management systems. The demand for housing settlement, infrastructure, and other facilities is increasing gradually with population expansion. Vertical expansion has become the common development trend of Dhaka to cope with the extensive population pressure. Most of the buildings do not follow minimum standard though there is a comprehensive set of rules and regulation and a complete guide for building design and construction named as Bangladesh national building code (BNBC 2015). Additionally, haphazardly grown settlement on filled up marshland and low-lying flood flow zones have also made the capital highly vulnerable to earthquake. According to statistics, 30% of buildings of Dhaka city are constructed on soft soil by filling up the low land (Sadat et al., 2010). Theses densely constructed, unreinforced and non-engineered buildings are increasing the risk of damages by a disaster. There are some incidents of building collapse even without an earthquake like ‘Rana Plaza’ Incidents. Therefore, the risk of an earthquake in Dhaka is easily imaginable. It has estimated that about 72,000 buildings which are 90 percent of the total buildings would collapse in a major earthquake of 7.0 or greater magnitude on the Richter scale (Haque, 2016). In addition to structural vulnerability, people have little knowledge about this hazard and precautionary measures because there were no big earthquakes in the last 100 years. They are not aware of the adverse effects an earthquake may bring upon them.

Along with flood and earthquake, a rising trend in the number of fire incidents in Dhaka has become a key concern for the citizens. Notable fires incidents have taken place like ‘Nimtoli' Fire, ‘Bashundhara' City Complex Fire, Bangladesh Steel and Engineering Corporation (BSEC) Bhaban Fire and ‘Tazreen Garments' Fire, etc. (Rahman et al., 2015). According to the Fire Service and Civil Defence (FSCD) Department, there were about 80 fire accidents in Dhaka city last year alone. The deadliest fire in recent times was the ‘Chawkbazar' fire this year (Helali, 2019). Fire hazard also affecting the readymade garments sector, which is generating 78% of the country's total foreign earnings (Wadud et al., 2013). Vulnerability of Dhaka City dwellers to fire hazards has been increased due to reckless building construction and disobedience of Fire Protection Act, 2003 and BNBC (Islam et al, 2008). Sometimes these rules are not sufficient because they are only concerned about only fundamentals of fire safety. These rules often do not consider the surrounding land uses and does not identify the risk emerging from the collective impacts of storing different hazardous materials together..

The coexistence of housing and unsafe factory, warehouses and business establishments in the same locality and multipurpose use of a building especially both as a residential and a workshop or factory are dangerous for public safety. The structural inefficiency of buildings and no maintenance of setback between buildings may aggravate the situation. Most of these buildings lack in precautionary measures like wide fire safety stairs, up to date fire extinguisher, smoke alarm, auto sprinkler system, etc. Even if all the precautionary measures exist in a building, most of the dwellers do not know how to use the fire fighting equipment for combating the fire. On the other hand, narrow road hinders the rescue activity after a hazard. Institutional inefficiency, insufficient equipments and lack of proper training of firefighters are worsening the situation. Therefore, institutional reform, strengthening of capacity at the individual and institutional level is needed in order to reduce fire hazard risks of Dhaka City. But it is not possible to bring an overnight change to the infrastructures of this city.

3.4. Climate change

There is a complex relationship between climate change and cities-based activities. Cities may contribute significant amounts of greenhouse gases in the atmosphere which in turns affecting earth's energy budget and thereby resulting in gradual global warming. However, increasing of earth's temperature is one of the major characteristics of climate change. On the other hands, cities are often more vulnerable to the impacts of climate change like urban heat island effects, heat waves and cold waves, groundwater depletion, water shortage, seasonal climatic variability, excessive rainfall, increased water logging, etc.

Dhaka, the capital city and only megacity of Bangladesh is considered as one of the most vulnerable cities to climate-induced hazards. It contributes a major portion of Bangladesh's greenhouse gases although the contribution is negligible relative to total emissions worldwide (Alam and Rabbani, 2007). But the generation of greenhouse gases is increasing with the city's population expansion, rapid urbanization and industrialization, electricity and fuel consumption and growing motor vehicle use. Deforestation combined with the encroachment of agricultural land to meet the demand for housing of growing population is also worsening the situation. At the same time, Dhaka is facing multitude pressures of different climate-induced hazards along with other non-climatic challenges and stresses. Unpredictable changes in temperature and rainfall causing increased frequency of floods and droughts. It is posing adverse effects on different sectors including infrastructure, industry transportations, utility services, sewage management, and human health and livelihoods, especially for the poor.

Dhaka is acting as a concentrated urban island, a renowned phenomenon that absorbs heat and exerts profound effects on both regional weather and global climate. This phenomenon is associated with a number of local problems such as biophysical hazards (e.g., heat stress), air pollution and associated public health problems. The city is experiencing a slight increase in average temperature over long term (Rabbani et. al., 2011) Climate-induced temperature fluctuations, heat and cold waves pose additional challenges for city dwellers in Dhaka particularly for children and the elderly. These events have been observed frequently in recent years. While there is no significant change in the annual average rainfall, the number of days without rainfall is increasing (Alam and Rabbani 2007) and winter in Dhaka is decreasing (Rabbani et. al., 2011). Non-climatic factors like poverty, poor living standard, increasing slum and squatter settlements are aggravating the overall situation.

3.5. Environmental Pollution

Environmental pollution including air and water pollution in Dhaka is a growing concern as it poses a significant impact on public health. Most of these environmental problems are human-induced, resulting in either from a lack of compliance with national policies, rules, and regulations, or from resource constraints to implementing different measures (Alam and Rabbani, 2007).

Air pollution is a major environmental risk to health throughout the world. Bangladesh is the fourth, among 91 countries with the worst urban air quality in its recent air pollution monitoring report of the World Health Organization, 2016 (Alam et al., 2018). Deferent air pollutants such as VOC, CO2, CO, O2, SO2, NOx, H2S, SPM, PM10, PM2.5, and Pb are significantly responsible for the deterioration of air quality. Most of these air quality parameters have been significantly increased at different locations in Dhaka (Alam et al., 2018). Problems associated with air pollution have been enhanced due to the increasing number of automobiles, industrial operations, urban constructions and adjacent brick kilns around the city. Meteorological parameters like temperature, rainfall, relative humidity, and wind speed are also one of the important factors to influence the urban air quality. According to national standards, the daily particulate matters exceed the optimum limit during the dry season, whereas it has been reported slightly lower during monsoon(Kayes et al., 2019). Air pollutants pose several health risks such as eye irritation, headaches, damage to kidneys and central nervous system, skin cancer, cardiovascular diseases, nausea, asthma, and anemia (Alam et al., 2018).

Dhaka city is surrounded by a number of rivers and canals of which Turag, Buriganga, Dhaleshwari, Balu, and Shitalakhya are the important ones. The quality of water in these rivers have reached a very critical situation and are not suitable for instant use due to different anthropogenic activities like the dumping of industrial, medical and household waste and untreated sewage effluent into these rivers. Inadequate solid waste and sewage management and lack of the water resources management plan and policies are also contributing to deteriorating the water quality gradually. The poisonous waters of these rivers have not only been killing all its aquatic life but also been posing health hazards to the dwellers of the city (Haldar and Islam, 2015). By using river water for washing clothing and bath many water born disease like yellow fever, cholera, dengue, malaria, and other epidemic diseases spread man to man. The people live nearby these rivers are also suffering from the odor pollution.

Waste management is also an important sector which may significantly contribute to improving the quality of the environment. The rate of the waste generation in Dhaka city is increasing with the growing population. Dhaka City produces more than 4000 Metric Tons of solid waste per day of which 200 Metric Tons waste contain toxic chemicals, radioactive elements and pathological substances (Yasmin and Rahman, 2017). Management of this huge quantity of waste is difficult as they are generated at a faster pace. Unsuitable methods of waste disposal, poor selection of dumping sites and lack of public awareness and adequate policies are making the waste management practices in this city most unsatisfactory. The most common problems associated with improper dumping include: diseases transmission, fire hazards, odor nuisance, atmospheric and water pollution, aesthetic nuisance and economic losses (Yasmin and Rahman, 2017).

4. Recommendations and Conclusion

4.1. Recommendations

- **Decentralization:** Dhaka is packed with a large number of physical structures and people. This kind of unplanned expansion can be solved through rapid political decentralization. It means strengthening the various tiers of the local government. In Bangladesh, most of the local government is not truly dependent. They are dependent on the central government to discharge their duties.
- **Good Governance:** Dhaka is a good example of lack of good governance. According to RAJUK(2015), *'It is a system that individuals and institutions, whether public or private, plan and follow to manage the common affairs of a city'*. In Dhaka, there are some strong government and development agencies. It needs proper coordination among these bodies of different levels.
- **People-Oriented Development:** In recent decades, the physical growth of Dhaka doesn't represent the picture of development. All the development steps should be people oriented and demand driven.
- **Law Enforcement and Implementation:** There are several rules, regulations, and projects to control the unplanned development of Dhaka city. It needs proper implementation of rules, regulations and Law enforcement.

4.2. Conclusion

The megacity – Dhaka plays an important role in the national economy of the country although it covers only 1% of the whole country. Its contribution to GDP is 36% and provides 44% of the country's total employment (Haider, 2018). The government and the dwellers of Dhaka should work in a collective way to revive this city.

5. References

Ahmed, M.S. and Morita, H., 2018. Analysis of essential facilities and occupancy class for earthquake preparedness in Dhaka City. International Journal of Earthquake and Impact Engineering, 2(4), pp.339-359.

Ahmed, M. and Morita, H., 2018. An Analysis of Housing Structures' Earthquake Vulnerability in Two Parts of Dhaka City. Sustainability, 10(4), p.1106.

Alam, M. and Rabbani, M.G., 2007. Vulnerabilities and responses to climate change for Dhaka. Environment and urbanization, 19(1), pp.81-97.

Alam, M.Z., Armin, E., Haque, M., Kayesh, J.H.E. and Qayum, A., 2018. Air Pollutants and Their Possible Health Effects at Different Locations in Dhaka City. International Journal of Environmental Science and Natural Resource, 9(4).

Alam, M. and Rabbani, M.G., 2007. Vulnerabilities and responses to climate change for Dhaka. Environment and urbanization, 19(1), pp.81-97.

Alam, M.J., 2018. Rapid urbanization and changing land values in mega cities: implications for housing development projects in Dhaka, Bangladesh. *Bandung: Journal of the Global South*, *5*(1), p.2.

Alam, M.J., 2011. Land and housing development projects and ensuing externalities in the built-environment: a study in Dhaka, Bangladesh. *Unpublished Ph. D. Dissertation*.

Bhuiyan, M. and Islam, M., 2018. A Study on Pedestrian Deaths in Dhaka City Road Accidents.

Dewan, A.M., Islam, M.M., Kumamoto, T. and Nishigaki, M., 2007. Evaluating flood hazard for land-use planning in Greater Dhaka of Bangladesh using remote sensing and GIS techniques. Water resources management, 21(9), pp.1601-1612.

Dewan, A., 2013. *Floods in a megacity: geospatial techniques in assessing hazards, risk and vulnerability* (pp. 119-156). Dordrecht: Springer.

Dewan, A.M., Yamaguchi, Y. and Rahman, M.Z., 2012. Dynamics of land use/cover changes and the analysis of landscape fragmentation in Dhaka Metropolitan, Bangladesh. *GeoJournal*, *77*(3), pp.315-330.

Factbook, C.I.A., 2015. The world factbook; 2015. *See also: http://www ciagov/library/publications/the-world-factbook, accessed July*, *30*.

Faisal, I.M., Kabir, M.R. and Nishat, A., 1999. Non-structural flood mitigation measures for Dhaka City. Urban Water, 1(2), pp.145-153.

Kayes, I., Shahriar, S.A., Hasan, K., Akhter, M., Kabir, M.M. and Salam, M.A., 2019. The relationships between meteorological parameters and air pollutants in an urban environment. Global J. Environ. Sci. Manage, 5, p.3.

Khan, D.M., Veerbeek, W., Chen, A.S., Hammond, M.J., Islam, F., Pervin, I., Djordjević, S. and Butler, D., 2018. Back to the future: assessing the damage of 2004 DHAKA FLOOD in the 2050 urban environment. Journal of Flood Risk Management, 11, pp.S43-S54.

Kuo, L. (2016, May 20). *80% of the world's megacities are now in Asia, Latin America, or Africa*. Retrieved June 22, 2019, from QUARTZ Web site: https://qz.com/africa/688823/80-of-the-worlds-megacities-are-now-in-asia-latin-america-or-africa/

Mahmud, A. H. (2017). Dhaka: Four centuries of uncontrolled growth. *Dhaka Tribune*

Makathy, T., 2008. *Policy adjustment for managing unplanned land sub-division development in an immature planning, Phnom Penh, Cambodia*.

Mausumi, N. and Rahman, M., 2018. Impact of Stakeholder Initiatives: Bangladesh Garment Industry. SCMS Journal of Indian Management, 15(2).

Mayo, S.K., 1998. Land prices, land markets and the broader economy. *Land Lines: Newsletter of the Lincoln Institute of Land Policy*.

Mohiuddin, A.K., 2019. Chemical Contaminants and Pollutants in the Measurable Life of Dhaka City. *PharmaTutor*, *7*(1), pp.25-37.

Rahman, M.A., 2006. State of disaster risk management in Dhaka city (Doctoral dissertation, BRAC University).

Rashid, H., Hunt, L.M. and Haider, W., 2007. Urban flood problems in Dhaka, Bangladesh: slum residents' choices for relocation to flood-free areas. Environmental management, 40(1), pp.95-104.

RAJUK, 2015. Dhaka structure plan (2016–2035). *Dhaka: Rajdhani Unnayan Kartipakkha*

Omondi, S. (2018, June 28). *What Is A Megacity?* Retrieved June 25, 2019, from World Atlas Web site: https://www.worldatlas.com/articles/what-is-a-megacity.html?fbclid=IwAR3VLl9D-PgSStosbgXjr043sBvozVyfnaPTomHTLqfIa-U6l4aWyJlOamY

Haider, A. A. (2018). *Traffic jam: The ugly side of Dhaka's development*. Retrieved July 01, 2019, from The Daily Star Web site: https://www.thedailystar.net/opinion/society/traffic-jam-the-ugly-side-dhakas-development-1575355

Halder, J.N. and Islam, M.N., 2015. Water pollution and its impact on the human health. Journal of environment and human, 2(1), pp.36-46.

Haque, A. N. (2016, January 11). Earthquake threat and building code. Retrieved January 5, 2017, from Daily Sun: http://www.daily-sun.com/home/printnews/106067

Helali, M.M., 2019. Fire safety issues in buildings of Dhaka City. The Daily Star, 31 March. Available at: https://www.thedailystar.net/star-infrastructure/news/fire-safety-issues-buildings-dhaka-city-1722730 (Accessed: 19 May 2019).

Hossain, S., 2006, December. Social characteristics of a megacity: a case of Dhaka City, Bangladesh. In *ProcTASA 2006 Conf, Perth, Australia* (pp. 4-7).

Islam, M.M. and Adri, N., 2008. Fire hazard management of Dhaka City: addressing issues relating to institutional capacity and public perception. Jahangirnagar Planning Review, 6(6), pp.56-67.

Sadat, M. R., Huq, M. S., &Ansary, M. A. (2010). Seismic vulnerability assessment of buildings of Dhaka city. J Civil Eng (IEB), 38(2), 159-172.

Seraj, T.M., 2007. Future of the private real estate industry and its actions needed. *Hotel West Inn Dhaka, on the occasion of REHAB Fair*, *19*.

Rabbani, G., Rahman, A.A. and Islam, N., 2011. Climate change implications for Dhaka City: A need for immediate measures to reduce vulnerability. In Resilient cities (pp. 531-541). Springer, Dordrecht.

Rahman, N., Ansary, M.A. and Islam, I., 2015. GIS based mapping of vulnerability to earthquake and fire hazard in Dhaka city, Bangladesh. International journal of disaster risk reduction, 13, pp.291-300.

Yasmin, S. and Rahman, M.I., 2017. A Review of Solid Waste Management Practice in Dhaka City, Bangladesh. International Journal of Environmental Protection and Policy, 5(2), p.19.

UN, 2008. World urbanization prospects: The 2007 revision. New York.USA

UN, 2016.The world's cities in 2016–Data booklet. *Economic and Social Affair*, p.29.

World Bank, 2007. *World Bank Bangladesh Development Series Report, 2007*, p. 126

World Population Review. (2019). *Dhaka Population*. Retrieved July 9, 2019, from World Population Review Web site: http://worldpopulationreview.com/world-cities/dhaka-population/

Research Paper

Negotiating Spaces of Exception

Metro Manila's Planned Unit Developments: The Case of Eastwood City

Anna Katrina KARAAN; Philippines

Abstract

Urban enclaves have come to define the growth of many contemporary cities, subdividing society spatially into homogenous groupings. In the global south, this has been translated even more distinctly due to the excessive disparity among social classes. With their predisposition towards exclusion, urban enclaves are often portrayed as particular sites of unsustainability. However, a specific version of these enclaves, the Planned Unit Development (PUD) and its current manifestation of high-density mixed-use townships, has been championed as a concept that inculcates more sustainable practices due to its innate flexibility. Utilizing a localized actor-centric approach, this study uncovers how PUDs in Metro Manila are negotiated as spaces of exception. The study uses a representative case study of one of the pioneering PUDs in Metro Manila, Eastwood City, and applies a qualitative methodology to explore how relations of state-space-society creates and continuously shapes these spaces. Eastwood City is uncovered to be a legitimized space of exception, where dominant narratives have prioritized private over public interests, but crossed into the realm of acceptability due to its claims of sustainability, particularly of the "live-work-play" lifestyle. However, this study also reveals how the narratives of the dispossessed are exhibited in the margins and how this is continuously (re)shaping the development. These point towards the possibility of alternative futures for PUDs by shifting the power to negotiate to all stakeholders, not only in the creation but also throughout the lifespan of the project, which can then lead to more inclusiveness and equality in the process. By operationalizing the PUD concept, urban enclaves can cease to be purveyors of singular interests but become dynamic spaces of exception that are constantly negotiated by their actors.

Keywords

Urban enclaves, planning tools, zoning exemptions (3-5)

1. Introduction

Narratives of urban development around the world have seemingly taken similar storylines. Cities have bought into the neoliberal ideology of privatization and competition, manifesting into the formation of enclaves that subdivide society into homogeneous groupings (Agnotti, 2013). In the global south, this phenomenon has been translated even more distinctly due to the excessive disparity among different societal classes, leading to further inequality through exclusion. This is a story that is exceedingly evident in Metro Manila, the capital region of the Philippines (Murphy & Hogan, 2012).

A rapidly urbanizing megacity, Metropolitan Manila is an agglomeration of seventeen municipalities that politically subdivide a contiguous urban area. These local government units (LGUs), despite sharing a functional area, remain highly disparate with their own policies and agendas (Porio, 2009). While the political scenario is weak, powerful elites have been shaping Metro Manila's urban fabric in the form of urban enclaves to fill in the gap (Shatkin, 2008: 388). These developments, usually targeted to the middle and upper classes, present a common model of the privatization of space (Roderos, 2013: 99).

Recently, a unique type of enclave development in Metro Manila has arisen. Planned Unit Developments (PUDs) in the form of urban townships are driving much of the national capital region's urban (re)development, where large areas of land are purchased and converted into high-density mixed-use developments by the private sector (Aquino, 2015). However, the nature of these types of enclaves contradict existing regulations and can only exist as an exception, facilitated by LGUs that desire this type of development in their city.

This particular type of enclave opens discourses on their existence as spaces of exception that are negotiated through power/knowledge relations among various actors. By taking Eastwood City as an exemplary case, the study is able to examine one of the pioneering urban townships in Metro Manila using a qualitative methodology to uncover the processes that underlie how these are being shaped.

2. Literature Review

2.1. Enclave Urbanism

Due to their prevalence, urban enclaves have spawned numerous studies (see Agnotti, 2013; MacLeod & Ward, 2002; Sidaway, 2007; Genis, 2007), often focusing on the way these are shaped by the rise of neoliberal ideology, which "mobilises urban space as an arena for market-oriented economic growth and elite consumption practices" (Sager, 2011: 149). A common manifestation of these is the mono-use gated community. These typically enclose a homogeneous class of people who can afford to pay for reliable services and security that, in many cases, only the private sector can provide (Grant & Mittelsteadt, 2004). In developing countries, these communities provide a sense of separation from the poverty prevalent in the city (Webster et al., 2002: 317).

Enclaves, however, are not only defined through the physical gating but also exist in spaces "that are presumed as part of an open city" (Agnotti, 2013: 115). They have co-opted urban movements that aim to provide more sustainable urbanity than what is present in modern cities through the creation of mixed-use communities, such as *new urbanism* (Council for New Urbanism, 2015), *urban villages* (Franklin & Tait, 2002), and *compact cities* (Hofstad, 2012). While these spaces ideally create sustainable communities and have become ideal city models (Jensen et al., 2011), reality reveals that these promulgate other unsustainable practices through exclusion instead (Jenks & Jones, 2010).

Recent studies on enclaves have shifted beyond dystopic representations of the city based on "overextended neoliberalism" into more nuanced approaches that explore localized manifestations (Pow, 2015), placing more importance on specific political, economic and social processes (McGuirk & Downling, 2009; Johnson, 2010; Koch, 2015). While not discounting neoliberalism as a driving force, the discussions emphasize enclaves as locally produced spaces that be seen as decision-making moments. *Arranged urbanism* evaluates

the interactions of state and non-state actors in the creation of space, and showing the close interaction of formal and informal practices in these enclaves (Koch, 2015: 409). The concept of *borderland urbanism* shifts from how enclaves are formed to how they are constantly changing at its boundaries through "continuous negotiations of power and control" and "continuously changing and evolving relational linkages" (Iossifova, 2015: 104). These borderlands become sites for alternative ways of being that challenge the static definition of enclaves (ibid.).

A similar thread among these concepts is the aim to redefine these spaces through processes of negotiation among different actors. However, as inequality is present and normalised as an intrinsic part of contemporary urbanism (MacLeod et al., 2003: 1667), negotiations tend to favour those who possess power while the bargaining of the powerless occurs at the margins. Refocusing on these interactions allows for enclaves to be seen not just as results of a global neoliberal process but as dynamic spaces that are continuously being shaped by localized relations.

2.2. Metro Manila's Urban Enclaves

The issue of enclave-ing is clearly prevalent in Metro Manila, a city that has been referred to as "the world's most fragmented, privatized, and un-public of cities" (Murphy & Hogan, 2012: 27). While this may be a hyperbolic statement, urban space in Metro Manila have been subdivided into private spheres to such a degree that "everyone except the utterly dispossessed … erects gates and fences and walls around their property and themselves" (ibid., 2012: 12). Enclaves in Metro Manila are not only the realm of the elite but are used by all classes to segregate themselves from one another (Garrido, 2013: 1343). With this kind of urbansim, the notion of public space has been relegated to quasi-public spaces within the private.

Neoliberalism has indeed spurred the formation of enclaves in the capital region with imaginaries of a sanitized "global city" through private-sector led mega-projects (Shatkin, 2006; Connell, 1999; Michel, 2010; Kleibert & Kippers, 2015). These are informed by a strong postcolonial identity that produces these "visions of a world class and modern metropolis" (Ortega, 2016: 35) with a "cultural distinction on the basis of progress" that has been internalized by the citizens (Garrido, 2012: 182). Moreover, these are facilitated by a highly patrimonial society, which places the power to plan in the hands of influential landed families (or those with ability to accumulate land), "[creating] what is in effect an urban feudalism … [building] their own 'manorial' cities within Metro Manila" (Murphy & Hogan, 2012: 23).

It appears that the government has conceded much ground to these private actors due to "intense fiscal and external pressures … and a local political economy that has fostered the political power of elite families" (Shatkin, 2008: 398), and has facilitated the dominance of private sector-led planning in the development of Metro Manila through the creation of "for-profit utopias" (ibid.: 399). With the diminished role of the public sector, uneven development and social divisions through the creation of exclusive spaces have become the common mode of urbanisation, often leading to the dispossession or displacement of the poorer members of society (Choi, 2014; Ortega, 2016; Roderos, 2013). However, while these descriptions present an overly powerful private sector, these developments can also be seen as a means to fulfill national or local agendas, which may mark them worthy of state facilitation (Kelly, 2003).

2.3. Planning for Exemptions

The congruence of factors involved in the urbanisation of Metro Manila has led to the popularization of a particular manifestation of urban enclaves: the Planned Unit Development (PUD), a planning concept and tool that originated from the United States of America in the 1950s and 60s (Burchell, 1973: 3). PUDs began as a reaction to the Euclidean zoning system that separated land uses and enforced uniform regulations. This system was criticised for being highly unsustainable as it encourages urban sprawl, perpetuates homogenous communities, prevents the development of useable open spaces, and discourages innovations in land use or design. The PUD concept answers these critiques as it allows for a more integrated form of development, and has since become increasingly popular (Mandelker, 2008: 420).

However, PUDs require more flexibility of uses than what the current system sanctions, which necessitate exceptions from zoning and other regulations as these "[do] not employ pre-set regulation but rather emphasizes land conversion through the art of negotiation" (Burchell, 1973: iii). This discretionary nature of PUDs has been seen as both a solution and a problem. While it provides flexibility that could enhance quality of life and form more sustainable communities, issues arise in the processes of negotiation, regulation, and the subsequent implementation of these in the urban space, as PUDs left unchecked often become exceedingly geared toward private interest (Committee on Public Regulation of Land Use, 1972: 62-64). Although controlling PUDs is said to defeat its purpose, recommendation on how to tackle these developments have been brought forward (Burchell, 1973; So, et al., 1973; Meshenberg, 1976), and some of these remain relevant: a sound policy base, a range of allowable discretions, submitting a plan for review, and collaboration with experts (Meshenberg, 1976: 2).

Planning tools that aim for increased flexibility in land use are not unique to the PUD, and can also be found in other countries with varying degrees of success. While these are known by different names and follow different processes, they ultimately have similar intentions – shifting from comprehensive plans to projects allowable through public concessions (Mosciaro and Pereria, 2019). Two prominent examples are the French *zone d'aménagement conserté* (ZAC) and the Brazilian *Operação Urbana* (Urban Operation - UO). Unlike the PUD, these are characterized more by the heightened role of the public sector, with the developments considered a public-private partnership, than a primarily private initiative.

The ZAC is a widespread instrument for implementing development schemes in France. Under the authority of the local government (though often initiated by interest private investors), designated areas for comprehensive redevelopment are granted special planning regime (*plan d'aménagement de zone* or PAZ), and revenues from land sales/leases and concessions granted by the ZAC is intended to fund the infrastructure of the development. While initially intentioned for new large-scale urban projects, it is also used in smaller development projects which facilitates complete private-sector funding, or projects in existing urban districts, which necessitates tighter control favoring rehabilitation over demolition (EC, 2000). In any case, even with the presence of private sector partners, the public sector still holds principal control over the development. This is attributed to the historical institutional culture of France that promotes collaborative processes, which extends to the inclusion of other interest groups and undergoes a public participation processes. For instance, in the ZAC Bercy in Paris, private sector partners were not given

preference treatment over environmental considerations (Nelson, 2000). However, the number of actors involved has made the process long and complex, and the control of the local authorities are oftentimes seen as restrictive.

Similarly, the Brazilian Urban Operations (UOs) aims to become a vehicle for joint efforts among public and private sectors in urban projects. UOs are enacted in law by the local government and "addresses issues such as the perimeter of the intervention, the zoning and building rules applied inside it, the aggregate stock of development rights, the conditions for negotiating these rights, the general guidelines for infrastructure improvements, and the basic governance framework to manage the project" (Moscario and Pereira, 2019: 4-5). One main mechanism is its use of additional development rights within the UO perimeter to finance improvements. These development rights (CEPACs) allow developers to exceed the standard floor-area ratio (FAR) permitted in UO, up until the maximum allowable FAR, increasing the flexibility of the use of space. While UOs are promulgating within Brazil and often seen as a best practice, it has been critiqued as further increasing uneven development due to the prevalence of market-interest over social-interest typical in these types of enclaves (Moscario and Pereira, 2019).

In the Philippines, where land use zoning and building codes are closely patterned after the US zoning system, the concept of PUD has been vaguely defined at the national scale, and enclaves that follow this definition are quickly becoming a main form of urban (re)development. Urban townships, which are privately owned and managed, often high-density, mixed-use "compact" developments, is emerging as the prevailing type of PUD (Kleibert & Kippers, 2013). However, while the intention may be similar to the developments described from the cases of France and Brazil, unlike in those countries, there is little evidence of regulatory measures or practices operationalising these developments in most cities in the Philippines, implying a scenario where PUDs exist as exceptions facilitated primarily through discretionary bases.

2.4. Defining Spaces of Exception

Throughout the literature reviewed, shifting discourses and practices on urban enclaves and their enabling planning frameworks considers spaces as "defined less by a pre-given property and more by the assemblages they enter and reconstitute" (McFarlane, 2011: 208). However, because enclaves are often sites of inequality, difference in power affects the ability of actors to negotiate in decision-making processes. According to Foucault, power is in flux and is constantly negotiated through the reinforcement or redefinition of knowledge or "truths" that are legitimized through various means (Mills, 2003: 33).

A prevailing discourse is the role of states of exception where suspension of norms creates opportunities for decision-making, and at the same time, the legitimacy of the decision maintains this exception as within order (Agamben, 2005). This is facilitated through the blurring binary between formal/informal (Roy, 2005), and further explained by Yiftachel as "gray spaces", which are either "whitened" if deemed beneficial to those in power, or "blackened", if not (Yiftachel, 2009: 243). This challenges the notion of exceptions being a static categorization; instead, as a practice, (in)formality has an active involvement in the production of space and its legitimacy (McFarlane, 2012: 105).

This argument presents space as dynamic and constantly negotiated through practices of (in)formality, and allow for places that can be highly adaptable to the ever-changing local and global contexts (Herrle & Fokdal, 2011: 12). PUDs, whose very nature depends on

flexibility, can be offered as examples of space of exception. Metro Manila, where PUDs are defining much of the urban (re)development yet is not regulated in the planning system, is an ideal context to explore how assemblages embody power/knowledge relations and is used to negotiate spaces of exception.

3. The Case of Eastwood City

The study on Eastwood City aims to uncover the processes that underlie negotiating Planned Unit Developments in Metro Manila, specifically the private developer-led urban township, using a representative case study approach by qualitatively analysing how these occur in the assemblage of state (particularly local and sub-local/*barangay*[1] levels), society, and space. The perspectives of both state and society were gleaned through a series of interviews and further supported by documentary analysis of various regulatory plans, guidelines, ordinances and marketing materials. Space was assessed based on how state and society perceive and interact with it, and further supplemented by site observation and mapping. Following this, the results were analysed through the description of how Eastwood City was created, and by placing the PUD within the discourses of power, in order to examine how this space of exception was and continues to be negotiated.

3.1. Creating a Space of Exception

Eastwood City widely promotes its exceptional-ism: the first integrated township that first delivered the live-work-play lifestyle concept through incorporating the first Cyberpark in the country targeting the emerging service industry of Business Process Outsourcing (BPO). Its very selling point was that it did not conform but set itself apart through its difference. Even now, years later and succeeded by numerous copycat developments, it still claims this difference by repeatedly highlighting that it was the first—the original.

This exceptional-ism is not only present in its marketing campaign. Its existence began through seeking exemptions from current zoning plans. The area where Eastwood City now stands was originally an industrial zone occupied by factories and warehouses, except for an existing low-income/working class community that classified as a socialized housing zone[3], referred simply as Barangay Bagumbayan. Opportunely, the industrial area ran adjacent to a major highway (C-5) that links the north to the south of Metro Manila, and surrounded by large swathes of residential areas. This generated sufficient traffic and high market catchment, making the area appealing for commercial developments.

In 1996, Empire East Holdings (now known as Megaworld Corporation) was able to purchase some contiguous industrial lots in the area to create a mixed-use Planned Unit Development. While no formalized planning mechanism are in place to operationalise PUDs in the local level, these developments still persist through co-opting existing processes, beginning with the request for a change of zoning from industrial to Special (Urban) Development Zone under the QC Zoning Ordinance of 1992, reserved as "areas characterized by deteriorated or deteriorating conditions but with high potential for environmental rehabilitation and socio-

[1] "The basic political unit [in the Philippines] which serves as the primary planning and implementing unit of government … activities in the community" (Endriga, 2004).

[3] A socialized housing zone is an area assigned primarily for housing of the underprivileged or homeless (Endriga, 2004).

economic improvement" (QC Ordinance No. SP-1369, S-2003). Once zoned as SUDZ, more flexibility is granted in the uses the lot can exhibit. Eastwood City was presented to fit this definition through the argument that "the subject site being in the growth corridor of C-5 is strategically located and highly accessible, thus presenting itself as another potential growth center for Quezon City" (QC Ordinance No. SP-432, S-96).

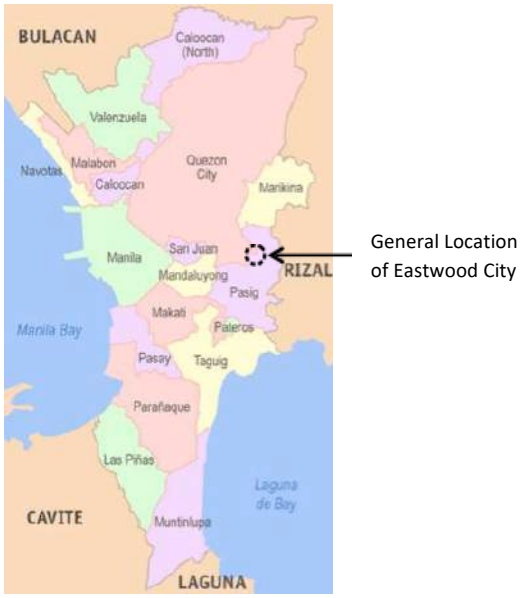


Figure 1 Political map of Metro Manila (with Eastwood City), source: Philippine Maps

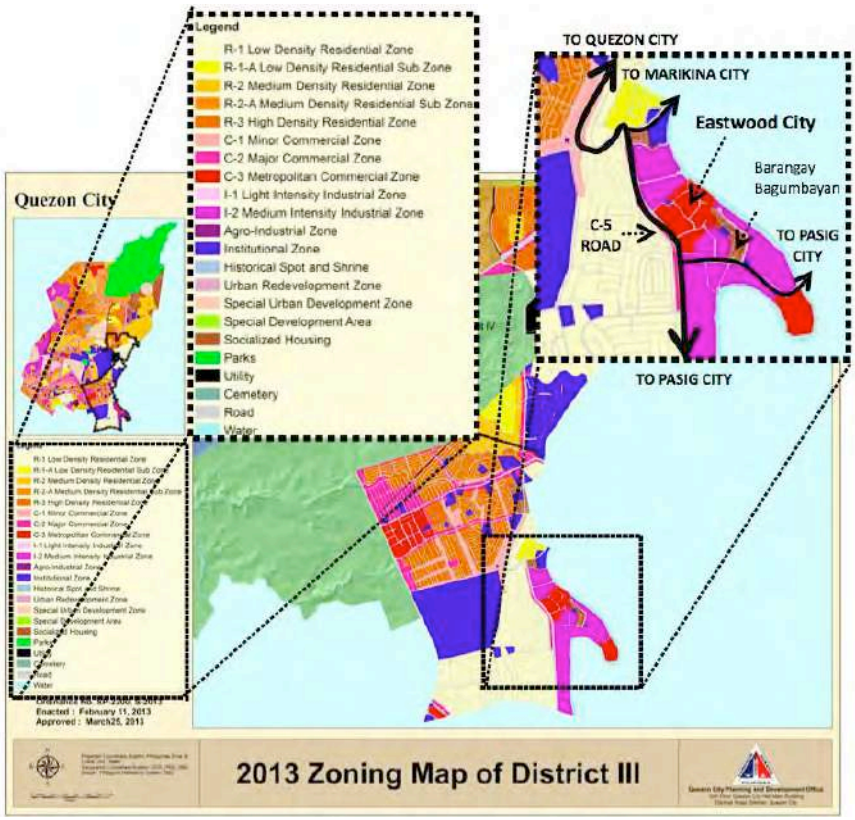


Figure 2 Quezon City 2013 Zoning Map of District III (with insets), source of base map: Local Government of Quezon City

The reasoning of being a growth centre was appealing. The highly residential nature of Quezon City has spurred its local government to encourage diversification of land uses that could lead to increased economic opportunities (Quezon City Development Council, 2010). With this, Eastwood City was granted uses allowable in a Metropolitan Commercial Zone (C-3) (Quezon City Ordinance No. SP-432, S-96), which has the least restrictions: no height limit, generous floor-to-lot area ratio (FAR) allowances, and the ability to mix uses in one development. However, this also means that in terms of planning the development, there is barely any input from the city's planning department, whose statement was "we don't know what's happening inside Eastwood; only Megaworld knows that." (Interview, 17 July 2016)

In order to be rezoned, the developer needed to make a request to the City Council, which has the sole power to enact and revise zoning ordinances. While the national agency Housing and Land Use Regulatory Board (HLURB) has prescribed guidelines on when and how zoning exceptions should be allowed in order to limit adverse effects of zone changes, it appears that the council has procedures of its own. While a high-density commercial development in the midst of a low-density industrial and residential area can most definitely be foreseen as causing adverse effects, the zoning exception was approved without limitations, enabling the developer to proceed with the kind of development that would best maximize its profits.

This process of exceptions clearly shows a mutually beneficial transactional relationship between the local government and the developer. For the developer, the benefit is that the desired development was approved at all and with few restrictions, allowing them to economize space and maximize profit. For the local government, the benefits are multifaceted. Vehicles of economic growth such as these high-density developments are seen as desirable additions to the city. These developments provide higher tax and other revenues to the city and its officials, as well as services to the citizens that the local government is incapable of providing (Porio, 2012: 7).

This sentiment persists not only in Quezon City but in other cities of Metro Manila as well. The strong presence of private investments underlies much of the progress in terms of services and infrastructure issued by the local governments (Shatkin, 2006: 593). Due the competitive atmosphere present and a lack of metropolitan governance, there is a race among these LGUs to attract these investments to their cities. Oftentimes, the winning strategy of the LGUs is their willingness to give concessions, from allowing much higher densities than what is advisable to sacrificing required spaces for amenities to benefit the private developer (Land Use Expert, interview, 27 July 2016).

In this scenario, power is constantly shifting through various levels of informal negotiations. On one side, the state wields land policies as an important bargaining tool; on the other, the developer presents desirable resources. The general public, however, plays little role in these initial negotiations that generally occurs behind closed doors. Thus, while the system does not follow what is officially prescribed, the rules of the game are known by their players who use this knowledge to put forward their own agendas. It is not an unregulated system, as usually follows the common notion of informality, but a deregulated one. As Roy (2009) states, "[deregulation] indicates a calculated informality, one that involves purposive action and planning, and one where the seeming withdrawal of regulatory power creates a

logic of resource allocation, accumulation, and authority" (2009: 83). Through deregulated systems, it is possible for (in)formally negotiated decision-making to take place.

3.2. "Whitening" the Grey

Figure 3 View of Eastwood City from C-5 Road, source: author, July 2016

Though not playing an active role in its creation, a general sense of satisfaction with the development is echoed by those interviewed, including those who would seem typically excluded from these types of development such as the working class population and residents of the adjacent poorer community (Roderos, 2013). For them, Eastwood City delivers a unique type of urban space that suitably answers their needs. This sentiment reveals that Eastwood City is a gray space that has been "whitened" (Yiftachel, 2009: 243). Instead of being seen as unacceptable, the PUD has been legitimised through the shared power/knowledge of the state and developer that capitalises on certain narratives.

While it should be noted that these are not representative of all stakeholders of the PUD, not one interview failed to mention the convenience that Eastwood City has brought to them. The location of this development places it as the easternmost commercial and business district in Metro Manila and close to the vast residential areas characterizing the eastern portion of the capital region, bringing employment opportunities and commerce/recreational areas closer to where many people reside. In addition, it hosts the Business Process Outsourcing (BPO) industry, which has been responsible for much of the country's economic growth in the past several years (estimated at 7.3% of GDP and 1.3 million jobs for 2016) and has allowed many working class Filipinos to improve their economic standing (Oxford Business Group, 2015).

Locating a business centre in Eastwood City has not only supported the direct users of the development, but also those who live nearby. For the residents of Barangay Bagumbayan, the low-income community adjacent to the PUD, having Eastwood City as a neighbour enabled new forms of income-generation through means such as room rentals and food sales that serve as low-cost alternatives to options inside the PUD. These accounts show that there has been an improved access to opportunities for a diverse group of people. This decentralisation of economic activity was indeed the claimed aim when Quezon City allowed for the reclassification of the industrial lot, and the development seems to have delivered on this. This has particularly strengthened its legitimacy in the eyes of various stakeholders, emphasizing the PUD's "whiteness".

Moreover, its main selling point, creating a live-work-play lifestyle, is particularly attractive not only to its users. Compact developments, touted as the anti-thesis to the unsustainable urban sprawl, aims to deliver a more sustainable lifestyle through dense mixed-use communities and has been promoted by the international community as a model of urban development (Jensen et al., 2011). The main advantages include more efficient services and shorter travel times leading to improved quality of life, less reliance on private vehicles that subsequently lessens consumption and pollution, and availability of diversity of opportunities, all of which lead to a better urban environment (Hofstad, 2012).

The compact city and similar developments, however, have been challenged as fallacious when its concept is translated into reality. Instead of being an instrument of sustainability, it becomes "a static product of developer's marketing campaign rather than an evolving process of human development" leading to inauthentic communities (Neuman, 2005: 22) and is implemented through "cherry-picking those aspects of the compact city as a sustainable urban model most attractive to their needs, such as increasing densities... which largely reflect dominant economic or environmental interests" (Dempsey & Jenks, 2010: 119). This densification tends to lead to further degradation of the environment, as it increases congestion, pollution and lack of open space. Furthermore, because social issues are not central to the concept, these developments tend to exclude those who cannot afford to pay for the lifestyle (Smyth, 2005: 92). Thus, compact developments tend to be exclusive spaces that favour the affluent, and encounters issues such as gentrification and displacement.

These critiques against compact developments are highly evident in Eastwood City, such as traffic congestion, open space deficit, and overloaded utility services. Rising concern about the development's vulnerability to disasters also gripped many of those interviewed because, coupled with the dubious quality of the buildings, Eastwood City is located next to often flooded Marikina River and the West Valley Fault Line. These emphasize that Eastwood City's claim to offering a "good life" may not be entirely valid. Arguments of sustainability focus mainly on economic aspects, while social and environmental aspects remain secondary, leading to very real concerns about the impacts of the development in the urban area.

Recently, doubts about the development have been increasing due to these issues, prompting the new Comprehensive Land Use Plan (CLUP) of Quezon City to remove its status as a growth centre due to these "built-in site limitations" (Quezon City Development Council, 2010: 22), but this has not yet been enacted and Eastwood City continues to grow. However, while these factors lessen the legitimacy of Eastwood City, for most of those interviewed, these still stand secondary to the benefits that the various stakeholders continue to enjoy: the convenience, the opportunities, the lifestyle. Everything else was overshadowed by the "whitened" image of Eastwood City.

3.3. Normalising Inequality

The stark inequality present in Eastwood City is the one thing that was rarely complained about by those interviewed. For some, the most attractive part about it is its very exclusivity, founded on aspirational imaginings. This sentiment is not only prevalent among the upper classes but is also echoed by the working class who would typically be among the most excluded. It would seem like inequality has been normalised in the system through layering of exclusive practices.

Eastwood City, like other urban enclaves, exhibits exclusivity in multiple levels by differentiating itself from its surroundings (Agnotti, 2013). The most obvious is physical isolation, with high-rise buildings forming an enclosure, secured access points, and obvious change in environs. Once inside Eastwood City, a curious combination of an international business district and a western-themed architecture can be immediately observed. There is little to connect the place to its local context; on the contrary, much effort has been made to displace Eastwood City and locate it in a fantasy world of global convergence, with the physical design just as one representation of this. Because much of the employment offered by Eastwood City is from the BPO industry, this creates a community that is highly tied to global processes, creating in itself a global identity (Kleibert & Kippers, 2015: 10), and setting itself as temporally apart from the outside (Michel, 2010).

Figure 4 Towers enclosing Eastwood City, source: author, July 2016

However, unlike in mono-use enclaves, this mixed-use characteristic creates a sense of conditional openness to the enclosure (Agnotti, 2013: 115). It grants access to the development to different users, yet segregates the space into layers of exclusivity. This can be observed by how different classes are spread out inside the PUD in unofficially designated areas, with the most dispossessed finding their space in the margins.

Figure 5 Jeepney waiting for passengers at No Loading and Unloading Zone, source: author, July 2016

At every entry point, one can find vibrant and often informal activities that cater to Eastwood City: transient food vendors lining, jeepneys stopping at "no loading/unloading" zones, "colorum" [unlicensed] public shuttles waiting surreptitiously for passengers. These alternative spaces can be found not only in the boundary, but also within the perimeter of the development: the common presence of technically illegal condo-sharing, a dormitory-type business/living arrangement to cut down costs of rent; lunch vendors disguising their wares and bring it into offices and shops; deals with the security crew allows for a blind eye in imposing restrictions. When asked about these exhibitions of informality, an interviewee replied, "If we don't do anything [about our situation], then nothing will happen." (Store cashier, interview, 26 July 2016)

These instances show that within and around the development are further states of exception, tolerated because they are used to address the needs of those the developer does not provide for, and existing as part of the deregulated system that persists in the PUD. These emphasize that space continuously changes due to the manifestations of these relations in the margins. However, while these can be seen as exhibitions of power, these can also further embed practices of exclusion into the system, as they remain in the peripheries of acceptability. How can there be a move towards equality when inequality has been normalised as a truth?

Barangay Bagumbayay, literally at the periphery and separated from the development, exhibits a significantly different case from the aforementioned examples of power at the margins. Because Eastwood City is located within the territory of Barangay Bagumbayan, it is actually under the jurisdiction of the barangay and must answer to their requirements. This status has given the barangay bargaining power despite being a poor community. To build, occupy, and operate, Eastwood City must coordinate and claim clearances with the barangay.

Figure 6 Barangay Bagumbayan with Eastwood City towers behind, source: author, July 2016

The imbued power of the barangay has given them a sense of control over their surroundings. They can deny or allow access, demand reparations and make concessions. While displacement is an ever-present concern, there is a sense of protection. The experience of Barangay Bagumbayan is an unexpected counterpoint to the dispossession of other sectors in Eastwood City. The power of the barangay does not come from the margins but from an acknowledged place: policy. Thus, in the effort to open various narratives and normalise equality in these PUDs, these spaces of exceptions, a turn to improvement of policy regarding these developments may be a step in the right direction.

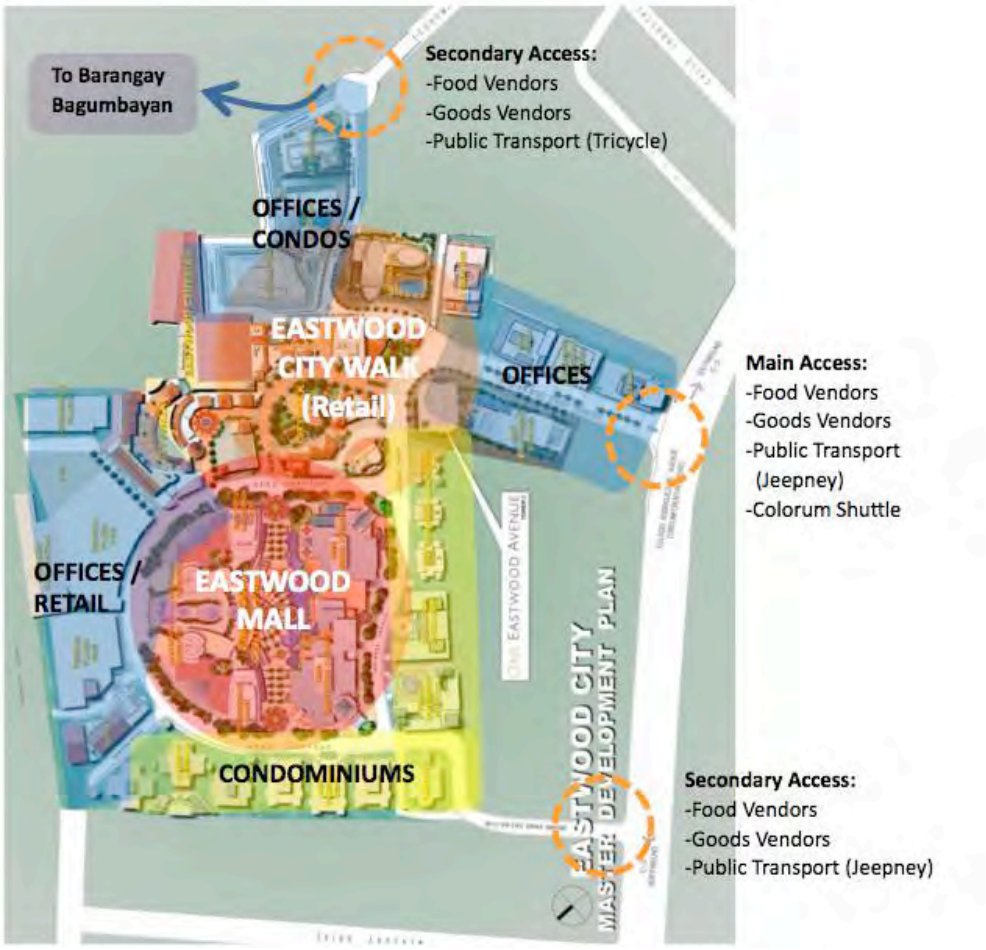


Figure 7 Eastwood City Master Development Plan (with overlay of uses/activities), source of base map: One Eastwood Avenue, Megaworld Corporation.

3.4. Negotiating Planned Unit Developments

Through the example of Eastwood City, PUDs have been argued as spaces of exception that are shaped through the (in)formal relations of various actors. However, because the power/knowledge of these relations are inherently unequal, so too are the places these shape. This assemblage of relations, however, is not set in stone and is indeed open for reassemblages that can imagine new potentials (McFarlane, 2011: 211). Providing policies, like that in Barangay Bagumbayan, can provide new ways of inclusion.

Flexibility in planning processes does have numerous advantages such as allowing for spaces to be more responsive to changing contexts and leading to better designed environments. It is for these reasons that the concept of PUDs and other similar spaces of exception were initially formed (Herrle & Fokdal, 2011: 12). While these developments indeed have a tendency to be abused, these can also facilitate more inclusiveness in the planning process due to its openness for negotiations. However, leaving it as status quo tends to create spaces that focus primarily on private interests (Mandelker, 2008). Thus, there is a need to achieve a balance between regulation and flexibility towards "a model that accepts unpredictability and informality without surrender to the ravages of market-led ideology…

that does not kill the vitality, productivity and adaptability that sustains lives" (Dovey, 2012: 365).

One possible approach is to operationalise the concept of PUDs as a public planning tool, wherein various stakeholders outside the state-developer relationship are treated as active participants taken into consideration from the outset instead of mere passive consumers of the delivered product (Sager, 2011: 181). International examples exist, for instance the ZACs of France and UOs of Brazil, but due to stark differences on how these places are manifested in the Philippine context, care should be taken in transferring ideas from varying realities (Patel, 2014), such as placing too much trust on how the state can advocate the needs of the community during the process and ensuring that the benefits acquired from these developments are used for public services. However, institutionalizing this continuous negotiation processes among different actors would at least "[enable] people as citizens with political roles, rights, and agendas" (Sager 2011:181).

In trying to answer how these developments should be negotiated, this study does not attempt to create definitive recommendations. Rather, it exposes factors and opens up possibilities on how PUDs can actually be negotiated to enable inclusiveness: with the continuous sharing of power throughout its lifespan. While this is difficult to achieve because power's demarcations are ingrained in the system, recognizing and operationalising PUDs as spaces of exception can instigate this shift, promote the long-lasting legitimacy of the PUD and, ideally, move towards truly inclusive and sustainable societies.

4. Conclusion

The findings of this study uncover Eastwood City as a story of potential. Eastwood City is presented as a space of exception whose mutability is negotiated by the power/knowledge relations. Its need for flexibility from rigid land use plans is facilitated through a deregulated system of mutually beneficial (in)formal negotiations between state-developer. This space is legitimised through narratives of sustainability, yet normalizes unsustainable practices of over-densification and exclusion. While the public seems satisfied with Eastwood City due to these narratives and even appears to appreciate the exclusivity it espouses, their dispossession is evident and exhibits power in the margins of the development. Barangay Bagumbayan, the poor community along the edges of the development, acts as a counterpoint whose recognized status over Eastwood City as part of its jurisdiction has given the community power through policy.

This brings the discussion to how Planned Unit Developments should be negotiated through uncovering the processes that may lead to more inclusiveness in the continuous (re)shaping of the PUD. Based on the experience of Eastwood City, it is in operationalising PUD as a planning tool through legitimising the act of negotiation and sharing this power among all stakeholders, not only during the creation but also throughout the lifespan of the PUD, that can ideally lead to more inclusive and sustainable enclaves.

While this study can be further strengthened by exploring more manifestations of PUDs in different cities of Metro Manila (as well as in other developing cities), Eastwood City as one of the first and most established can reveal processes that may have similarities to the experience of other PUDs and act as a starting point in understanding them. This can lead to more in-depth analysis of PUDs, comparing how they are implemented in various contexts,

observing their changes over time, or networking these within the urban systems of the megacity. Furthermore, these findings can be a resource for a more inclusive approach on planning for these spaces of exception.

5. References

Agamben, G. (2005). *State of exception*. Chicago: University of Chicago Press.

Aquino, R. (2015). *Cities within a city: the rise of Manila's new urban townships*. [online] Property Report. Available at: http://www.property-report.com/cities-within-a-city-the-rise-of-manilas-new-urban-townships/ [Accessed 6 Jul. 2016].

Burchell, R. (1973). *Frontiers of planned unit development: a synthesis of expert opinion*. New Brunswick, N.J.: Center for Urban Policy Research.

Choi, N. (2014). Metro Manila through the gentrification lens: Disparities in urban planning and displacement risks. *Urban Studies*, 53(3), pp.577-592.DOI:10.1177/0042098014543032

Committee on Public Regulation of Land Use. (1972). PLANNED UNIT DEVELOPMENTS AND FLOATING ZONES. *Real Property, Probate and Trust Journal, 7*(1), 61-67.

Connell, J. (1999). Beyond Manila: walls, malls, and private spaces. *Environ. Plann. A*, 31(3), pp.417-439. DOI: 10.1068/a310417

Council for New Urbanism (CNU). (2015). *What is New Urbanism?*. [online] Available at: https://www.cnu.org/resources/what-new-urbanism [Accessed 2 Jul. 2016].

Dempsey N., & Jenks, M. (2010). The Future of the Compact City. Built Environment (1978-), 36(1), 116-121. Retrieved from http://www.jstor.org/stable/23289987

Dovey, K. (2012). Informal urbanism and complex adaptive assemblage. *International Development Planning Review*, 34(4), pp.349-368. DOI: 10.3828/idpr.2012.23

Endriga, D. (2004). *The language of environmental planning in the Philippines*. Quezon City, Philippines: School of Urban and Regional Planning, University of the Philippines and UP Planning and Development Research Foundation.

Foucault, M.(1998). *Aesthetics, method, and epistemology*. New York: New Press.

Franklin, B. and Tait, M. (2002). Constructing an Image: The Urban Village Concept in the UK. *Planning Theory*, 1(3), pp.250-272. DOI: 10.1177/147309520200100304

Garrido, M. (2013). The Sense of Place behind Segregating Practices: An Ethnographic Approach to the Symbolic Partitioning of Metro Manila. *Social Forces*, 91(4), pp.1343-1362. DOI: 10.1093/sf/sot039

Garrido, M. (2012). The Ideology of the Dual City: The Modernist Ethic in the Corporate Development of Makati City, Metro Manila. *International Journal Urban Regeneration Research*, 37(1), pp.165-185. DOI: 10.1111/j.1468-2427.2011.01100.x

Genis, s. (2007). Producing Elite Localities: The Rise of Gated Communities in Istanbul. *CURS*, 44(4), pp.771-798.DOI: 10.1080/00420980601185684

Grant, J. and Mittelsteadt, L. (2004). Types of gated communities. *Environment and Planning B: Planning and Design*, 31(6), pp.913-930. DOI:10.1068/b3165

Herrle, P. and Fokdal, J. (2011). Beyond the Urban Informality Discourse: Negotiating Power, Legitimacy and Resources. *Geographische Zeitschrift, 99*(1), 3-15.

Hofstad, Hege, Compact city development: High ideals and emerging practices, Refereed article No. 49, October, 2012, *European Journal of Spatial Development*. (Citation as instructed)

Housing and Land Use Regulatory Board, (2014). *CLUP Guidebook: A Guide to Comprehensive Land Use Plan Preparation*.

Iossifova, D. (2014). Borderland urbanism: seeing between enclaves. *Urban Geography*, 36(1), pp.90-108. DOI: 10.1080/02723638.2014.961365

Jenks, M and Jones, C (2010). Chapter 1: Issues and Concepts. In: Jenks, M and Jones, C (eds.) *Dimensions of the Sustainable City.* London: Springer.

Jensen, J, Christensen, T and Gram-Hanssen, K (2011). Sustainable Urban Development - Compact Cities or Consumer Practices? *Danish Journal of Geoinformatics and Land Management 46(1),* 50-64.

Johnson, L. (2010). Master Planned Estates: Pariah or Panacea?. *Urban Policy and Research*, 28(4), pp.375-390. DOI: 10.1080/08111146.2010.532475

Kelly, P. (2003). Urbanization and the Politics of Land in the Manila Region. *The Annals of the American Academy of Political and Social Science*, 590(1), pp.170-187. DOI: 10.1177/0002716203256729

Kleibert, J. and Kippers, L. (2015). Living the good life? The rise of urban mixed-use enclaves in Metro Manila. *Urban Geography*, 37(3), pp.373-395. DOI: 10.1080/02723638.2015.1082799

Koch, F. (2015). The Rules of the Game and How to Change Them: Urban Planning Between Formal and Informal Practices. A Colombian Case Study. *International Planning Studies*, 20(4), pp.407-423.DOI: 10.1080/13563475.2015.1068685

MacLeod, G. and Ward, K. (2002). Spaces of Utopia and Dystopia: Landscaping the Contemporary City. *Geografiska Annaler, Series B: Human Geography*, 84(3&4), pp.153-170. DOI: 10.1111/1468-0467.00121

MacLeod, G., Raco, M. and Ward, K. (2003). Introduction. *CURS*, 40(9), pp.1655-1671.DOI: 10.1080/0042098032000106546

Mandelker, D. (2008). Legislation for Planned Unit Developments and Master-Planned Communities. *The Urban Lawyer, 40*(3), 419-449.

McFarlane, C. (2011). Assemblage and critical urbanism. *City*, 15(2), pp.204-224. DOI: 10.1080/13604813.2011.568715

McFarlane, C. (2012). Rethinking Informality: Politics, Crisis, and the City. *Planning Theory & Practice*, 13(1), pp.89-108. DOI: 10.1080/14649357.2012.649951

McGuirk, P. and Dowling, R. (2009). Master-planned residential developments: Beyond iconic spaces of neoliberalism?. *Asia Pacific Viewpoint*, 50(2), pp.120-134. DOI: 10.1111/j.1467-8373.2009.01388.x

Meshenberg, M. (1976). *The administration of flexible zoning techniques*. Chicago: American Society of Planning Officials.

Michel, B. (2010). Going Global, Veiling the Poor Global City Imaginaries in Metro Manila. 58(3), pp.383-406.

Mills, S. (2003). *Michel Foucault*. London: Routledge.

Murphy, P. and Hogan, T. (2012). Discordant order: Manila's neo-patrimonial urbanism. *Thesis Eleven*, 112(1), pp.10-34.DOI: 10.1177/0725513612450500

Neuman, M. (2005). The Compact City Fallacy. *Journal of Planning Education and Research*, 25(1), pp.11-26. DOI: 10.1177/0739456x04270466

Ortega, A. (2016). Manila's metropolitan landscape of gentrification: Global urban development, accumulation by dispossession & neoliberal warfare against informality. *Geoforum*, 70, pp.35-50. DOI: 10.1016/j.geoforum.2016.02.002

Oxford Business Group. (2015). *The Philippines' BPO sector creates jobs and is drawing wealth and investment.* [online] Available at: https://www.oxfordbusinessgroup.com/overview/philippines-bpo-sector-creates-jobs-and-drawing-wealth-and-investment [Accessed 13 August 2016].

Patel, S. (2014) Is there a 'South' perspective to urban studies? (eds.) *The Routledge Handbook on Cities of the Global South.* Oxon, Routledge. pp. 37-47.

Porio, E. (2009). Shifting spaces of power in Metro Manila. *City*, 13(1), pp.110-119. DOI: 10.1080/13604810902726301

Porio, E. (2012). Decentralisation, Power and Networked Governance Practices in Metro Manila. *Space and Polity*, 16(1), pp.7-27. DOI: 10.1080/13562576.2012.698128

Pow, C. (2014). Urban dystopia and epistemologies of hope. *Progress in Human Geography*, 39(4), pp.464-485. DOI: 10.1177/0309132514544805

Quezon City Development Council, (2010). *Quezon City Comprehensive Development Plan 2010-2016*. Quezon City.

Roderos, R. (2013). Reshaping Metro Manila: Gentrification, Displacement, and the Challenge Facing the Urban Capital. *ST*, 1(2), pp.79-103. DOI: 10.13185/st2013.01204

Roy, A. (2005). Urban Informality: Toward an Epistemology of Planning. *Journal of the American Planning Association*, 71(2), pp.147-158. DOI: 10.1080/01944360508976689

Roy, A. (2009). Why India Cannot Plan Its Cities: Informality, Insurgence and the Idiom of Urbanization. *Planning Theory*, 8(1), pp.76-87. DOI: 10.1177/1473095208099299

Sager, T. (2011). Neo-liberal urban planning policies: A literature survey 1990–2010. *Progress in Planning,* 76(4), pp. 147-199. DOI: 10.1016/j.progress.2011.09.001

Shatkin, G. (2005). Colonial Capital, Modernist Capital, Global Capital: The Changing Political Symbolism of Urban Space in Metro Manila, the Philippines. *Pacific Affairs*, 78(4), pp.577-600. DOI: 10.5509/2005784577

Shatkin, G. (2008). The City and the Bottom Line: Urban Megaprojects and the Privatization of Planning in Southeast Asia. *Environment and Planning A*, 40(2), pp.383-401. DOI: 10.1068/a38439

Sidaway, J. (2007). Enclave space: a new metageography of development?. *Area*, 39(3), pp.331-339. DOI: 10.1111/j.1475-4762.2007.00757.x

Smyth, H. (2005). Running the Gauntlet: A Compact City within a Doughnut of Decay. In Jenks, M, Burton, E and Williams, K (eds.) *The Compact City: A Sustainable Urban Form?* London: Spon Press. p. 101-113.

So, F., Mosena, D. and Bangs, F. (1973). *Planned unit development ordinances*. [Chicago]: [American Society of Planning Officials].

Webster, C., Glasze, G. and Frantz, K. (2002). The Global Spread of Gated Communities. *Environment and Planning B: Planning and Design*, 29(3), pp.315-320. DOI: 10.1068/b12926

Yiftachel, O. (2009). Critical theory and 'gray space': Mobilization of the colonized. *City*, 13(2-3), pp.246-263. DOI: 10.1080/13604810902982227

Case Study / Project

SMART GROWTH APPROACH

IN PLANNING BOGOR CITY INFRASTRUCTURE

fah LATIFAH, Dayinta PINASTHIKA

Abstract

Bogor as a satellite city in Greater Jakarta Metropolitan Area (40 km to the south) is rapidly growing with its main function as a center of the residential area, tourism, and education. As a residential center for Jakarta workers, during 2015 there were 114 thousand peoples commuted every day from Bogor to Jakarta by train, excluding car and bus commuters through highway (source: PT KA, 2015). The data shows that Bogor had already become the main provider of the residential area for Jakarta workers. Data also shows that more than 60% of property transaction in Bogor during last 5 years involved Jakartans (source: urbanindo). The rapidly growing of built-up areas and urban activities in Bogor have caused many problems such as the increasing numbers of slum areas, traffic congestion, informal sector occupancy in public spaces, pollution, etc. As a residential city, Bogor finds it difficult to stem the rapid investment in new housing developments while the provision of infrastructure is very limited so that these problems arise. The Ministry of Public Works and Housing as the leading sector in urban infrastructure provision initiated a planning project to improve the quality of infrastructure in Bogor to overcome the problems.

This project was run for 7 months in April to October 2016, which we served as consultants who assisted the ministry. The project found that to improve the quality of the urban spaces in Bogor, interventions need to start from the city center area as the urban acupuncture. This area was delineated in an area of around 500 hectares in the heart of Bogor, where the main activities of the city took place. A smart growth concept was used as the planning approach in this project by focusing on designing mixed-use and compact development, walkability, public transportation oriented, human scale oriented, and public space emphasis. The concept was derived by first dividing the area into 15 micro sub-area (each around 30 hectares) which have different themes and characteristics one to each other, with each sub-area having one local public service center. The division also took into account the walking radius in each sub-area and the possibility of developing a public transportation node in each service center. It can also be learned that it is necessary to set a minimum service standard for each sub-area in accordance with their service scale and main activity as a basis for determining the type of infrastructure that needs to be provided.

This project also provided infrastructure programs in a microscale context (human-scale infrastructure) to improve the quality of each sub-area, so that accumulatively would give a positive impact in terms of improving the quality of the whole city center. The resulting infrastructure program will be an input for the city government to formulate the annual budget.

Research Paper

Space of flow including capital and information shape the megacity groups：

based on the example of Chengdu-Chongqing city groups in China

SHUAI LI, Tongji University; China

Abstract

With globalization,space of flow ,such as capital, information and talent are moving around the world, which combine separated cities into influential urban groups. This research takes Chengdu-Chongqing urban agglomeration in China as an example, whose GDP exceeded 900 billion dollars in 2018.From this example ,we are concerned about its formation process and future planning. As for theory, this study utilizes Castel's theory of Network Society, which holds that "space of flow", such as, capital and information create "space of place" (cities) under globalization. Meanwhile, the key point to urban development is the information and capital. The key point to Urban planning is the attraction of external information(including talent and news) and capital. As for the method, focusing on the information and capital, this paper build the analyzing network model among 27 cities of Chengdu-Chongqing urban groups . For the information model,the intensity of information flow among cities is simulated and measured by using Baidu Index big data, in order to reflect the information attractiveness. We can find the the character of this city group network and space organization of the city groups under the view of "space of flow.As for the results, firstly,it is found that the flow factors of capital and information are positively correlated with the level of economic development, which means that the cities with high GDP ,such as Chengdu and Chongqing, have a strong flow of capital and information. Secondly, the status of cities in urban groups are determined by the value section of their enterprises. For example, Chengdu and Chongqing at the highest level, mainly hold companies with high economic value such as finance, trade and law firms, while sub-level areas share companies with slightly lower value such as manufacturing, medicine and so on. The higher the value of the company occupied by the city, the more power of the city. If the city owns multinational corporations, it can influence the world by global capital. Thirdly, cities are likely to form group development, because capital and information have agglomeration effect. As long as capital and information can flow to the region, this city can participate in the operation of urban groups. Finally, for future planning methods, under the influence of globalization, capital and information will flow more frequently, and cities will develop in groups. The core of planning is to highlight the characteristics and advantages of the city to attract the space of flow such as new companies and talents, so as to enhance its own competitiveness for better development.

Keywords

Space of flow,Chengdu-Chongqing urban agglomeration,information model

1. Theoretical research

1.1. Space of flow

With the development of economic globalization, cities have formed economic activities that combine geographically highly diffusive and functionally deeply integrated activities (P. Dicken, 2011), and form collaborative and complementary relationships through industrial chains, thus forming interrelated production networks and urban networks. The networked urban system is the advanced form of urban agglomeration development. (J. Friedmann, 1986). In 1996, M. Castelles (1996) put forward the theory of "social network" to explain the essence of urban network. He believed that cities, as "space of place", are hubs or nodes of global urban network, while "space of flow" such as capital flow, information flow and people flow, is the "space of flow". It has created a network of links between cities around the world. In the empirical aspect, there are three main research perspectives: infrastructure research, enterprise organization research, virtual network research. Infrastructure research is mainly based on Derudder (2008), Burns (2008) and other scholars through highways, railways, aviation and other carriers to study the flow of people and goods between cities.For enterprise links, Professor Peter Taylor created Locking network method,which is used to measure global urban links and is represented by GaWC's chain network model. For the researches of information flow network ,are represented by virtual network (Krings, et al. 2009; Zhenfeng, et al. 2016), especially using the data from social media and microblog .

1.2. Urban network under the perspective of information flow

The essence of urban network is the relationship between cities reflected by the factors of folw.,and information is an important supporting condition in the form of urban network (Mingfeng, Gaofeng, etc.2007). Because information flow is faster and more dynamic than other flow elements which need "actual carrier" such as enterprise organization and infrastructure.Furthermore it can better reflect the potential changes and the latest developing demand of urban network. At the same time, the Internet itself does not have a strict hierarchy of urban information exchange, so it reflects the characteristics of urban network more objectively to a certain extent, and complements other urban network studies with "actual" carriers, providing new perspectives and opportunities for the development of cities around the world.

Scholars have done a lot of research on this: Mitehelson(2002) and others use information flow such as telephone to describe the links between metropolitan areas; Zhenfeng (2012) and others, taking Sina Weibo as an example, have explored the characteristics of Chinese urban network based on cybersocial space. Xiong Lifang (2014) and Cao Ziwei (2016) used Baidu Index to interpret the the city hierarchy of Yangtze River Delta city network.

1.3. Urban Space in network form

With the rapid transmission of information and other flow elements, the relationship between cities is gradually weakened by the influence of proximity. Traditional research on urban regional spatial organization is based on the principle of spatial proximity, following the logic of "core, side and edge" spatial organization and the traditional paradigm of "central place" theory. However, professor Castel's "space of flow" gave birth to a new form of spatial organization - Urban network, which refers to the networking urban system. The shorter distance between cities will not reflect the strong connection .The importance of the distance between cities tends to weaken, and the urban system has evolved into a multi-

center, complex network and flat open system (Tang Zilai, 2010). The spatial study of urban agglomeration has also turned to how to quantitatively calculate and visualize the information flow, transportation flow, enterprise connection flow and the urban system represented by them. The status of a city is also determined by its proportion in various "flow elements" and the frequency of its connections (Xiong Lifang, Zhenfeng, etc.2013). Then under the network city organization, how to layout the urban regional space and how to attract the “space of flow have become important factors for the future development of the city.

2. Rearch subject and methods

2.1. Chengdu-Chongqing city groups

The area of Chengdu-Chongqing urban agglomeration was determined by the <Chengdu-Chongqing Urban Agglomeration Development Plan>in 2016 from central government (Fig. 1). The total area is 185,000 square kilometers,including 27 districts,such as Yuzhong, Wanzhou, Qianjiang, Fuling, and parts of Kaixian and Yunyang, as Chengdu and Ziyang in Sichuan Province. Gong, Luzhou, Deyang, Mianyang (except Beichuan County and Pingwu County), Suining, Neijiang, Leshan, Nanchong, Meishan, Yibin, Guangan, Dazhou (except Wanyuan City), Ya'an (except Tianquan County, Baoxing County), Ziyang and other 15 cities .It has a total area of 185,000 square kilometers, with a permanent resident population of 900,940 in 2014 and GDP of 376 trillion yuan, accounting for 1.92%, 6.65% and 5.49% of the country respectively.

Figure 1 Research area

2.2. Data——Baidu Index

Baidu Index is based on the search volume of one city's residents for another city. According to the report released in October 2017 by StatCounter Global Stats, the proportion of Baidu search engine usage in China is as high as 82.99%, accounting the largest part. Therefore, Baidu Index can reflect the degree of concern of urban people to another city (which can be

called "attention"), and simulate the information flow between cities. At the same time, based on the current research of "Baidu Index" to simulate the information flow between cities, it is confirmed that Baidu Index reflects the economic and social links among cities to a certain extent, and reflects the comprehensive strength of cities (Xiong Lifang, etc., 2013). In order to study the development of Chengdu-Chongqing urban agglomeration before and after the publication of "Chengdu-Chongqing Urban Agglomeration Plan" in 16 years, and considering the availability of data.This paper takes the average of user search index in 2015and2018.

2.3. Research method

Referring to previous scholars'methods (Xiong Lifang, et al., 2013), the algorithm is as follows: The information flow intensity between two cities is calculated by the **Rab** formula of network attention product between cities A and B.

$$Rab = Ab * Ba$$

(Among them, **A**. For the user attention of City A in City B, **B**. For city B in city A user attention.

If the total amount of information flow in city A is N, it is the sum of information flow in city A and other cities in core area.

$$Na = Rab + Rac + ... + Raz$$

The relative attention (relative information flow) of a city is expressed by **P**, which is the relative position of the total information flow of the city in the core area in the region. Calculating formula:

$$P = Nk/Nh$$

(Among them, **Nk** is the total amount of information flow of a city, and **Nh** has the corresponding value of the largest amount of information flow of a city in the study area.)

3. The network character of Chengdu-Chongqing city group under the view of information flow

3.1. The variation character with year

From 2015 to 2018, the total amount of information flow of Chengdu-Chongqing urban group increased, and the increase was larger. The total amount of information flow in each city has risen from 7151724 to 9648844, and the average amount of information flow in each city has risen from 446982 to 603052, an average increase of 35%. At the same time, the annual variation of the total information flow in Chengdu-Chongqing urban agglomeration is measured by the variation coefficient C (the relative amount of standard deviation relative to the average size). The C value in 2015 is 1.223, which is less than 1.344 in 2018. It can be seen that the information links between cities are becoming closer and closer, and the stability of urban network based on information flow is becoming stronger and stronger (Figure 2).

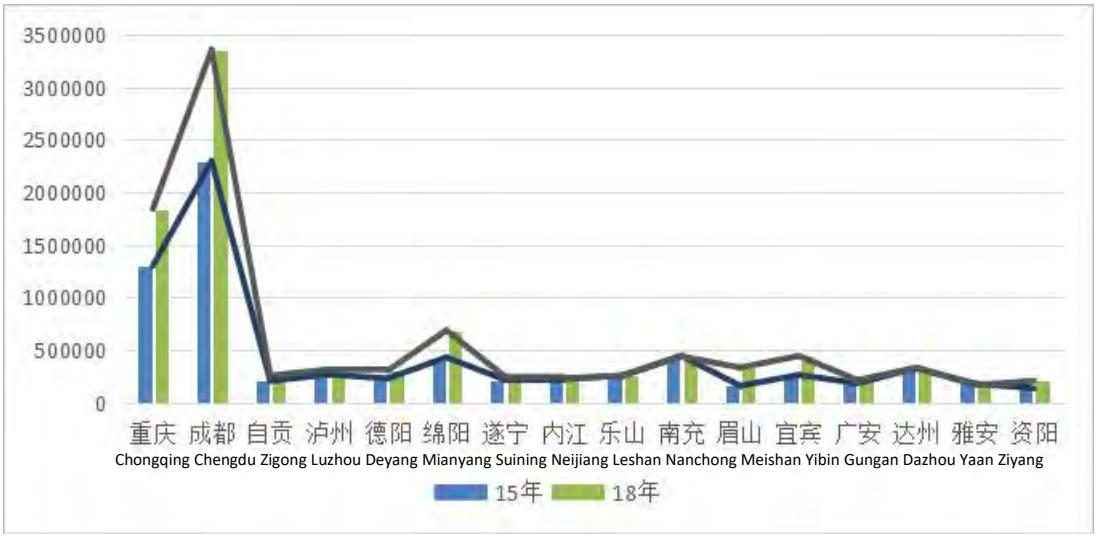


Figure 2 Change of Information Total Amount in Chengdu-Chongqing Urban group

3.2. Hierarchical character

The urban network levels of Chengdu-Chongqing urban agglomeration in 2015 and 2018 were obtained by clustering method with spss method. (Table 1).

Table 1 Information Network Hierarchy

Level	city (2015)	city (2018) (the change of the ranking)
1st	成都 chengdu	成都 chengdu
2st	重庆 chongqing	重庆 chongqing
3st	南充 nanchong、绵阳 mianyang、达州 dazhou、泸州 luzhou、宜宾 yibin、乐山 leshan、德阳 de yang、内江 neijiang	绵阳 mianyang (+1) 、宜宾 yibin (+3) 、南充 nanchong (−2) 、眉山 me shan (+9) 、达州 dazhou (−2) 、泸州 luzhou (−2) 、德阳 deyang
4st	遂宁 suining、自贡 zigong、广安 guangan、雅安 yaan	自贡 zigong (+2)
5st	眉山 meishang、资阳 ziyang	乐山 leshan (−3) 、遂宁 suining (−1)、内江 neijiang(−3)、广安 guangan(−1)、资阳 ziyang(+1)、雅安 yaan(−2)

(1) The urban network presents the development trend of "double core". Chengdu and Chongqing occupy the core position of the network, with the strongest directivity of network information links, exceeding one million in both cities, and their linformation amount are over 50% in the total network. Further, they are still in the rising stage,from 50% (15 years) to 53.8% (18 years). Among them, Chengdu has a more prominent position, accounting for 34.7%, which is 1.82 times that of Chongqing.

(2) The network presents a distinct hierarchical development trend. The first three cities developed well, while the latter two cities lagged behind. In 2015, the network level of Chengdu-Chongqing urban agglomeration was "1+1+8+4+1", and in 2018, it was "1+1+7+1+6" (fig. 3). It shows that the information of the first three cities develops rapidly

(information accounts for more than 80%) and the gap between the first three cities and the second one is increasing, which leads to the increase of the number of the last series cities.

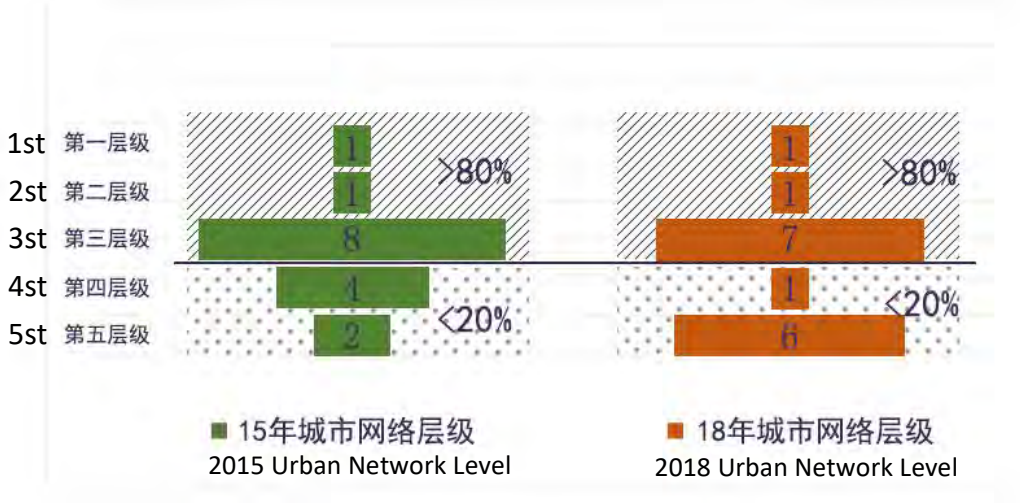


Figure 3 Image example_ISOCARP logo

(3) In the network, Yibin and Meishan have achieved good development, of which Yibin has risen by 3 places, with the increase of information amount reaching 118%, and Meishan has risen by 9 places more rapidly, with the increase reaching 207%. The status of Leshan and Neijiang has declined considerably, falling three places respectively, and from the third level to the last level.

3.3. The variation character with year

In order to further compare the structural characteristics of Chengdu-Chongqing urban agglomeration network, the influence before and after the establishment of Chengdu-Chongqing urban agglomeration is analyzed. From the perspective of space-time evolution, urban network maps are drawn based on the information flow intensity matrices of Chengdu-Chongqing urban agglomeration in 2015 and 2018 respectively (fig. 4), and a backbone network with information flow intensity more than 50,000 between cities is selected (fig. 5). At the same time, considering the status of Chengdu-Chongqing urban agglomeration network in the country, and also based on the intensity of information flow, the structure of Chengdu-Chongqing urban agglomeration in the national layout is drawn (fig. 6).

(1) From an external perspective, Chongqing-Chengdu has a prominent core position and upgraded urban links. As the dual core of Chengdu-Chongqing urban agglomeration, Chongqing and Chengdu have frequent exchanges of information elements between cities, which has leaped to become the second strength connection similar to Beijing-Tianjin and Guangzhou-Shenzhen . At the same time, the status of the two places as information nodes in the West has been strengthened, and their links with the Yangtze River Delta, the Pearl River Delta, Tianjin, Beijing and Hebei have been further strengthened. The status of Chengdu (5 links) is better than Chongqing (3 links).

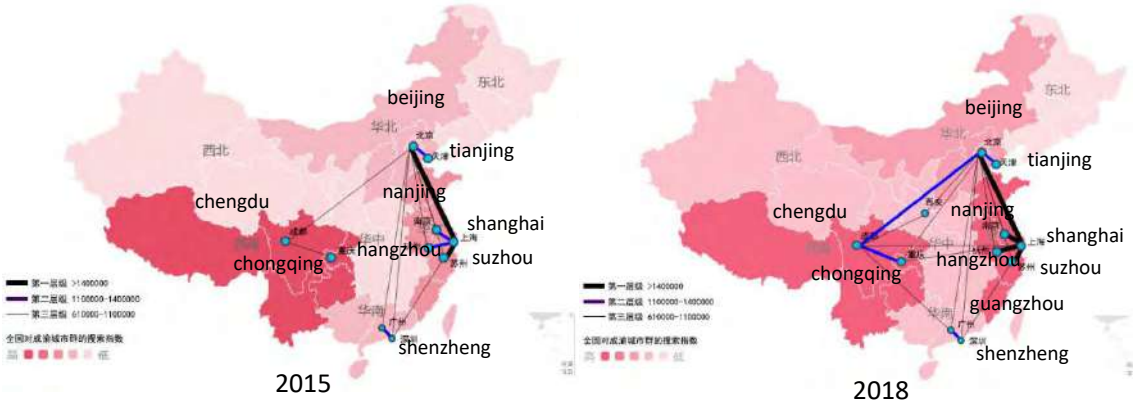


Figure 4 Structural Map of National Backbone Information Network

(2) From an internal perspective. The overall network structure of Chengdu-Chongqing city has been continuously optimized and gradually matured. The information links between cities in 18 years were stronger than those in 15 years. The network shows the frequent interaction structure between Chengdu and Chongqing, and the increasing interaction between Chengdu and Chongqing as the core city and other cities.

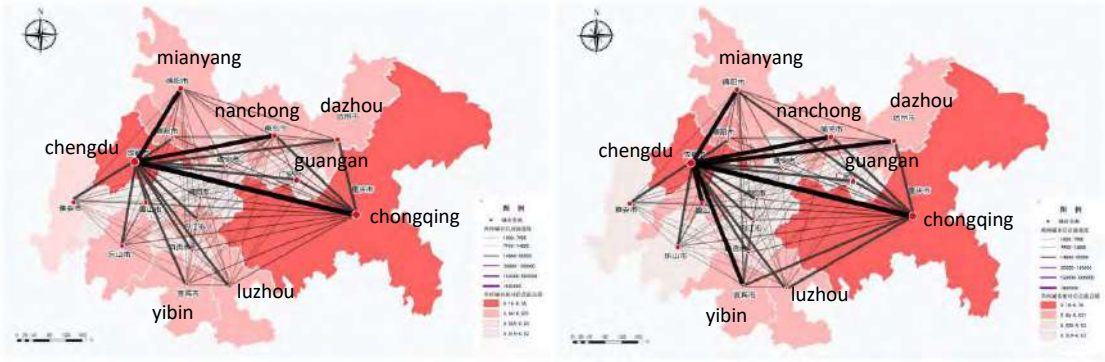


Figure 5 Chengdu-Chongqing Information Network Structure Map

(3) As far as the backbone network is concerned, the secondary nodes have been developed and the whole structure is diamond-shaped. Chongqing has broken through the administrative boundary and expanded its influence in Sichuan. Reflected in Chongqing and Sichuan provincial cities, the amount of information has increased, and interaction is more frequent. Chongqing's main links include Dazhou, Nanchong and Guang'an, with the addition of Yibin, Luzhou and Mianyang.

The network has also expanded from a single northern triangle connection to a diamond-shaped network structure with Mianyang, Nanchong and Dazhou as the core in the South and Yibin and Luzhou as the core in the north. Correspondingly, in the planning of Chengdu-Chongqing Urban Agglomeration, Yibin and Luzhou in the south are regarded as the core cities of the region, and the regional transportation links are strengthened. Therefore, the southern cities are closely connected with Chongqing's information network.

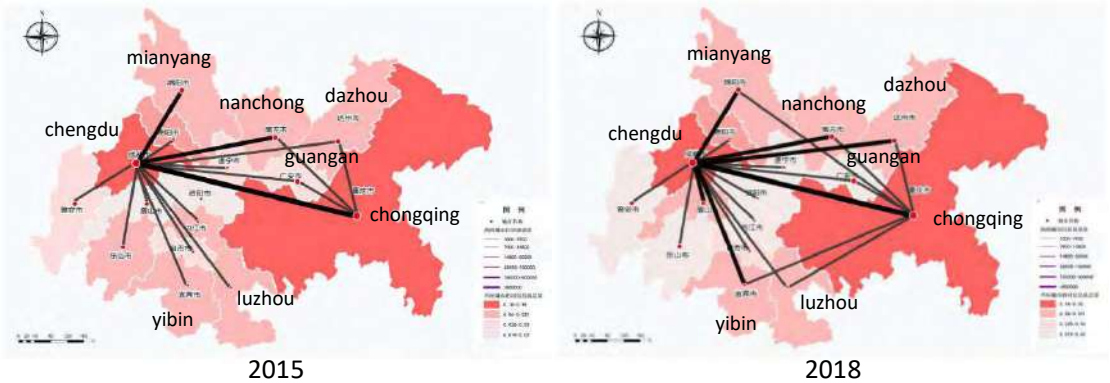


Figure 6 Structural Chart of Chengdu-Chongqing Backbone Information Network

4. Re-recognition of Chengdu-Chongqing Urban Space from the Perspective of Information Flow

4.1. Development of urban groups relying on gateway cities

In 2016, the State Council's approval document for the development plan of Chengdu-Chongqing urban agglomeration (State Letter No. 68, 2016) clearly pointed out that "by 2030, the radiation-driven role of Chongqing, Chengdu and other national central cities will be significantly enhanced, and the integrated development of urban agglomeration will be fully realized." From the perspective of information flow, it is found that Chongqing and Chengdu, as "information portals" in the west, play a two-way role in connecting the national network and radiating the urban agglomeration inward. Externally, the second and third largest cities in Chongqing and Chengdu are Beijing and Shanghai, and the top ten cities all come from the outside of the urban agglomeration (Table 3).

Table 3 Priority of Chongqing-Chengdu Urban Linkage in 2018

city	Connectivity	Relative correlation value	city	Connectivity	Relative correlation value
chongqing	1. chengdu	74. 35	chengdu	1. chongqing	74. 35
	2. beijing	41. 36		2. beijing	67. 38
	3. shanghai	37. 01		3. shanghai	56. 26
	4. shenzheng	24. 46		4. xian	55. 32
	5. xian	24. 33		5. shenzheng	36. 81
	6. guangzhou	21. 39		6. hangzhou	29. 81
	7. hangzhou	19. 33		7. guangzhou	27. 38
	8. suzhou	16. 37		8. wuhan	20. 95
	9. wuhan	15. 63		9. nanjing	20. 49
	10. kunming	8. 52		10. suzhou	17. 86

Internal aspect: From the analysis of the relationship network within the urban agglomeration, it is shown that the first and second first cities of Chengdu-Chongqing urban agglomeration are Chengdu and Chongqing, and are the dominant flow direction of the city (Figure 7 takes Luzhou and Guang'an as examples). From the analysis of both external and internal sectors, it can be concluded that Chongqing and Chengdu play a portal role in Chengdu-Chongqing urban agglomeration, and they are important media inside and outside the urban agglomeration and information hub inside (Figure 8).

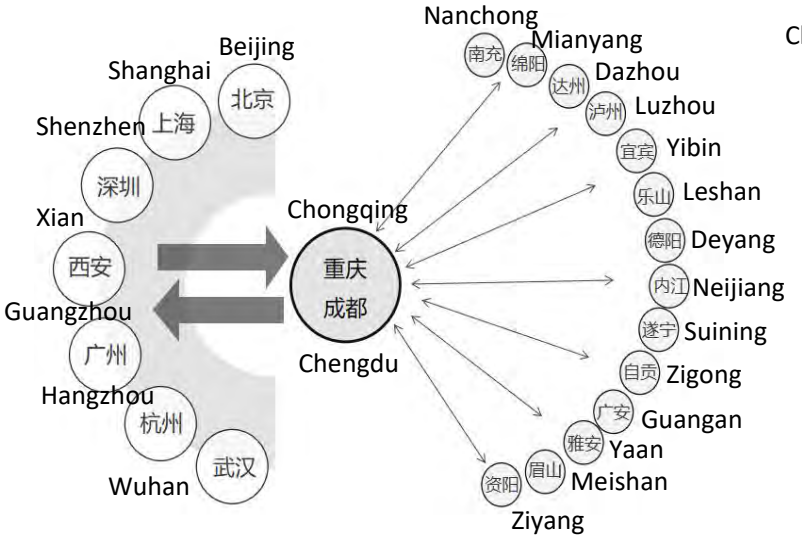


Figure 7 Chongqing and Chengdu as two sectors of information portal

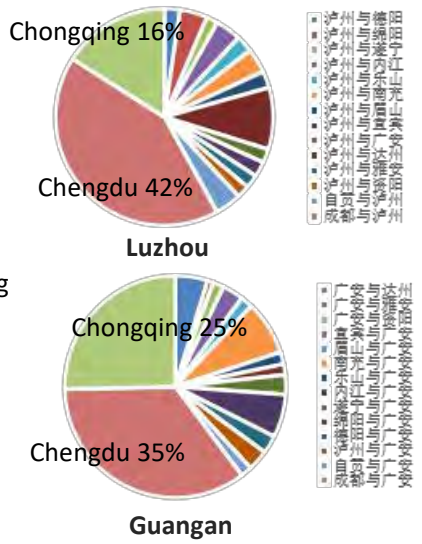


Figure 8 Analysis of the First City in Urban Agglomeration

4.2. Spatial Economic Basis Behind Information Flow

In today's highly informationized global economy, invisible information network has a great impact on urban areas, but information flow will not exist in isolation. The development of information network is often influenced by the level of urban development. It will gather and disperse with capital, labor force, and other factors of production in the geographic space (Hall, 2009). Therefore, the economic development foundation and labor force of the city itself are the important influencing factors of the development of Chengdu-Chongqing network pattern.

This paper chooses 16 cities of Chengdu-Chongqing urban agglomeration in 2018 to analyze the correlation between the Gross Regional product, the number of permanent residents and the total information flow of these cities in 18 years. The results show that the correlation is significant at 0.01, and the correlation coefficient is greater than 0.7 (Figure 9), which means that the total urban information has a relationship with the total regional urban value and the permanent population. Significant and strong correlation. At the same time, by means of SPSS regression analysis, it is found that there is a positive correlation between the amount of information and GDP, permanent population respectively (Figure 9).

		info	peo	gdp
info	皮尔逊相关性	1	.751**	.868**
	显著性（双尾）		.002	.000
	平方和与叉积	1.008E+13	6456558888	5.925E+10
	协方差	7.752E+11	496658376.0	4557996655
	个案数	14	14	14
peo	皮尔逊相关性	.751**	1	.973**
	显著性（双尾）	.002		.000
	平方和与叉积	6456558888	7332189.724	56694789.27
	协方差	496658376.0	564014.594	4361137.636
	个案数	14	14	14
gdp	皮尔逊相关性	.868**	.973**	1
	显著性（双尾）	.000	.000	
	平方和与叉积	5.925E+10	56694789.27	462920281.6
	协方差	4557996655	4361137.636	35609252.43
	个案数	14	14	14

**. 在 0.01 级别（双尾），相关性显著。

		GDP /万元	常住人口 /万人
城市信息总量	模型 R 方	0. 753	0. 564
	显著性	0. 001	0. 002
	t	6. 024	3. 941
	未标准系数	128	880. 577
	标准系数	0. 868	0. 751

Figure 9 Analysis Table of Relevance between Information Quantity and GDP and Population

To sum up, in Chengdu-Chongqing urban agglomeration, the amount of urban information is highly related to the regional gross domestic product and the permanent population, and will grow with the growth of the gross domestic product and the permanent population. The information network between cities is not only the reflection of people's attention to the city, but also the economic and demographic basis of the city as an important support. On the one hand, only when a city has a strong economic foundation and talent gathering, can it produce more information exchange. On the other hand, cities can stimulate more elements of information flow, which also indicates opportunities for urban economic and labor growth. In the 18-year Chengdu-Chongqing urban agglomeration, we can see that economic development, population density and information activity have a high degree of overlap in space (Figure 10). Information flow network also represents the economic and demographic basis behind it to a certain extent. Therefore, paying attention to the change of information flow and becoming the core of information flow can often be a city. Bring good opportunities for development.

Information GDP Population

Figure 10 Information, GDP and Population Distribution of Chengdu-Chongqing Urban group

4.3. Gradually break through the traditional "core-edge" level of network development

Different from the spatial organization logic based on "central place" theory, which determines the location of center or periphery, the degree of connection between urban node and other nodes in urban network determines the location of the urban node at the core or periphery of the network (Doreen Massey, 2010). Using NetDraw to further abstractly analyze the information network structure of Chengdu-Chongqing urban agglomeration, we can clearly see that the information flow links between secondary cities

are constantly strengthened, and the overall trend of network urban system is presented (Fig. 11, 12).

In 2015, Chengdu and Chongqing are in the absolute core leading position, presenting obvious "core-edge" secondary structure, and Chengdu has a slightly stronger position. Secondly, the status of nodes in Nanchong, Yibin, Mianyang and Luzhou has been improved, which can also produce stronger networks in other areas, such as Yibin and Luzhou, Mianyang and Suining, Mianyang and Dazhou, which change the previous situation of radiation from Chengdu and Chongqing alone and show the trend of flattening network characteristics. From the evolution of the network, we can see that the free flow of information between cities is not bound by administrative and regional constraints. Not by the traditional administrative hierarchy of "municipalities directly under the Central Government, provincial, prefectural and county-level cities", but homogenization for all cities. The development of urban agglomeration also has the relative edge of the city to enhance the status of contact, strengthen information interaction with other cities, so that the network from a single core to network development.

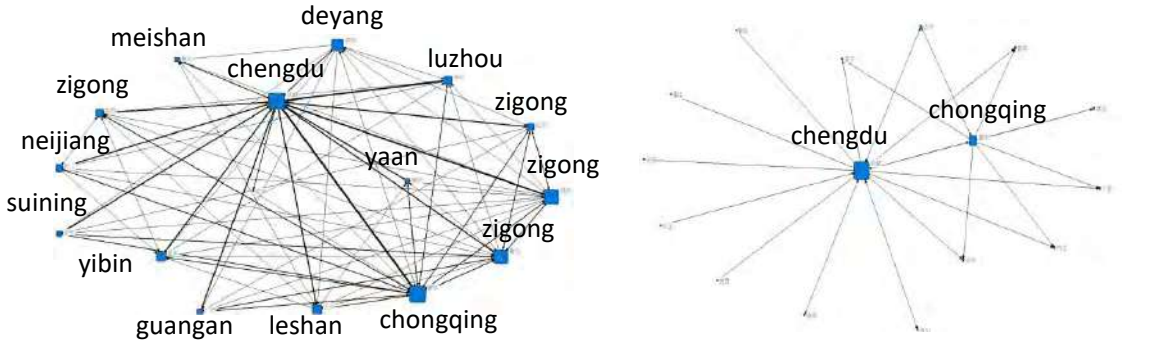


Figure 11 The obvious "core-edge" secondary structure in2015

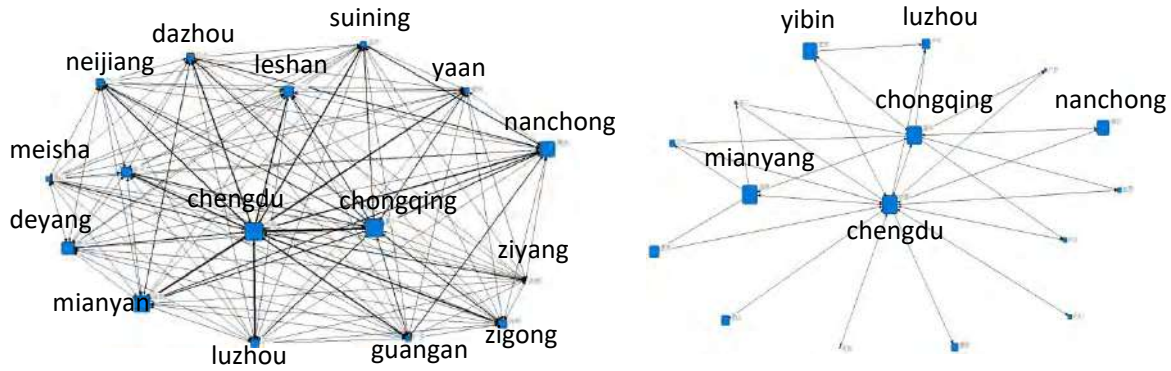


Figure 12 The obvious trend of network structure in 2018

5. Conclusions

Spatial flow promotes the reorganization of the spatial structure of urban areas (Ravetz, 2016). The focus of urban agglomeration has shifted from the traditional urban material structure and urban form itself to the social network beyond spatial perception (Davoudi,

2008), and from the "flow element" to consider the "place space" carrying the flow element. This research is from the perspective of information flow elements, using "flow data" to construct urban network relevance. On this basis, the author reflects on the "Chengdu-Chongqing Urban Agglomeration Planning" put forward in 16 years, hoping to provide more scientific technical support and a new perspective for the future Chengdu-Chongqing Urban Agglomeration Planning:

(1) Chengdu-Chongqing Urban Agglomeration refers to the full play of the dual-core driving function of Chongqing and Chengdu, giving play to its advantages of communicating East and West, and speeding up the development of the western region, which is fully based on. Chongqing and Chengdu are "information portals" in the western region, and they are important external media and internal information hub of urban agglomeration. The relationship between Chongqing and Chengdu has been growing steadily, and has risen to the second level of information connection intensity in the whole country, similar to that between Beijing and Tianjin, Guangzhou and Shenzhen. The strengthening of the core city links has brought a better information base for Chengdu-Chongqing urban agglomeration, and is also conducive to enhancing the intensity of information links within the urban agglomeration, which is conducive to the development of other node cities in the region.
(2) Planning the connection channel between urban entity and virtual entity will become an additional part of the new planning. The elements of information flow do not exist alone, but are related to the mixed elements of urban economic flow and human resource flow. Therefore, on the one hand, cities should pay attention to marketing and promotion effects in their development. For example, Chengdu-Chongqing urban agglomeration has been approved as a national-level central city group, and the overall urban information attention has been greatly enhanced. For the city itself, the enhanced information attraction contains the potential of economic and human attraction; on the other hand, new urban development. It is to enhance the information connection with other nodes and promote information exchange. In addition to network attention, convenient links such as physical transportation and enterprise communication will also be conducive to the dissemination of information and promote the development of the city.

(2) Networked urban agglomerations have open boundaries and interactive breakthroughs in administrative hierarchies. Therefore, the new planning encourages cross-regional cooperation, builds a shared and efficient infrastructure network, and allows flow elements to flow freely. From the perspective of network, the energy level of a city depends more on its network capability than on the population size and administrative level that most traditional planning considers. We find that the open and interactive relationship between the networked urban agglomerations, such as the rapid increase of the links between Chongqing and Sichuan cities, especially in Neijiang, Luzhou and Nanchong. At the same time, the urban network has broken the original single radiation structure of Chongqing and Chengdu, and the secondary radiation nodes such as Nanchong, Yibin, Mianyang and Luzhou have appeared, especially the upgrading of Yibin and Luzhou, which has expanded the whole network from the original "triangle" to the "diamond" type, and the development of secondary nodes is no longer affected. Because of the hierarchical system, future planning cities should focus on building their own links with foreign cities, and not restrict themselves by traditional planning languages such as administrative boundaries, metropolitan boundaries and axle belts, so as to carry out multi-regional cooperation and free circulation of flow elements.

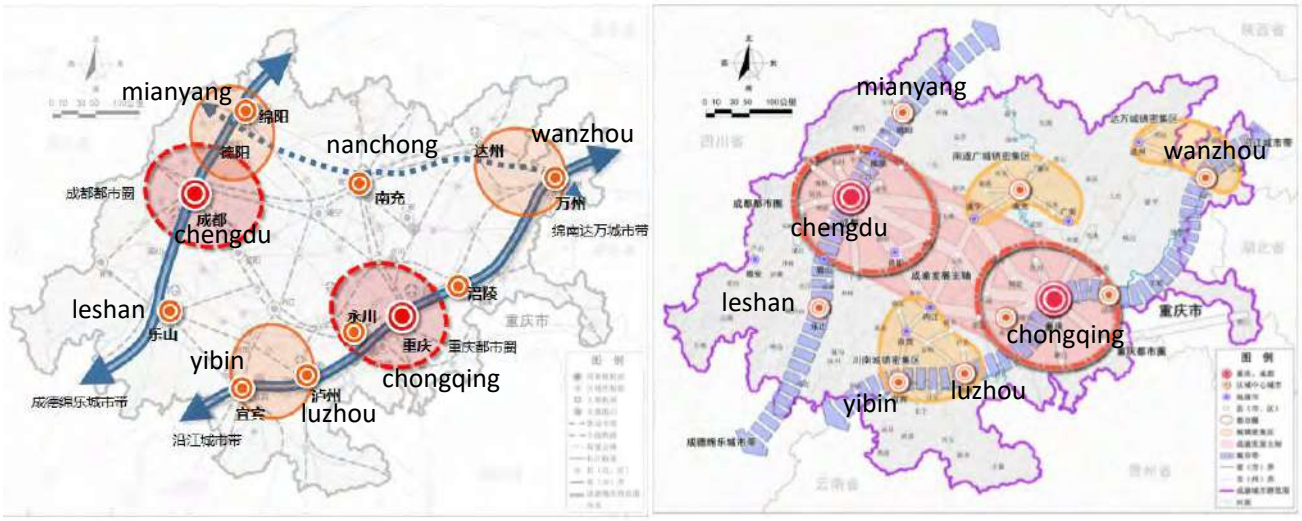


Figure 6 Image example_ISOCARP logo

6. References

[1] Castells M. The rise of network society[M]. Oxford: Blackwell, 1996.

[2] Derudder B, Witlox F. An appraisal of the use of airline data in assessing the world city network: a research note on data[J]. Ur- ban Studies,2005,42(13):2 371 — 2 388.

[3] Taylor P J. World City Network: A Global Urban Analysis[M].London : Routledge , 2004.

[4] Tang,Zilai;Zhao,Miaoxi(2010)“Evolution of Urban System in Yangtze River Delta Region from the Perspective of Economic Globalization: Analysis Method of Linkage Network and Value Section”， Urban Planning Forum， No. 1.

[5] Li,Tao;Cheng,Yao;Zhang,Yina（2017）“Theory, Method and Practice of Urban Network Research”， Urban Planning Forum，No. 6.

[6] Xiong,Lifang;Zhen,feng;Wang,Bo（2013）“Research on Urban Network Characteristics of Yangtze River Delta Core Area Based on Baidu Index”， Economic Geography， Vol. 33 No. 7.

[7] Xiong,Lifang;Zheng,feng;Xi,Guangliang （2014） “Characteristics of urban network changes in China's three major economic zones: An Empirical Study Based on Baidu's information flow”， Tropical Geography， Vol. 34 No. 1.

[8] Ming,Feng;Gao,Feng （2007） “Spatial Logic of Network: Explaining the Change of World Urban System in the Information Age”， International Urban Planning， Vol. 22 No. 2.

[9] Wu,Changyan;Huang,Xianjing （2017） “Economic Connection Space and Economic Integration Trend of the Yangtze River Economic Belt”， Economic Geography， Vol. 37 No. 7.

[10] Li， Zhengrong;Xu,Dengyao （2018） “Analysis of Urban Network Structural Characteristics and Organization Modes from the Perspective of Flow Space: Based on the Comparison of Traffic Flow and Information Flow in Chengdu-Chongqing Urban Agglomeration”， Economic Forum，Vol. 577 No. 8.

Research Paper

The Spectrum of Metropolitan Areas across the World, and Detection of Potential Metropolitan Areas with Chinese Characteristics

Qing LU, Peking University; China
Liyan XU, Peking University; China
Zhen CAI, Urban Space Planning and Architectural Design CO., LTD; China
Xiao PENG, Peking University; China

Abstract

When people talk about the Metropolitan Area (MA), they mean differently in different parts of the world with different contexts. Based on its spatial extent, internal structure, socio-economic function, and network characteristics, an MA can refer to various entities from a metropolis to a Megacity-region. In an effort to clarify the MA concept, we review the origin of the MA concept and its development in various parts of the world, especially the United States, Japan and China, so as to propose a spectrum of MAs, and their relationship with specific human and natural geographical contexts. Particularly, we find MAs in China typically have a unique three-circle structure, which is composed of a core circle, a commuting circle, and a functional metropolitan circle. By international comparable standards which include factors such as population density, facility density, and economic activity intensity, and adjusted with reasonable context-dependent considerations in China, the three circles are designated as follows: the spatial extent with the highest development intensity and assuming a central regional role is identified as the core circle; the districts and counties around the core circle with a commuting rate greater than 10% are identified as the commuting circle; and the districts and counties within an one-hour accessible zone are identified as the functional metropolitan circle. To test the model, we utilize eight sources of big data covering ecological background, population, economy, transportation, real estate, land use, infrastructure, and culture characteristics, and with a fusion analysis of the data we show how the factors combined give rise to the three-circle structure in typical Chinese MAs, and why the combination of the same factors in the US and Japanese contexts works otherwise to fill different niches in the spectrum of MAs mentioned above. For a further inquiry, within the framework of the same model and using the same dataset, we identify 32 cities from all 338 prefecture-level cities in China that would qualify as an MA or potential MA, which we call "the Metropolitan Areas with Chinese Characteristics", and designate the spatial extent of the three circles within each of the MAs. Additional analyses are also conducted to locate the main development corridors, key growth poles, and currently underdeveloped regions in each of the MAs. We conclude the paper with discussions of potential challenges of MA development in China vis-a-vis current policies, such as cross-administration collaboration between jurisdictions within the same MA, and cross-scale collaboration between MAs, cities, and city groups. Placing the research in the global context, and considering the vast similarities between China and other developing countries in terms of population density, land resources, urbanization

level, and socio-economic development status in general, we argue that China's model of MAs may be also applicable to other developing countries. Therefore, this research may shed lights to planning researchers and practitioners around the world, especially in developing countries in understanding the development conditions of MAs in their own contexts, and also in methods for identifying and planning potential MAs to achieve their specific policy objectives.

Keywords

Metropolitan Area, Spatial Planning, Geospatial Information Systems, Big Data

1. Introduction

1.1. Metropolitan area concepts

Metropolitan area is a complex spatial system. Urban geography, population geography and urban planning provide theoretical support for summarizing the development of the metropolitan area from the perspective of regional differences and spatial structure evolution. In 1961, Jean Gottman first mentioned the concept of "Megalopolis" in the book " Megalopolis: the urbanized northeastern seaboard of the United States ", which refers to the phenomenon of urbanization in the northeastern United States (Gottman,1961). The first naming of the phenomenon, that is, a central city or a few large cities that play a central role, plus an urban economic region surrounded by areas with strong connection from the central city (Gottman,1957; 1978). In the 1950s, Japanese scholars proposed the concept of "Toshiken" and applied it to regional urban planning (Tomita,1975). In 1951, the Japanese scholar Kiuchi Shinzo proposed that the metropolitan area should be composed of three parts: the central area, the surrounding area of the city and the vast hinterland of the suburbs by studying the cross-sectional changes and regional structure of urban population increase and decrease (Kiuchi,1954). His ideas were further developed into the metropolitan area concept of Japan, and as one of the important spatial organization characteristics of Japan, western countries and other urban areas. The definition of the metropolitan area in Japan basically refers to the American standards, and then sets various metrics according to the specific national conditions such as the population and area of Japan (Kanemoto,2002). Because China and Japan belong to the East Asian Chinese character culture circle, Japan's theoretical exploration and successful practice in the metropolitan area has been widely quoted in China. Chinese scholars, including Yixing zhou, Shimou Yao, Chaolin Gu, Chuanqing Wu, etc., began to study the concept of urban agglomeration (Zhou,1986; Yao,2005; Gu,1994). There is never a unified academic definition about metropolitan area. However, most definitions indicate that the metropolitan area is an interconnected whole formed by cities of different grades, types and sizes, with the help of regional transportation networks. Combining the existing concepts of metropolitan area, metropolitan area in this paper is defined as a region consisting of a densely populated urban core and its less-populated surrounding territories, sharing industry, infrastructure, and housing. This definition highlights the dominant position of the central city, the close relationship between the internal social economy and the boundary of the economic development of the circle.

1.2. Criteria of metropolitan area

The New York metropolitan area is a geographic unit defined by the US Bureau of Statistics （NY-NJ-PA Metropolitan Statistical Area）. A core-based statistical area (CBSA) is a U.S. geographic area defined by the Office of Management and Budget (OMB) that consists of one or more counties (or equivalents) anchored by an urban center of at least 10,000 people plus adjacent counties that are socioeconomically tied to the urban center by commuting (Vicino,2007; Luo,2007). The standards of urban areas and non-urban areas are according to different national conditions . Japan refers to urban areas as “Shigaichi”, an area with a population density of not less than 4,000 people per square kilometre (Sorensen,1999). People have a tolerance for the length of commuting time, so the long axis radius of the metropolitan area is stable around 50 kilometers, that is, the size of the commuting circle determines the size of the metropolitan area. In the 1950s, the Japanese Administrative Office defined the metropolitan area as: a one-day cycle that can accept the geographical scope of a functional service in a certain aspect of the city (the population must be more than 100,000). The metropolitan area is the spatial scope that is closely related to the various regions formed by the city when it exerts its functions. It is usually measured by logistics, people flow, economic flow, information flow, etc. And the city's own external control ability and economy radiation capacity is also an important measure of metropolitan area. The Japanese Administrative Office revised the concept of the metropolitan area in 1960, and defined the commuting population in the central city and the periphery, and the logistics traffic volume in the metropolitan area. It pointed out that the metropolitan area is centered on the designated city of the central government. An area consisting of one or two or three mega-central cities with a population of more than 2 million and a number of neighboring cities with more than 500,000. The commuting rate from the peripheral area to the central city is not less than 15% of the population, and the amount of material transportation between metropolitan areas cannot exceed 25% of the total transportation volume(Qiu,2009). The commuting rate from central cities and peripheral cities largely reflects the economic, transportation and other links between metropolitan area.

2. Metropolitan area identification

2.1. Research objects

In this study, 32 major cities (excluding Hong Kong, Macao and Taiwan) were selected as research objects, 31 of which were located in the east of Heihe-Tengchong Line, including 4 municipalities (Beijing, Shanghai, Tianjin, Chongqing), 5 cities with separate plans (Shenzhen, Dalian, Qingdao, Ningbo, Xiamen) and 10 sub-provincial cities (Guangzhou, Nanjing, Hangzhou, Wuhan, Chengdu, Xi'an, Harbin, Changchun, Shenyang, Jinan), 12 provincial capital cities (Zhengzhou, Hefei, Changsha, Kunming, Nanchang, Nanning, Taiyuan, Guiyang, Fuzhou, Shijiazhuang, Haikou, Urumqi) and a prefecture-level city (Suzhou). We conduct in-depth research on the national metropolitan area, judge its development stage, and fully grasp the development of China's metropolitan area, and establish a methodology for the identification and scope of metropolitan areas.

2.2. Data source

Sources of this research data include national and local statistics(2013,2015,2017), China Unicom's “smart step” mobile phone signaling data(2018), AMAP point of interest(POI)

data(2018), DMSP/OLS remote sensing lighting data(2015), remote sensing image data(2018), and official website of local government.

2.3. Metropolitan area identification method

According to the factors such as population density, facility space density, and economic production activity intensity, the spatial unit with the highest development intensity in the region and taking the central function in the region is identified as the core circle. The determination process of the core area is as follows: (1)Assign multisource data to the kilometer grid. (2)Extract weighted scores greater than 15 points as the base layer after normalized processing of different kinds of data. (3)Screen the township street data to obtain the initial boundary of the core circle, and then use the light index data which can reflect the concentration level of economic activities to complete the boundary check. Extract the area where the light index value is greater than a certain threshold, and combine it with the initial boundary of the core area. And then get the boundary urban core circle of metropolitan area.

The urban circle is a spatial unit that is closely related to the core area in the region, and the commuting level that can directly reflect the degree of contact in different regions is selected as an indicator. Based on AMAP map commuting data, take the districts and counties around the core area as the basic unit. And the district or county units with the commuting rate to the core area greater than 10% are identified as the urban circle of the metropolitan area.

The metropolitan circle is a spatial unit that is closely related to the urban area within the region. It is also based on the commuting rate to realize the identification of the metropolitan area. Based on AMAP map commute data, calculate the commuting rate of districts and counties around the urban circle. Extract the district and county units with core circle and urban circle commuting rate greater than 1% as metropolitan circle. So far, the scope of the metropolitan area has been formed by the core circle layer, the urban circle layer, and the metropolitan circle layer.

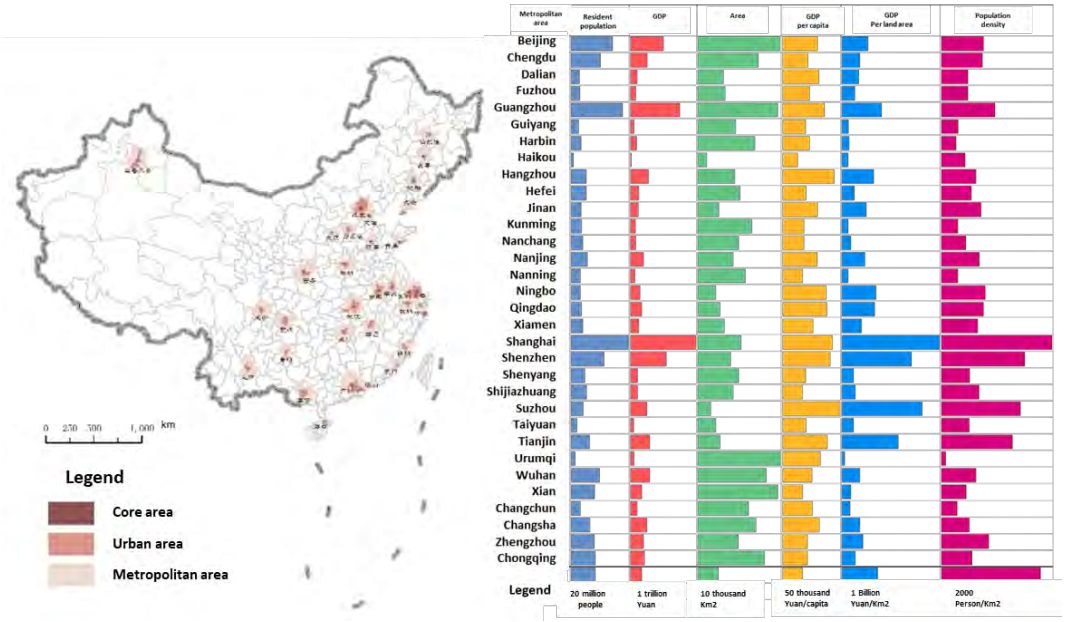


Figure 1 Diagram of 32 metropolitan areas in China and statistical results of basic data

3. Spatial Logic of China's Metropolitan Area Evolution

" Core-Near-Area-Node" : The evolution Process of the spatial structure of the metropolitan area

Based on the development cases of large cities and their surrounding areas at home and abroad, and combined with the researches in fields like urban and geographic science, it can be found that the spatial development of metropolitan area will focus on the core part of metropolitan area, the node cities near the core part, and the important node cities in the wide area. Experiences from the development process of foreign metropolitan areas reveal that the formation of metropolitan areas has obvious characteristics of stages, often going through the process of "single-center agglomeration- diffusion near the center- diffusion in the wide area- diffusion in a network way" (Fang,2009). At first, the spatial development of metropolitan area will go through the absolute concentration stage, that is, the rapid development of the core area, the rapid growth of population in the urban center, and the aggregation of peripheral resources and population to the core, which could be concluded as "single-center aggregation" in spatial. As core cities' economic development, metropolitan areas will enter the stage of " diffusion near the center ", characterized as the stable development of core circles and industrial transformation and separation of employment and residence. Industry and population will also spread to the suburbs of cities in spatial, thus foster the rapid development of the areas near the metropolitan areas (Dong,2005). After that, "diffusion in the wide area " as the residential functions and economic activities spreading to more peripheral areas along transport trunks and rivers, will appear in the metropolitan area. With the gradual integration of industry and city along the main corridors of some node cities, the city develops from a single-function city to a comprehensive-

function city. The functions of the region are more sound through the form of new industrial new towns, thus the region evolves into a more advanced "multi-center network" structure.

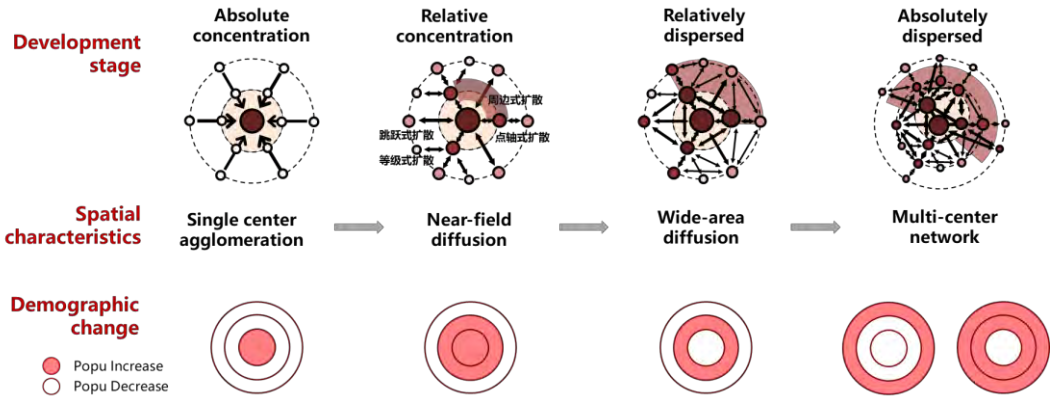


Figure 2 Metropolitan space development stage model

Metropolitan areas of Beijing, Chengdu and Guiyang are chosen comparing cases by observing night-light maps. It could be found that, the core part of Beijing and the adjacent metropolitan areas have a higher development level, and the important node cities along Jing-Ha, Jing-Jin, Jing-Bao, Da-Guang and other high-speed corridors also have higher development levels, such as Guan. For Chengdu metropolitan area, the development center is the adjacent area near the core city circle, such as the new area of Tianfu. A few node cities along the development corridor have begun to develop rapidly in the meantime. Guiyang metropolitan area is in the initial stage of core circle development without significant expansion, which has an impact on the peripheral areas.

Table 2 Characteristics of different types of metropolitan areas in China

Type	Core area scale	Radius	Area	Typical metropolitan area
Developed metropolitan area	>1000km^2	120-150km	40-50thound km^2	Beijing metropolitan area
Mature metropolitan area	500-800km^2	80-100km	2-3.5thound km^2	Chengdu metropolitan area
Developing metropolitan area	200-300km^2	50-80km	1.5-2.5thound km^2	Guiyang metropolitan area

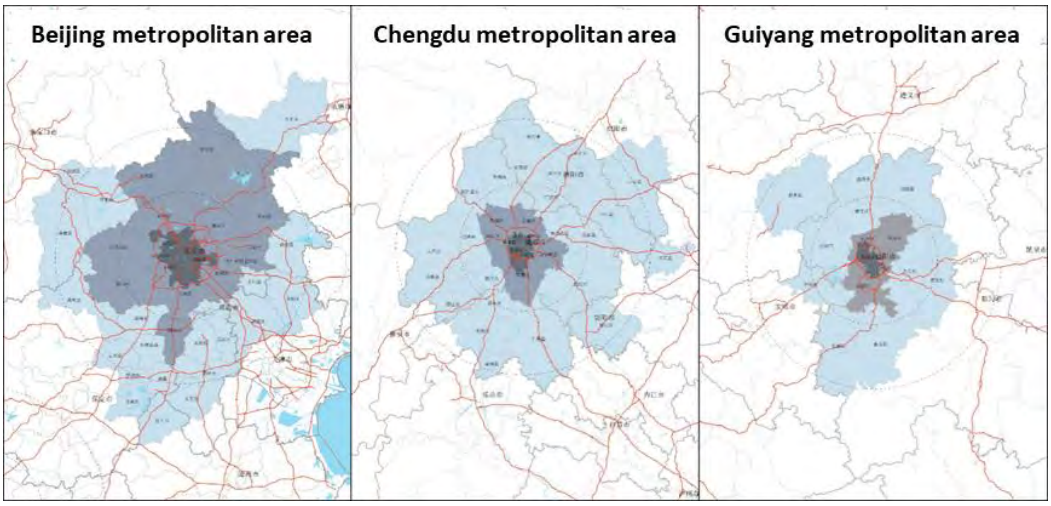


Figure 3 Diagram of Beijing, Chengdu and Guiyang metropolitan areas

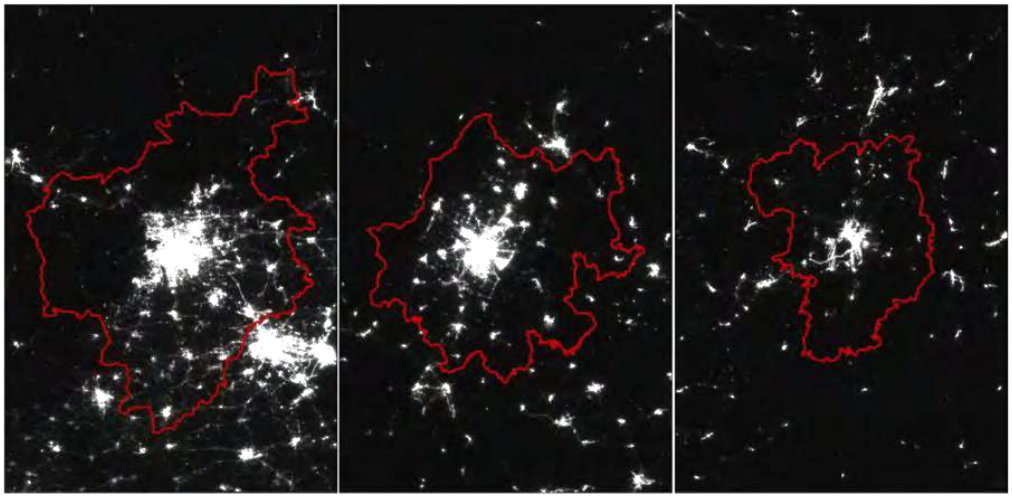


Figure 4 Night lighting index map of Beijing, Chengdu and Guiyang metropolitan areas

4. Spatial components of the metropolitan area structure

Metropolitan areas in China are mainly in the stage of the single-center formation, and influences on the peripheral regions are gradually increasing. Based on the relevant researches at home and abroad, the basic components of metropolitan area can be summarized as the following five items:

1 Strong nucleus: The central area of a large city with a large population and developed economy is the core support of the metropolitan area. Normally, the nucleus radius ranges from 15 km to 20 km. The population is highly concentrated, and the population density is more than 10,000 people/km2. The leading industry is high-end service industry, which has a strong comprehensive service function.

2 Radiation circle: The circle area composed of several surrounding towns located in the radiation region of the central area is the vast hinterland of supporting the development of core cities. The area is determined by the 1-hour commuting circle, with a radius of 50-80

km and an area about 120,000 km2. The minimum population density in the region is about 1,000 people/km2.

3 Expansion axis: The expansion of metropolitan area is not uniform, but forming the development axis connecting the central area and surrounding towns along the traffic corridors, which constitutes the development artery of the metropolitan area.

4 Key points: The node towns which play key roles in the hinterland of metropolitan area are the new growth poles supporting the high-quality development of metropolitan area.

5 Close network: Elements such as human flow, material flow and information flow between different cities form the close network in the metropolitan area. And the network guarantees integration development of metropolitan area essentially.

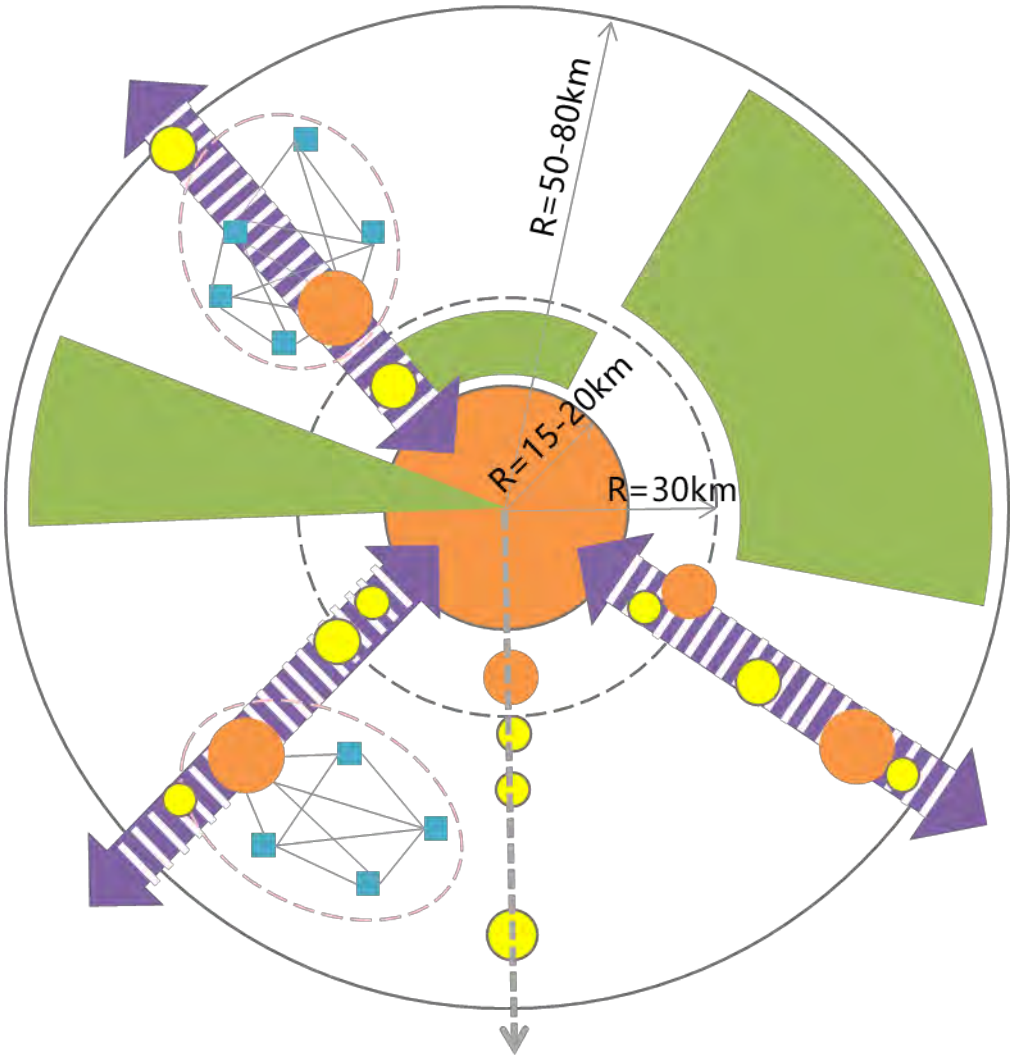


Figure 5 Metropolitan area structure model

5. Spatial development characteristics of metropolitan areas in China

Based on above components, the spatial development characteristics of metropolitan area can be summarized as the following four aspects:

1 The strong and sustained center city is the basis and guarantee for metropolitan area development and gradual maturation. In China's urban system, the basic condition for the formation of metropolitan area is the density of population in core city more than 10,000/km2. However, the "big city disease" will become prominent when the population density is more than 20,000/km2. It is necessary to promote the healthy development of the metropolitan area by means of regional coordination.

2 Limit commuting time exists, and "one-hour commuting circle" is the boundary of the hinterland of metropolitan circle. Under the current residence-employment conditions, the maximum commuting time that residents can accept is 45 minutes to 1 hour. That is to say, the scope of "one-hour commuter circle" often determines the maximum radial distance from the center to the edge of a metropolitan area. Most of the new towns in the London metropolitan area are located within the 50 km circle, The towns in the Paris metropolitan area are also mainly within the 50 km circle, while the radius of the whole metropolitan area is about 80 km.

3 Relying on the main corridors, the core circle and the outer circle are closely related by population, transportation and economy. Within the metropolitan area, most of the traffic links through expressways and rail transits, supporting the higher commuting rate from the outer circle to the core circle. Based on the good-condition corridors, direct investment activities are happened closely among the cities, and division of labor and cooperation among the cities in the metropolitan area are also promoted efficiently and orderly.

4 The coordination of the ecological pattern and the protection of resources in the metropolitan area should be emphasized. And high-quality development of the metropolitan area could not be separated from the sustained advancement of the construction of ecological civilization. In recent years, regional and watershed-scale environmental problems have replaced single and individual environmental events, and become the main factors constraining the conversions to a high-quality stage of China's developed areas. Establishing a reasonable and organized regional eco-spatial system through regional coordination, integrating economic and social developments, are necessary conditions for the healthy and sustainable development of metropolitan area.

6. References

Dong, Xiaofeng; SHI, Yulong (2005) “A Study on the Development of the Metropolitan Region”, Advances in Earth Science, Vol.20 No.10.

Fang, Chuangin (2009) “Progress and General Definition about Identification Standards of Urban Agglomeration Space”, Urban Planning Forum, No.4.

Gottman, Jean (1957) “Megalopolis, or the Urbanization of the Northeastern Seaboard”, Economic Geography, Vol. 33 No. 3.

Gottman, Jean (1961) Megalopolis: the urbanized northeastern seaboard of the United States, Boston, USA, M.I.T. Press.

Gottman, Jean (1978) Megalopolitan System Around the World , Systems of Cities, Oxford, USA, Oxford University Press.

Gu, Chaolin (1994) "Metropolitan Spatial Growth Patterns in China", Urban Planning, No.6.

Kanemoto, Toshitsugu; Tokuoka, Kazuyuki (2002) "Metropolitan Area Definitions in Japan", Applied Geography Study, No.7.

Kiuchi, Shinzo (1954) "Urban Concentration? or Regional Decentralization? in the Future Japanese Population Problems: An Example from Noto Peninsula, Ishikawa Prefecture", Japanese Journal of Human Geography, Vol.6 No.1.

Luo, HH (2007) "Study on Space Correlation Degree Between the Border Belt and Core Area of the Continuous Area of Metropolis-Jinhua City as an Example", Urban Studies, Vol.14 No.5.

Qiu, F D; Tong, L J; Zhu, C G (2009) "Spatio-temporal Pattern and Driving Mechanism of Economic Development Discrepancy in Provincial Border Regions: A Case Study of Huaihai Economic Zone", Geographical Research, Vol.28 No.2.

Sorensen, Andre (1999) "Land Readjustment,Urban Planning and Urban Sprawl in the Tokyo Metropolitan Area", Urban Studies, Vol.36 No.13.

Tomita, Kazuaki (1975) "Changing Patterns of Population and Industries in the Metropolitan Area of Japan", Geographical Review of Japan, Vol. 48 No. 5.

Vicino, Thomas; Hanlon Bernadette; Rennie John (2007) "Megalopolis 50 Years On:The Transformation of a City Region", International Journal of Urban and Regional Research, Vol. 31 No.2.

Yao, Shimou (2005) "On Urban Regional Spatial Planning and Construction in Large Cities of China", Economic Geography, Vol.25 No.2.

Zhou, Yixing (1986) "The Advice About Defining the Conception of Urban and Statistic Caliber of Urban Population", Urban Planning, No.3.

Case Study Paper

How to Define the Boundaries of Metropolitan Areas:

Case Study of Wuhan, China

Wenjing LUO, Wuhan Planning & Design Institute; China

Li XU, Wuhan Planning & Design Institute; China

Yunming GENG, Wuhan Planning & Design Institute; China

Abstract

To plan ahead for an efficient and smart growth, this paper explores the methodology of defining the boundaries for metropolitan areas. Using Wuhan as a megacity in Central China with a population of more than 10 billion as an example, this paper attempts to set up an analytical framework to define the boundary of metropolitan areas by quantitative analysis on urbanization, geography, transport, economics and qualitative analysis on ecological, spatial and cultural aspects.

Keywords

Urban boundary, Metropolitan areas, Megacities, Wuhan, China

1. Introduction

To plan ahead for a smart growth of urban clusters and megacities, there has been a trend of developing metropolitan areas for megacities in China, which considers defining the boundaries of metropolitan areas as the basis and premise. Defining a city boundary has already been a challenge for urban planners and geographers let alone metropolitan areas considering their cross-bordering characters. Where do metropolitan areas start and end? Is there a continuum of rural and urban land uses to define them? If is, what kinds of factors are the boundaries of metropolitan areas relevant to? Based on literature reviews and case studies, this paper explores the methodology of defining the boundaries of metropolitan areas by the case study of Wuhan, China.

With a population of more than 10 million, Wuhan has already become a megacity in terms of its population, economic development and regional roles in Central China. Along with the paced-up city expansion, Wuhan has moved into the stage of regional collaboration with the goals towards a more competitive and liveable metropolitan area in smart growths. However, the role of metropolitan areas is missing in the case of Wuhan. Compared to megacities home and abroad, the scale of Wuhan municipality and Wuhan clusters, which also include 6 cities surrounding it, is too small and too big to be defined as a metropolitan area. To plan ahead for a more efficient and sustainable megacity, it is necessary to define the boundary of Wuhan metropolitan area.

The reminder of the paper is structured as follows. The next section provides an understanding of metropolitan areas and the methodologies of defining their boundaries based on literature review and case studies. The third section focuses on Wuhan contexts and discusses the current development stage of Wuhan as well as its relations with the surrounding areas. Based on the trends of regional cooperation, it is necessary to define the metropolitan area between the municipality and urban cluster. Following this, the next section attempts to define the boundary of Wuhan metropolitan area in dimensions of its urbanization, geography, transit, economics, ecology, psychology and culture. First, layers of analysis on urbanization rates, economic relations and traffic commutes have been overlapped so as to define a rough boundary of Wuhan metropolitan. Then, ecological and cultural factors have been made to check and adjust the boundary. Last but not least, further investigation has been made to correct and adjust the boundary by considering the local cultural and phycological factors. The conclusion has been made that the methodology of defining the boundaries by the case study of Wuhan could be also applied to other metropolitan areas.

2. Literature Review

The research on metropolitan areas initiated at an early age. It was in 1910 the concept of metropolitan area first brought up in the USA. After the World War Ⅱ, metropolitan areas have become a new model of urban structures with the rapid development of economics. In the middle ages of 20th century, the concept of metropolitan area has been elaborated in Tokyo and large amounts of new town practices have been carried out in Britain. It was in the 1980s that the new town theories and the concept of metropolitan area have been brought in China influenced greatly by the former Soviet urban planning ideas. In 1993, the concept of metropolitan area has been brought up in Shanghai, which initiated a series of research on metropolitan areas and new towns in China. However, the existing literature focuses mostly on the understanding of metropolitan areas but not on the methodology of defining their boundaries, which can be referenced in practices.

2.1. Metropolitan Areas

In the Tokyo Plan 1960, the concept of metropolitan area was brought up, indicating an area including the central city with the population of more than one million surrounding by towns with over half a million residents. The central city, well connected with towns by highways in a radius of 50 kilometres, would attract more than 10 percent of its population from its surrounding towns, with the commuting time of 1 hour to 2 hours. In 1990, Kenneth Fox has formally established the concept of metropolitan area based on the research of Jean Gottmann. It implies that the central city with more than 50 thousand residents are surrounding with central towns and peripheral towns, with the population density more than 50 people per square miles and the increase percent more than 15 percent every 10 years. At least 15 percent of the non-agriculture labours of the peripheral towns, which should take account for more than 70% of the whole towns, would commute to central towns or 20% of the non-agriculture labours would commute back and forth. On this basis, the metropolitan area can be defined as central cities and their surrounding towns, with frequent commutes and convenient transits, which usually take 1 or 2 hours.

Based on the practices, metropolitan areas consist of central cities and their surrounding towns, the scale of which is between cities and urban agglomeration. Within the metropolitan area, central cities and their surrounding towns have been working closely with each other with between 10 and 20 percent residents commuting in between at a distance ranging from 60 to 80 kilometres. London, as an example, can be used to better understand the spatial scale of metropolitan areas and their function structure. The metropolitan area of London covers an area of 12109 square kilometres at a radius of about 60 kilometres centring at the city London covering an area of 1580 square kilometres, which has been defined by the commuting distance. With the cities and towns in the east, London metropolitan area have developed as an urban agglomeration area or megalopolis, covering an area 39 thousand square kilometres. The metropolitan area of London includes 8 new towns surrounding the city of London, working closely with each other with different functions. Some are mainly residential like Wokingham, while some are dominated by commercial and administrative functions like Crawley Town and some are famous as university towns like Reading. The frequent commutes between London and its surrounding towns like Crawley and Kent have relieved the overpopulation of London city and also increase the population of periphery areas. Tokyo metropolitan area, as another example, consists of the city Tokyo as the political, administrative, financial, informative, economic and cultural centre and towns with specific functions like educations and port industries. In 2008, a commuting circle has been formed between the city Tokyo and its surrounding towns, from which residents come to the central city for work or school above the age of 15 and accounting for more than 10 percent of the whole population. Based on this, metropolitan areas, exemplified by these cases, can be considered as units made up of central cities and their surrounding towns between urban municipality and urban clusters. Within the radius of between 60 and 80 kilometres, the central cities and their surrounding towns with between 10% and 20% of their residents commuting to central cities have been working closely with each other.

2.2. The Boundaries of Metropolitan Areas

The practices of defining the boundaries of metropolitan areas can be reviewed based on the examples of New York, London, Paris, Tokyo, Shanghai and Beijing. In the cases of New York, the boundaries of the metropolitan area have been defined at a radius of 60 kilometres centred at New York city. Made up of the central city and 26 counties from 3 states, the metropolitan area of New York covers an area of 32 thousand kilometres with the population of 178 million. Also at a radius of between 60 and 80 kilometres from the centre, the metropolitan area of Paris covers an area of 120 thousand kilometres with the population of 11 million. Similar to the radiuses of the previous two cases, the metropolitan area of Tokyo, consisting of Tokyo city, Kanagawa-Ken, Saitama-arena and Chiba-ken, has an area of 134 hundred square kilometres and a population of 36 million. At a larger scale, the metropolitan area of Beijing has a radius of 90 kilometres and an area of 27 thousand square kilometres including Beijing city and 9 towns in its surrounding area. With a much bigger radius of 120 kilometres, the metropolitan area of Shanghai consists the central city and its surrounding 6 towns, taking up almost 30 thousand square kilometres. The methodologies of defining the boundaries of the metropolitan area of Shanghai is based both on quantitative and qualitative analysis. The towns not only within the 90-minite travelling distance but also with closer economic connections, more frequent transits and more similar culture identities can be included in the metropolitan area of Shanghai.

Based on the literature reviews, the methodologies of defining the boundaries of metropolitan area focuses more on quantitative analysis with the indexes of populations, coverages, economic development, commutes and etc. It has been proposed that towns adjacent to central cities with the non-agriculture population of more than 200 thousand, non-agriculture products taking up more than three fourths of GDP and non-agriculture economic activities taking up more than 60 percent can be included into the metropolitan area(Zhou,2000). On this basis, a system of 14 indexes including economic development, traffic conditions, telecommunications, Gini coefficient, urban densities, capital ratios, industry location quotient index, coverage of built-up areas, growths of enterprises, commodity circulation, industry trophy, economic export-oriented degree, urbanization and industrialization level has been established (Fang, 2005). Meanwhile, it has been estimated that there could be about 20 metropolitan areas in the plains of China, which can cover an area of between 40 and 50 thousand square kilometres with a population of 50 million and a radius of 120 kilometres.

3. The Wuhan Contexts

As a geographic central megacity in China, the municipality of Wuhan covers an area of 8569 square kilometres with a population of about 11 million. Wuhan and its surrounding cities including Xiaogan, Hanchuan, Xiantao, Huanggang, Ezhou, Daye, Xianning and etc all make up the Wuhan cluster covering an area of 58 thousand square kilometres (see figure 1). Aimed to be one of the national centres, Wuhan has been proved to be at the very stage of urban agglomeration according to the statistics of its urban development. With the development of service industries, the proportion of which will increase and surpass the manufacturing industries, it is estimated that Wuhan will enter the stage of dispersed development and the era of post industries around 2030. It is also has been exemplified by the cases of megacities worldwide that their growth will bring about functional complementation across borders and regional corporations at different scales. Therefore, it is necessary for Wuhan to define different scale of areas to plan ahead for an efficient and sustainable megacity. However, the scale of Wuhan municipality and Wuhan clusters is either too small or too large to achieve spatial integration at the first step, in comparison with the cases of other megacities home and abroad (table 1). The case study of Tokyo and London has demonstrated that the metropolitan area, as a spatial scale between municipalities and urban clusters, can help with the regional cooperation based on the division of labours and the allocation of regional resources.

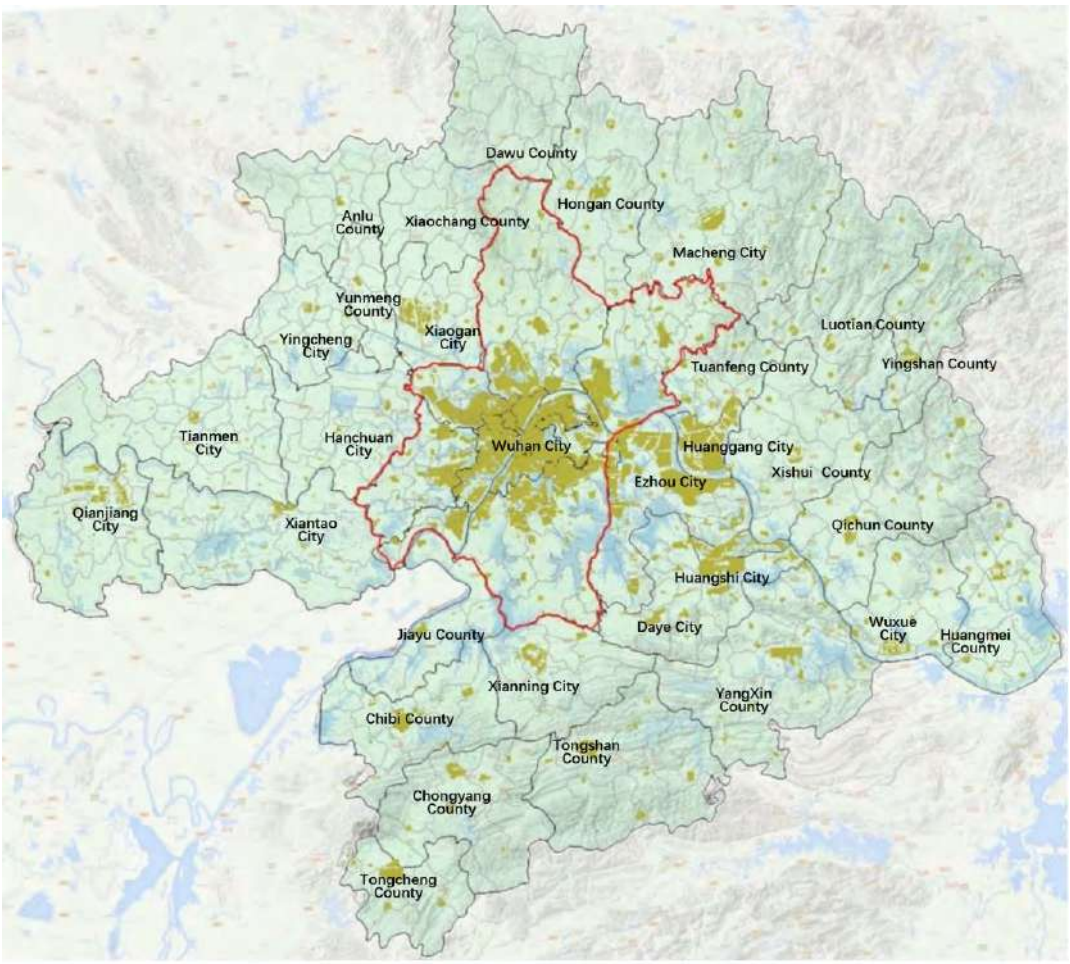


Figure 1 The Wuhan Cluster

Table 2 The Scale Comparison of Megacities Home and Abroad

Cites	The Areas of municipalities	The Areas of metropolitan areas	The Areas of Urban Clusters
Tokyo	2200km^2	13.4 thousand km^2	36.9 thousand km^2
London	1600km^2	11.4 thousand km^2	45 thousand km^2
Shanghai	6340km^2	17.1 thousand km^2	212 thousand km^2
Guangzhou	7434km^2	11.3 thousand km^2	56 thousand km^2
Wuhan	8569km^2	——	58 thousand km^2

On one hand, the cities and towns surrounding Wuhan have demonstrated the potential to share the responsibilities of Wuhan as a future national centre. With the Shunfeng Airport aimed to be the largest freight hub in the world located in the municipality of Ezhou adjacent to Wuhan, lots of logistics and e-commercial enterprises have been attracted to locate around. Besides, there are already industrial parks around Wuhan, which can help with the commercialization of science and technology research due to their abundant land resources and cheaper costs. Meanwhile, industrial parks in Wuhan have also found their partnerships in the surrounding areas, which has improved the efficiency of regional cooperation and the levels of urbanization. On the other hand, the fast-paced urbanization has made the built-up area of Wuhan expand out of its urban growth boundary, which there

is also a tendency that the adjacent cities are gradually expand to. With the regional cooperation between Wuhan and its neighbours, it is obvious to find urban agglomerations around the municipal borders, in the Wuhan-Xiaogan, Wuhan-Hanchuan and Wuhan-Ezhou adjacent areas. With the strong intention for more regional cooperation between local governments, there will be more resources to be allocated and more functions to be shared in a larger scale. For example, the neighbouring city Xianning and Ezhou intend to share tourism and manufacturing functions with Wuhan based on their resources.

Therefore, developing metropolitan areas, as universal law for megacities, is an important strategy for Wuhan to realize its goal as the national centre, a necessary step for Wuhan to achieve regional integration and an essential tool to plan ahead for an efficient and sustainable megacity. Based on the current development stage of Wuhan, it is necessary to define the metropolitan area between the municipality and urban cluster which have an average commuting distance of 40 and 150 kilometres respectfully.

4. Research Contents

Based on the literature review and case studies, according to the local conditions in Wuhan, the metropolitan area of Wuhan could be interpreted as an area with adjacent spaces, frequent communications, close economic connections and complementary functions. Thus, the methodologies of defining the boundaries of the metropolitan area should be based both on quantitative and qualitative analysis. Indexes like commuting distances, economic connections and population mobilities can be used to define a rough boundary of the metropolitan area. On this basis, the boundary can be checked and adjusted according to the ecological and cultural factors. The quantitative analysis will be conducted by GIS tools, which can spatialize the data of population, economics, industries and commutes so as to define the boundary. Data has been collected not only from relevant government departments of Wuhan and its six surrounding cities but also on internet like the immigration of inhabitants, railway and bus transits as well as the economic connections between headquarters and branch companies. Based on the literature reviews and case studies, not only quantitative analysis has been made on social and economic connections, but also qualitative analysis has been made in the ecological, spatial and cultural aspects.

4.1. Quantitative Analysis

（1）Analysis based on commuting distances

Based on the case studies, the areas within one-hour's driving distance could be included into the metropolitan areas. Thus, analysis has been made on the GIS platform to define the boundary of the areas within one-hour's drive by planned networks starting from the residential and business districts in the central city of Wuhan, which can be shown in the Figure 2. In addition, commuting by public transport has also been included. With the same method, the boundary of the areas within 30-minute's travel by train starting from the train stations in the central city of Wuhan has also been defined (Figure 3). On this basis, the areas in the above two boundaries have been combined to be included within the boundary of the Wuhan metropolitan area based on commuting distances, which includes 11 administrative unites surrounding Wuhan (Figure 4).

Figure 2 The Areas within One Hour's Drive from the Central city of Wuhan

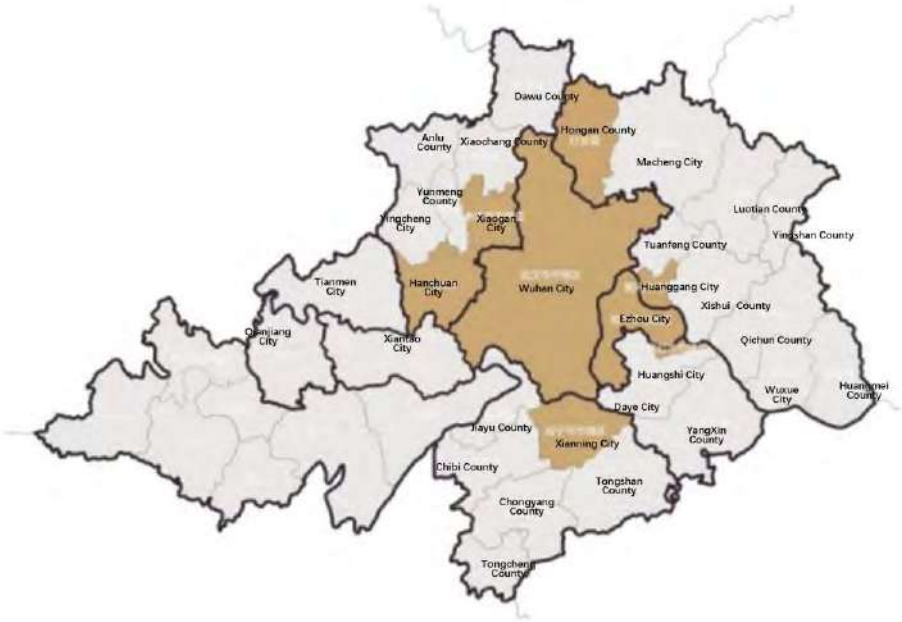


Figure 3 The Areas within 30-mintue Train from the Train Stations in Wuhan

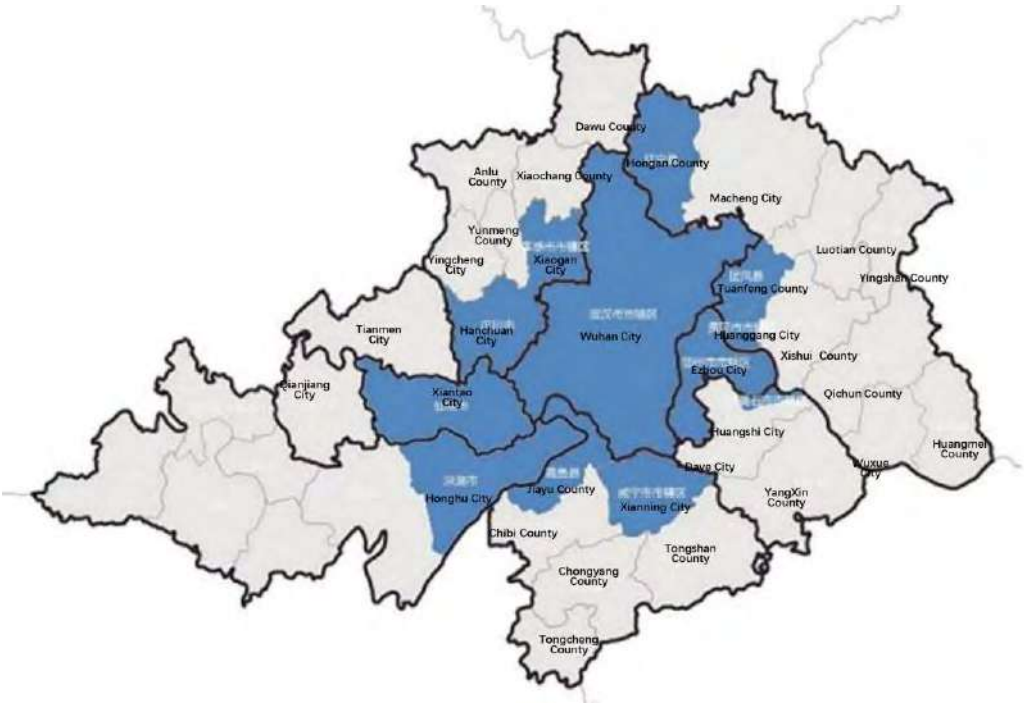


Figure 4 The Boundary of Wuhan Metropolitan Areas by Analysing Commuting Distances

(2）Analysis based on population mobilities

Population mobility can be measured not only by analyzing the statistics from governments but also by counting the timetable of buses and trains. On one hand, the numbers of in-migrants and out-migrants between Wuhan and its surrounding cities have been collected and the cities with the top numbers can be selected (Figure 5). On the other hand, analysis have been made on the timetable of intercity buses and trains between Wuhan municipality and its surrounding cities, which can define the cities with more train services to Wuhan ranking in the top (Figure 6 and 7). On this basis, the boundary of Wuhan metropolitan areas in the analysis based on population mobilities has been defined, which includes 8 administrative unites surrounding Wuhan (Figure 8).

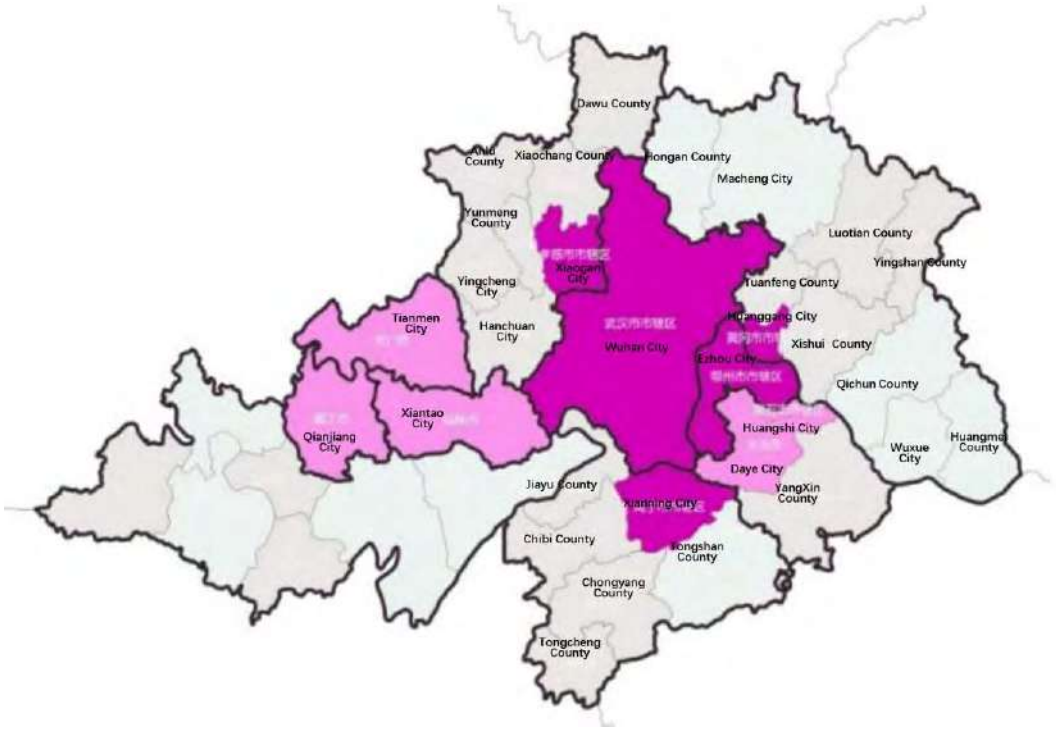


Figure 5 The Areas with More In-migrants and Out-migrants between Wuhan

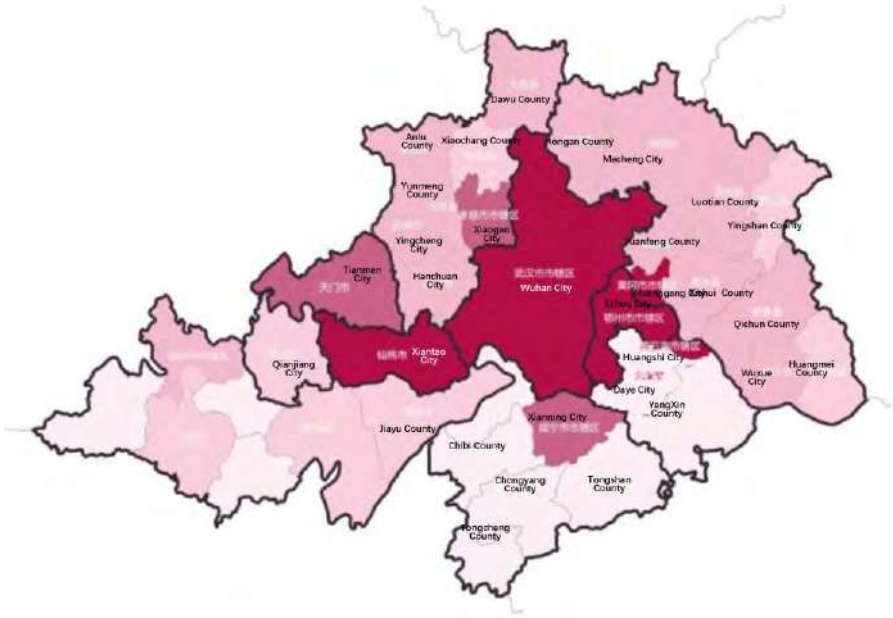


Figure 6 The Areas with Relatively More Intercity Bus Services between Wuhan

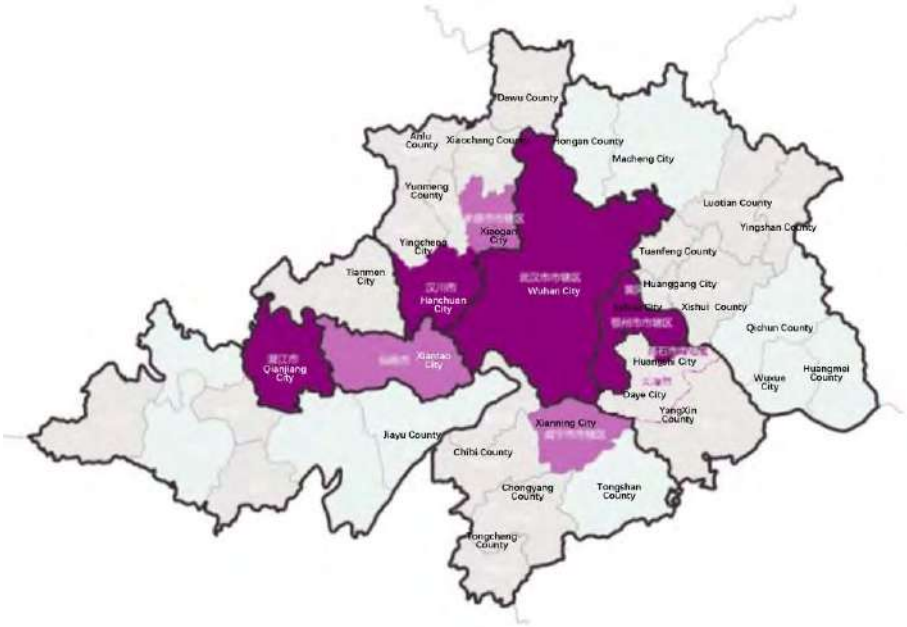


Figure 7 The Areas with Relatively More Intercity Train Services between Wuhan

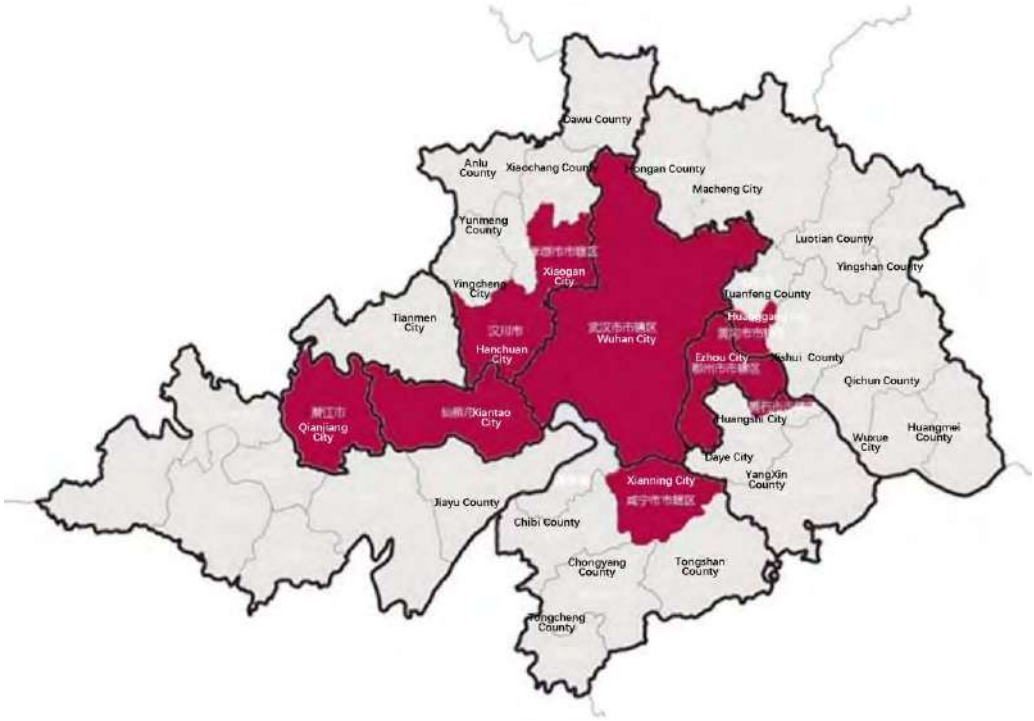


Figure 8 The Boundary of Wuhan Metropolitan Areas based on the Analysis of Population Mobility

(3) Analysis based on economic connections

Economic connections, although complicated and difficult to measure by several indexes, can be demonstrated by analysing the geographies of headquarters and their branch offices

as well as the investment statistics. First, the cities which locate more branches with their headquarters in Wuhan have been selected (Figure 9). Then, the cities with more investment by Wuhan can also been defined (Figure 10). In this way, the boundary of Wuhan metropolitan area by analysing economic connections can be defined, which includes 5 surrounding administrative units surrounding Wuhan (Figure 11).

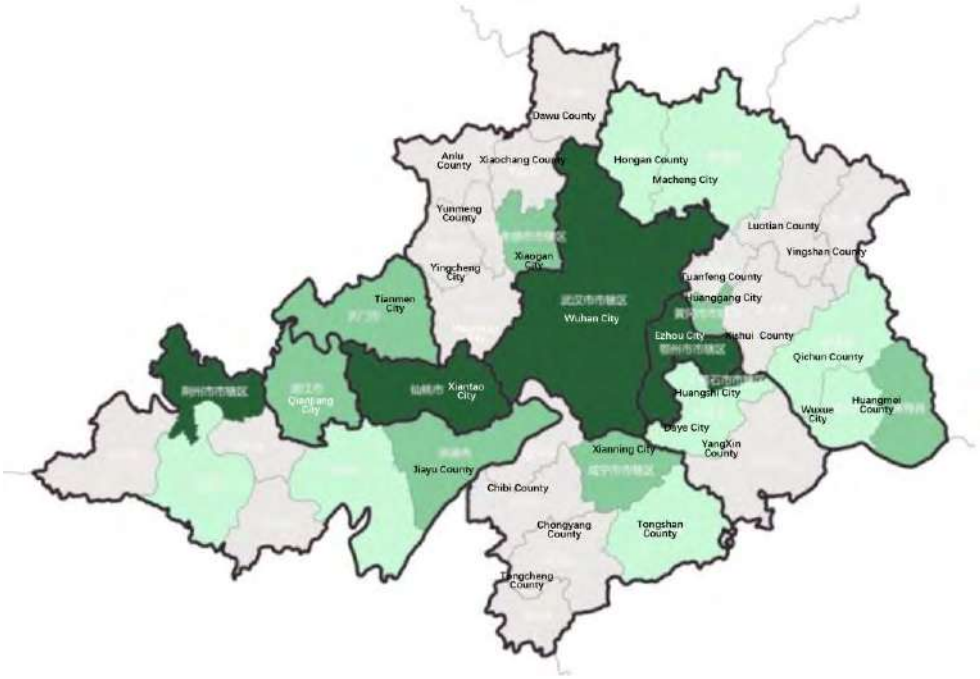


Figure 9 The Areas with More Headquarter-branch Connections

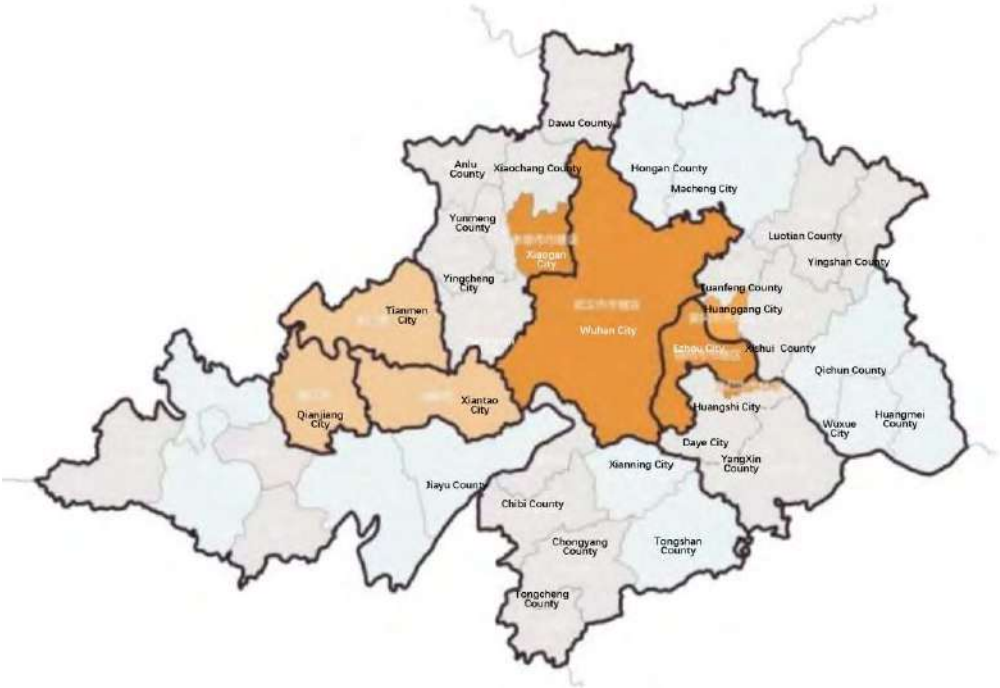


Figure 10 The Areas with More Investment Connections between Wuhan

Figure 11 The Boundary of Wuhan Metropolitan Areas by Economic Connections

Based on the analysis of commuting distances, population mobilities and economic connections, 13 cities surrounding Wuhan have been selected as the potential components of Wuhan metropolitan area. However, cities without meeting all the requirements of commuting distances, close economic connections and population mobilities have been excluded. Thus, the boundary of Wuhan metropolitan area has been defined based on quantitative analysis, which includes 7 cities surrounding Wuhan (Figure 12).

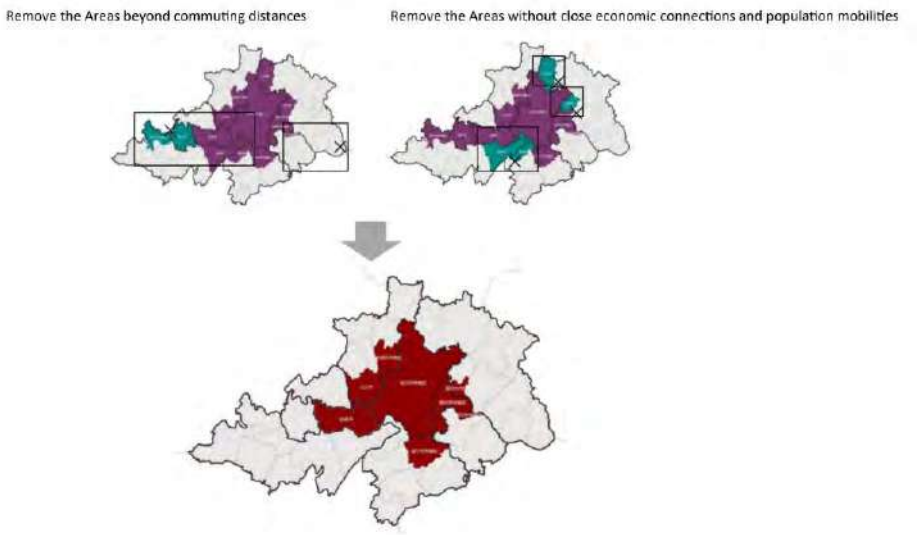


Figure 12 The Boundary of Wuhan Metropolitan Areas by Qualitative Analysis

4.2. Qualitative Analysis

To complement the quantitative analysis, ecological, cultural and spatial factors have been taken into consideration in the qualitative analysis.

(1) Analysis based on ecological resources

Ecological resources, as key elements to maintain regional sustainability, should be included into the boundary of metropolitan areas. In the cases of Wuhan, major ecological elements like forest parks, wetland parks and lakes have been taken into accounts which concern five cities surrounding Wuhan. Among the ecological elements, there are two lakes locating in the cross-bordering areas of Wuhan, Xianning and Ezhou, one of which is not only the alternative reservoir of Wuhan but also the one of best-maintained wetlands in Asia. In addition, ecological resources with tourism functions could also been included into the metropolitan area to complement the regional roles of central cities, which can increase the competitiveness as a whole (Figure 13). By analysing the attractiveness of existing tourist sites, hot touring spots concerning two administrative units should be included into the Wuhan metropolitan areas.

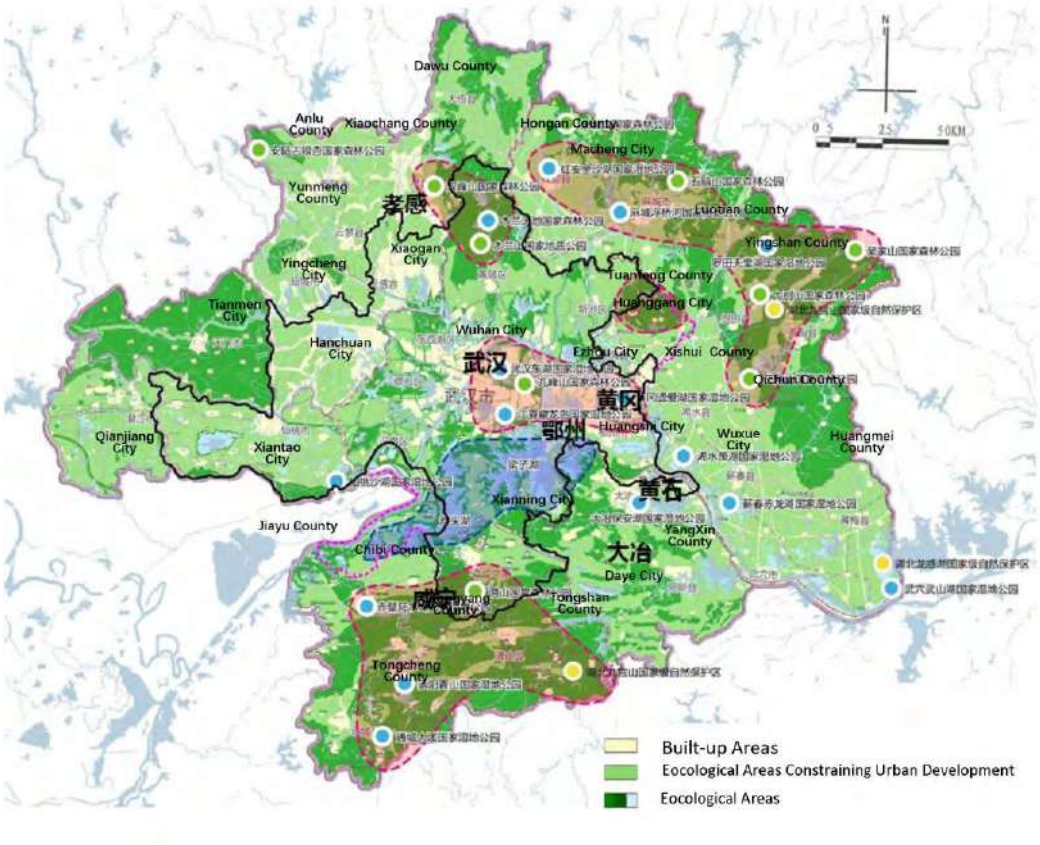


Figure 13 Analysis on Ecological Resources surrounding the Wuhan Municipal

(2) Analysis based on adjacent spaces

Although quantitative analysis based on commuting distances has taken the adjacent spaces into account but failed to pay attention to the functions. On one hand, there are some areas with similar functions like industrial parks adjacent to Wuhan, which have achieved mutual cooperation along with competitions and longed for regional integrations. On the other hand, it is obvious that Wuhan municipality has expanded to neighbouring areas as the early forms of urban agglomerations, like the bordering areas between Wuhan and Ezhou, Huangshi(Figure 14). Therefore, major infrastructures like airports and harbours which will

have great impact on regional integrations should also be included into the boundary of metropolitan areas. In the cases of Wuhan, one existing airport, two planned airports and five harbours have all been taken into account.

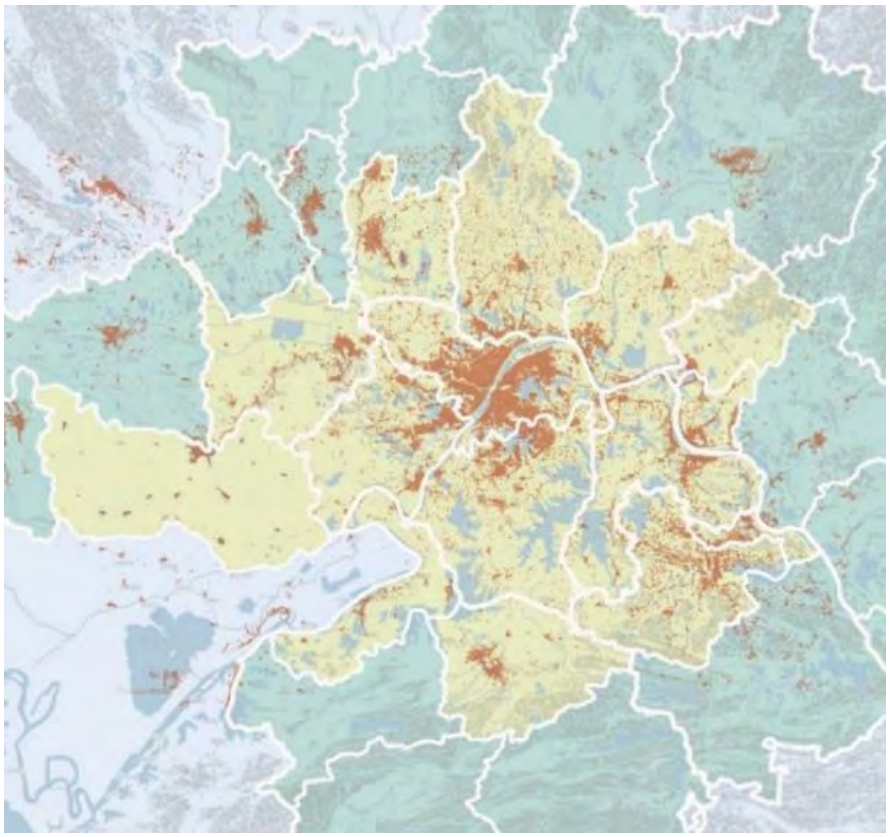


Figure 14 Analysis on the Adjacent Spaces the Wuhan Municipality

（3）Analysis based on cultural factors

As the root of urban developments, culture can exert unseen but profound effects on regional developments. Throughout history, the cities in the Wuhan Cluster have been underwent several administrative changes from the same affiliation to different ones. In addition, there is also a shift of the central city geographically from the west to the east, which used to be Wuhan and Ezhou. Base on the analysis on the histories, it is necessary to include Ezhou into the boundary of Wuhan metropolitan areas. If urban histories can demonstrate the regional city structures in the past, dialects as important means of communication can be used to reflect regional connections at present. In the cases of the Wuhan Cluster, there are mainly at least three kinds of dialects, based on which cultural zones can be defined to readjust the boundary of Wuhan metropolitan area by including 3 more administrative units.

4.3 Summary

First, quantitative analysis based on commuting distances, population mobilities and economic connections has been made to define the rough boundary of the areas in which Wuhan municipality has been well connected with its 8 surrounding administrative units. Then, qualitative analysis based on ecological resources, adjacent spaces and cultural factors has readjusted the boundary by including 3 more administrative units. Therefore, the

boundary of the metropolitan area has been defined which includes 11 administrative units surrounding Wuhan municipality. With an area of 21thousand square kilometres, a population of 17.68 million and a GDP of 1.45 hundred million RMB, the metropolitan area accounts for 36%, 57% and 79% of the whole area, population and GDP of Wuhan Cluster respectfully.

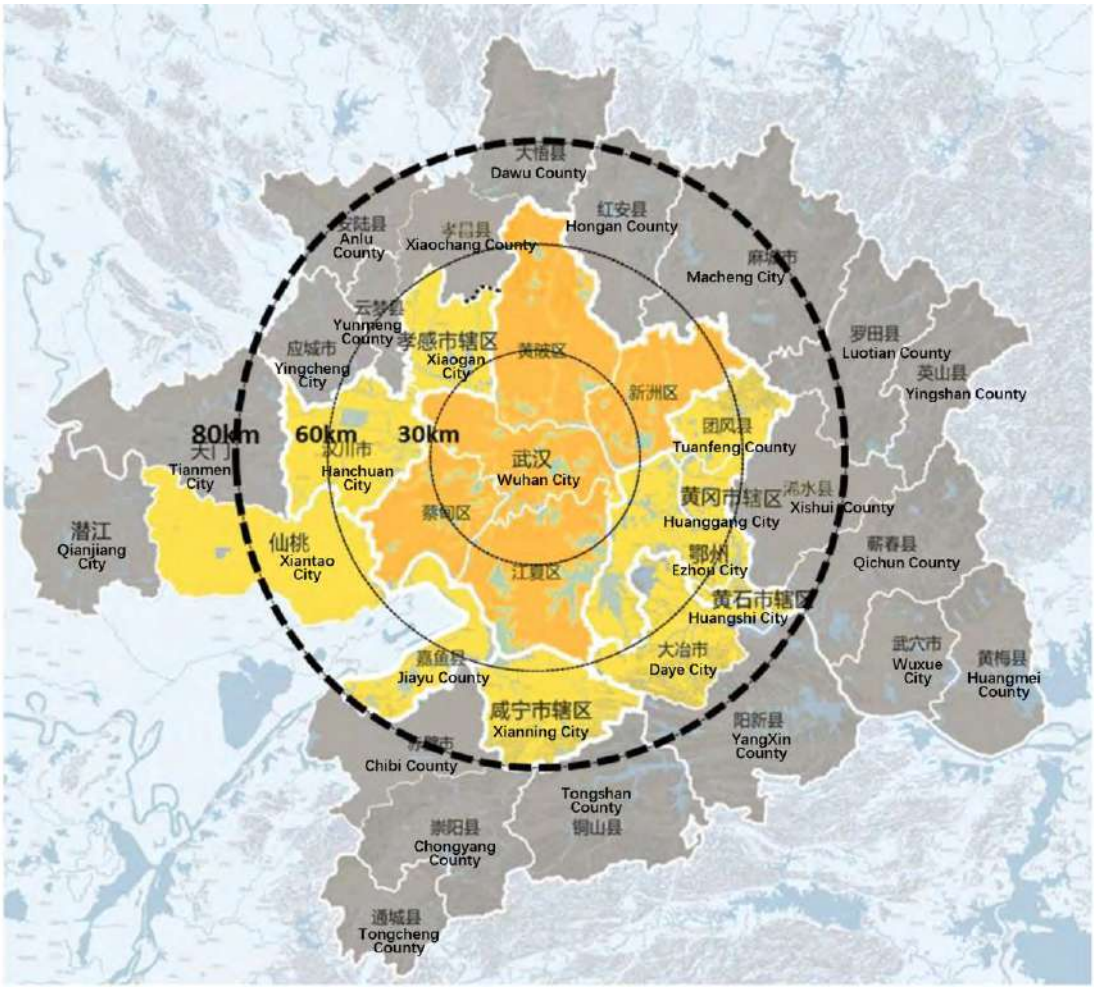


Figure 15 The Boundary of Wuhan Metropolitan Area

5. Conclusions

As an intermediate spatial form between megacities and urban clusters, metropolitan areas are not only sharing adjacent spaces but also close social, economic, ecological and cultural connections, which could define their invisible boundaries. Base on the literature review and case studies, according to the contexts of Wuhan, a method to define the boundary of metropolitan areas has been proposed by both quantitative analyses on commuting distances, population mobilities and economic connections and qualitative analysis on ecological resources, adjacent spaces and cultural factors. It is necessary to mention the shortcomings and limitations of the method. On the one hand, the boundary defined by this method may be not entirely correct and accurate. One the other hand, as the contexts of

metropolitan areas concern different factors, the goal of this paper is not to be taken reference from but to establish a framework to shed lights on other megacities to define their boundary of municipal metropolitans.

Acknowledgements

The authors would like to acknowledge the funding of Wuhan Planning Bureau.

6. References

Tannier Ce´ cile, Thomas Isabelle, Vuidel Gilles, Frankhauser Pierre (2011). A Fractal Approach to Identifying Urban Boundaries. Geographical Analysis. Vol.43 No. 2(April).

Yang Jiang (1970). Research on the Strategic Planning of Metropolitan Areas.Beijing: Science Press.

Zhou, Yixing(1991) The Metropolitan Interlocking Region in China: A Preliminary Hypotheses , in the Extended Metropolis: Settlement Transition in Asia. Ginsburg, B. Koppel&T.G. McGee(ed.) Honolulu: University of Hawaii Press.

Zhou Yixing(2003) Urban Geography. Beijing: Business Press.

Hu Xuwei, Zhou Yixing, Gu Chaolin(2000) Research on the Urban Spatial Agglomeration and Diffusion in Chinese Costal Urban Areas. Beijing: Science Press.

Hong Shijian, Huang Xiaofeng(2007) Study on the Concept and Definition of Metropolitan Area. International Urban Planning. Vol.22 No. 5(October).

Hong Shijian(2010) Study on China's Metropolitan Governance Transformation based on New Regionalism. International City Planning. Vol.25 No.2(March).

Ning Yueming(2003) Discussion on the Planning System of Metropolitan Areas Abroad. World Regional Study. Vol.12 No.1(January).

Case Study Paper

The Spatial Strategies of Knowledge Corridors in Megacity Development:

Case Study of the Optical Valley Knowledge Corridor, China

Wenjing LUO, Wuhan Planning & Design Institute; China
Zhongying SONG, Wuhan Planning & Design Institute; China
LI XU, Wuhan Planning & Design Institute; China

Abstract

As a comprehensive spatial concept, corridors especially mega-corridors and knowledge corridors have played irreplaceable roles in developing megacities. This paper uses the case of the Optical Valley Knowledge Corridor in China as an example to illustrate how to make spatial strategies of knowledge corridors in the dimensions of innovation networks, knowledge economies, environments and urban amenities, transportation systems and urban governance towards making a liveable, sustainable and efficient megacity in the backgrounds of knowledge-based urban development.

Keywords

Corridors, Knowledge-based urban development, Knowledge economies, Megacities

1. Introduction

Originated from the linear city model more than a century ago, the term “corridor” is not only an urban model fully tailored to the transport technology but also a comprehensive spatial concept in dimensions of infrastructures, economics, urbanizations and ecology. It is in the 1990s that the modern version of the corridor concept namely mega-corridor has been brought up in the Europe 1992 project, which aimed at the physical integration of European Territory. Especially with the addition of a prefix “mega”, mega-corridors have been assumed to play key roles not only in physical but economic integrations together with the cross-border and transnational infrastructures. In a similar way, cities especially megacities are also growing out of their borders towards regional collaboration, which has given a new role for corridors in the aspects of achieving spatial, economic and social integrations to enhance regional competitiveness.

Especially in the times of global knowledge economies, there has been a prevalence of knowledge corridors considering their great contributions to knowledge-based developments for megacities. With the rise of innovation districts, science and technology clusters have been formed in the forms of corridors in the backgrounds of knowledge economies, which can be exemplified by Silicon Valley, Route 128, London M4 Corridor and

etc. With the announcement of *National Innovation-driven Development Strategy Outlines* in China(State Council of China,2016), great efforts especially in Chinese megacities have been dedicated to developing knowledge corridors aimed at enhancing regional competitiveness through linking themselves with their surrounding cities and towns by a bundle of infrastructures and mainly developing technology-led industries, like Shanghai G60 Corridor, Guangzhou-Shenzhen-Hong Kong-Macau Corridor, Hangzhou West Knowledge Corridor, Hefei Knowledge Corridor and etc.

To achieve regional competitiveness by knowledge-based development, the government of Hubei Province, as one of the major provinces locating in Central China near Yangtze River, has announced at the end of 2018 to develop a knowledge corridor based on one of the largest agglomerations of high technology, primary electronic companies in its territory, known as the Optical Valley which has aimed to be the Chinese version of Silicon Valley. As a provincial development strategy, the Optical Valley Knowledge Corridor (OVKC) is not only supposed to implement the Chinese innovation-driven development strategy, but also to develop a more liveable, sustainable and efficient megacity, which is Wuhan as the capital of Hubei Province, by enhancing the spatial, economic and social integration with its neighbouring cities. Greatly inspired by Silicon Valley, Route 128 and other corridors, the Optical Valley Knowledge Corridor is also an answer to the cluster phenomenon in innovation geography to develop a more competitive innovation economy through technology leapfrogging (Cornell University, INSEAD, WIPO, 2018).

However, despite the general claims of the importance of knowledge corridors, we still know very little about strategic goal-setting in this area. Although there have been a large number of practices concerning corridor development cross administrative borders, studies focused on planning practices of using corridor strategies at an urban scale can be considered relatively scarce. Thus, the aim of this paper is to investigate how to use corridor strategies towards more liveable, sustainable and efficient megacity in the context of China. The Chinese planning system can represent the characters of many top-down counterparts in most developing countries and some developed countries. With the goal to achieve spatial, economic and social integration, the spatial strategies of corridors concern a complex set of economic, social and even political factors, which may be not all applicable to different institutional systems but can be transferrable to other cities which intend to use spatial strategies of knowledge corridors.

The methodological approaches here do not only include the case study investigation of the OVKC as well as science and technology clusters, but also the literature review on corridors. In addition, a set of semi-structural interviews with local governments, representatives from 4 local universities and 17 local enterprises and an online survey concerning the needs of knowledge workers have been conducted. Starting with the literature review on the concept of corridors, the paper will attempt to provide an understanding of the knowledge corridor concept by an investigation of the innovation clusters especially a discussion of the Silicon Valley. Following the interpretations of knowledge corridors in five dimensions, the fourth section will attempt to establish the framework of making spatial strategies of knowledge

corridors. Using the OVKC as an example, strategies have been proposed in correspondence to the interpretations by making it as a loop for innovation systems, a boom for knowledge economies, an attraction for knowledge workers, a highway for innovation flows and a mutual-force for urban governance. Last but not least, the concluding part will discuss the challenge of implementation in policymaking, followed-up work to do and its implications for other cities.

2. Literature Review

Not as a new and univocal one, the corridor concept can be traced back to the linear city models brought up by the Spanish urbanist Soria y Mata(1844-1920) as early as 1882, which has been called the first model fully tailed to the development of transport technology (H Priemus & Zonneveld, 2003). On this basis, the Ciudad Lineal model has been developed and exerted influences on the pattern of urban expansions along with infrastructures especially in regional plans, which was not in the form of unbroken lines but more likely “beads on a string”. Although opposed by many urbanists due to the destruction of ecological environments, the linear or belt developments have taken place on a large scale with the technological progress of transportations. Especially in the 19th century, urban decentralization has been enabled by the widespread use of private cars, which can be exemplified by the Silicon Valley in California, Route 128 near Boston, the Silicon Glen in Scotland and the M4 Corridor in Britain. The Silicon Valley, originated from the Stanford Industrial Park, has undergone the expansion along the Route 101 and Route 280 towards San Francisco and Santa Carla. Meanwhile, Route 128, also benefited from the knowledge spillovers of MIT, has been known as the technology corridor due to the agglomeration of high technology firms. As the United Kingdom’s equivalents to Silicon Valley and Route 128, Silicon Glen running through Edinburgh and Glasgow has been known as the “industrial belt” of Scotland, and the M4 Corridor has also witnessed the high technology growth along the M4 highway. The common features of all the cases mentioned before are not only that they are all originated from the spillover effects of universities but also famous for the agglomerations of technology enterprises along the main roads.

With the constructions of cross-border especially transnational infrastructures and the awareness of economic integration, corridors are leading urban expansion more at regional and interregional scales than at sub-regional and urban scales. As a modern version, the concept of mega corridors has been brought up in the “Project” Europe 1992, which aimed to promote the economic, social and physical integration by enhancing the level of connectives (Priemus & Zonneveld, 2003). Evolving as a multi-faceted concept, the mega corridor has been not only defined as a bundle of infrastructures with heavy flows of traffic linking transnational urban agglomerations, but also an attempt to reconcile regional economic growths and sustainable developments. Thus, the meaning of corridors has been extended to the dimensions of infrastructures, regional economy, urban development and governance(Zonneveld & Trip, 2003).On this basis, the spatial developments of corridors have been focused on establishing the connections between the transportation, economic development, environment and urbanization with the premises that which areas should be designated as corridors and which parts should be defined as development zones and open

spaces (Priemus & Zonneveld, 2003). As an instrument to achieve economic, social and urban integration, the corridor strategies imply overcoming not only physical borders but also social, cultural and institutional barriers which call for co-governance. Thus, strategic spatial planning, which is directed more towards integrated courses beyond traditional planning, concerns that the corridor concept has been elaborated as a physical and network of international infrastructure, and especially the nodal points of corridors have been balancing between the space of flows and the space of places (Albrechts & Coppens, 2003).

Although the concept of corridors has evolved from linear or belts forms to networks, one thing for sure is that the essential characteristic of corridors is the connectivity which enables the free and easy flow of people, goods and information (Chapman, Pratt, Larkham & Ian,2003). Especially in the backgrounds of knowledge economies which calls for efficient flows of financial and intellectual capitals, corridor developments have been considered as important instruments for megacities to achieve economic competitiveness by spreading economic activities from nodal points to the surrounding areas. Greatly inspired by the success of corridor developments especially the Silicon Valley, Route 128, the Silicon Fen and the M40 Corridor, developing countries in Asia Pacific Region have taken on initiatives of knowledge-based urban development especially science and technology clusters in the form of corridors. Amongst the most notable in the past few years are Tokyo-Yokohama-Tsukuba Corridor, Malaysian Multimedia Super Corridor, Shanghai G60 Knowledge Corridors, Guangzhou-Shenzhen-Hong Kong-Macau Corridors in China and etc. Although the concept of knowledge corridors has not been officially defined, the key elements of corridor projects in the backgrounds of knowledge-based urban development focuses on the assembly of knowledge infrastructure(e.g. universities, research and development institutes and etc), technological infrastructure(e.g. ICTs) ,connections to the global economy (e.g. international companies and finance institutions)and concentrations of well-educated and creative people(e.g. knowledge workers) (Winden & Berg, 2004; Carrillo, 2006; Corey & Wilson, 2006, Sarimin & Yigitcanlar,2011). The strategic developments of knowledge corridors in the economic, socio-cultural, enviro-urban and institutional dimensions have been exemplified by the case study of Malaysian Multimedia Super Corridor to be able to achieve economic prosperity, environmental sustainability, socio - spatial order and local institutional competence (Sarimin & Yigitcanlar,2011).

Although there have been examples of corridors towards knowledge-based urban development, the concept of knowledge corridors hasn't been officially proposed yet based on the literature reviews. Thus, before discussing the spatial strategies of knowledge corridors, there are two key questions to be resolved. Firstly, how to understand the concept of knowledge corridors in the new economies driven by science and technological clusters, which do not rely on traditional factors like before. Secondly, how to make spatial strategies of knowledge corridors towards a more liveable, sustainable and efficient megacity based on the local conditions? The next sections will attempt to answer the questions.

3. The Understanding of Knowledge Corridors

On the one hand, what knowledge corridors are different from other corridors is that the former one has an agglomeration of knowledge infrastructures especially and the ability to attract knowledge flow especially intellectual and capital resources constantly. On the other

hand, what corridors can contribute to the knowledge-based developments is that they can use the strength of connectivity to draw more flows into the nodal points and spread them into the surrounding areas so as to increase the regional competence at a larger scale, which will affect the space of places in return. This section will attempt to elaborate on the interpretations of knowledge corridors.

As a complex process, innovation often requires knowledge flow between different kinds of knowledge organizations which establish contact networks and alliance networks by frequent and repeated interactions (Huggins &Thompson, 2015). During the process, local innovation network could be established, which initially catalyzes the intellectual change and knowledge transfer across administrative borders, namely the regional innovation networks which will improve the efficiency and influences of local networks in return. (Pyka & Scharnhorst, 2009). This could be exemplified by the new-emerging trend of science and technology clusters since 2017, which grow beyond urban or regional borders by major transportation systems to achieve collaborations (Cornell University, INSEAD & WIPO, 2018). In the top-ranking list of the science and technology clusters, knowledge corridors have proved to improve their competitiveness of local and regional innovation networks by achieving efficient connections at different scales. Thus, knowledge corridors can be interpreted as a new form of urban and regional spatial structure, which could establish free flows of innovation resources by a bundle of infrastructures linking urban agglomerations, so as to develop local and regional innovation networks. The following five aspects are the major features of knowledge corridors that could be exemplified by case studies.

First of all, there should be a high concentration of different kinds of innovation resources related to the whole process of knowledge production, diffusion and transfer, which act as the foundation of producing innovation flows. In particular, knowledge production sectors include universities as well as their affiliated labs, knowledge transfer sectors like research institutions and related servicing facilities including investment captures and incubators should be all included as the three basic kinds of innovation resources, which keep interacting with each other to form innovation networks of knowledge corridors. Taking the Silicon Valley as an example, Stanford University, Stanford Research Park and Institutional Venture Partner can represent the three typical kinds of innovation resources, which have been interacted with each other frequently and repeatedly and formed the foundations of innovation networks. What's worthy to mention is that key technological infrastructures like national labs, as essential parts of the innovation resources, are playing crucial roles in forming regional innovation networks.

Secondly, the commercial spin-off effects of knowledge production sectors are the roots of innovation networks as well as their dynamics, considering their roles of enhancing expected economic returns of knowledge. For instance, the success of the Silicon Valley does not only repy on the spillover of Stanford University, which has given birth to local leading enterprises but has also benefited from firm neighbourhoods, where leading enterprises play the role of dandelion so as to nurture new start-ups. As essential parts of local innovation networks, firm neighbourhoods and their structures can be depicted as matrix machines, which indicates that distances matters a lot to the way leading enterprises interacting with new start-ups (Pyka & Scharnhorst,2009). This can be exemplified by the case of Hangzhou West Knowledge Corridor, which has witnessed the assembling lots of new start-ups within a 5 kilometre-radius circle centred at the local leading enterprise namely Alibaba.

Thirdly, keeping an attraction for knowledge workers can be considered as catalysts to boom innovation networks, as human capitals have proved to be key flows to improve regional competence. The various demands of knowledge workers should be satisfied by providing not only pleasant environments but also well-established urban amenities. Taking the Silicon Valley again as an example again, its pleasant climate, seashore and mountain landscapes have been known as one of the key factors to keep withdrawing human flows from other places of the world. Besides, there are not only basic urban amenities like schools, gyms, cultural centres and hospitals, but also a high density of the third places besides home and work like coffee shops for knowledge workers to interact with each other face to face, which has also proved to be essential urban amenities especially to creative industries. Thus, it has been proposed in the plan of the Hangzhou West Knowledge Corridor that the density of coffee shops should be improved to 2 per kilometres square, according to the counterparts of the Silicon Valley.

Fourthly, infrastructures which are the backbones of knowledge corridors should be well-equipped, so as to improve the efficiency of innovation flows. On the one hand, transportation hubs like airports, train stations and harbours as nodal points should be well-connected to the regional transit systems, which can not only facilitate the absorption of intellectual and capital flows but also help developing regional innovation networks based on the local networks. On the other hand, the inner transit system including highways, subways as well as bike lanes should be well established to improve the efficiency of inner flows between nodal points. This can also be exemplified by the Silicon Valley which has not only benefited from the Route 101 and 280, but also from the San Francisco International Airport and San Jose International Airport. Thus, it has been proposed in the plan of Shanghai G60 Knowledge Corridor that the network density of highways should be improved 15 percent based on the existing transit system.

Last but not least, smart urban governance to keep urban planning, development and management flexible and adapt to the uncertainty of innovation is the key to keep constant flows in the places of space. The case of the Silicon Valley has not only exemplified the success of market-driven forces but also the smartness of urban governance. Not only the top-bottom approach by governments to regulate the spaces which play necessary roles in the process of innovation but are less-favoured by market, but also the bottom-top approach to improving the initiatives of markets should both be used in the governance of knowledge corridors. Besides, as the boundary of knowledge corridors usually crosses the borders of cities, provinces or even nations, the governing process usually requires the collaborations of vertical governments as well as the participation of universities, enterprises, citizens and etc. As a dynamic participatory process, the co-governance of knowledge corridors will not only need a long-term vision and short-term actions, but also require continuous evaluation and revision according to their own developmental stages and also adapting to new requirements (Sarimin & Yigitcanlar ,2015)

Based on the interpretations of knowledge corridors in five dimensions, the next session will attempt to discuss corridor strategies especially for megacities by the case studies of the OVKC in China, so as to shed some lights on other cities

4. The Knowledge Corridor Spatial Strategies in Megacity Developments: Case of the Optical Valley Knowledge Corridor in China

As the largest knowledge-based urban development initiative in Hubei Province, China, the OVKC covers an area of 1515 kilometres square in Wuhan as well as its neighbouring city namely Ezhou. By benchmarking the progress amongst the prosperous knowledge corridors, it is intended that the OVKC function as a high-tech catalyst to help Wuhan and Ezhou to attract knowledge workers and techno-enterprises and become global international centres, so as to help with the transformation of urban development. The completion of the OVKC is estimated at an approximate 30-year timeframe and the development staged into three phases to allocate the initiatives. The first phase of the OVKC aims at creating a regional innovation hub in the Yangtze River Economic Belt in three years. The main goal of the second phase would be making the OVKC as an essential part of the Chinese innovation communities until 2035. Last but not least, the final goal would be aiming at a world-class innovation cluster, so as to help transform China into a "knowledge nation" till 2050. Towards the goals, adapting to the prevailing social-economic, technological and environmental circumstances in Wuhan, with the principles of producing diversity, prosperity, equity, efficiency and sustainability, a framework of spatial strategies of knowledge corridors based on the five dimensions of interpretations have been established in the aspects of making the OVKC a loop of innovation networks, a boom for knowledge economics, an attraction for knowledge workers, a freeway for innovation flows and a mutual-force for urban governance.

4.1. Making knowledge Corridors a Loop of Innovation Networks

As a type of linear form, knowledge corridors are actually science and technology clusters with a variety of knowledge sectors interacting with each other. The major differences between knowledge corridors and other types of science and technology clusters lie that the former ones with the character of connectivity are easier to develop a loop of innovation networks both locally and globally. Cases like the Silicon Valley show that the development of innovation networks usually go through stages from the agglomeration of knowledge sectors, the formation of local networks, the development of local networks and establishment of regional networks. Although the OVKC has abundant innovation resources including 60 universities, 19 national labs, 121 research institutes and etc, there are still missing ingredients including inter alia, key technology infrastructures, new types of research institutions, venture capitalists to fund the start-ups compared to other knowledge corridors home and aboard. Due to the lack of certain types of innovation resources, the local innovation networks has not been well-established only with local universities, research institutes interacting frequently with enterprises in Wuhan and out of Hubei Province. Let alone the regional innovation network, which has been dominated by three technology clusters centred around megacities like Beijing, Shanghai and Shenzhen. Therefore, the OVKC is at the stage between the formation of local networks and the development of local networks.

Based on the current stage of the OVKC, strategies towards making a loop of innovation networks have been made including bringing more varieties to the types of innovation resources, developing both local and regional innovation networks, so as to improve the

regional roles in the national and international innovation geographies. Firstly, various knowledge sectors have been proposed to be introduced including new types of research institutions and all related servicing sectors like venture capitals and incubators specifically. What's more important is that key technological infrastructures should be encouraged to locate within the OVKC, which would prefer scenery sites. Secondly, networking development is required not only between local universities and industries within Wuhan, but also between all kinds of knowledge sectors in and out of Wuhan as well as Ezhou. Knowledge neighbourhoods have been proposed to be established centring at local universities and research institutes surrounded by venture captures, incubators and new start-ups within 5 kilometres, so as to enhance the transfer of knowledge (Figure 1). On this basis, local innovation networks can be built with four distinctive functional zone designated as key areas to produce, transfer and commercialize knowledge specifically and multiple knowledge neighbourhoods as nodal points to improve the capacity of local networks. Thirdly, the regional networks can be developed with the two airports acting as the innovation hubs to input and output knowledge talents and products. Based on its own strengths, the OVKC will be able to form a regional innovation community with Shanghai and its surrounding cities along the Yangtze River.

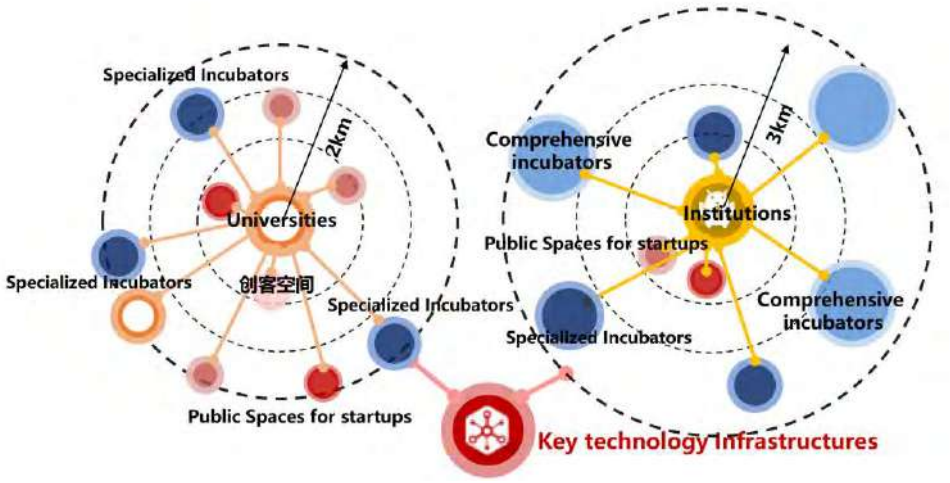


Figure 1 Local Knowledge Neighbourhoods

4.2. Making Knowledge Corridors a Boom for Knowledge Economies

Related to the innovation network is the geographical concentration of technology enterprises, which form industrial clusters and derive the booming of knowledge economies. Thus, the key to making knowledge corridors as a boom for knowledge economies is to incorporate the industrial chain with innovation networks by bridging the gaps between the producing and commercializing knowledge so as to keep nurturing local leading enterprises which could also give birth to new start-ups in the firm neighbourhoods. However, although the OVKC has been well-known for its competitiveness in optoelectronics industries, bio industries and intelligent manufacturing industries, the main reason lies that local leading firms are mostly the branches of national enterprises with their research functions locating in the first-tier cities like Beijing, Shanghai and Shenzhen. This has resulted in the failures of building local firm neighbourhoods, which can be exemplified by the fact that the current

amount of unicorn enterprises ranks behind compared to other knowledge corridors in China. Besides, there is an intriguing fact that high-tech firms have taken account for two-thirds of the total amounts but one-third of all the production value of Hubei Province respectively. Investigations indicate that current high-tech firms are experiencing the threshold of growth due to lack of technical service facilities like pubic semi-works, public data-sharing centres.

Therefore, to boom the knowledge economies of the OVKC, the first thing to do is to build local neighbourhoods of firms and enhance networking possibilities between existing local leading enterprises and start-ups by locating technological service facilities including public semi-works, data-sharing centres and research labs in between, which not only can decrease the cost of growth for start-ups but also can realize the “dandelion” roles of local leading enterprises through face-to-face communications(figure 2). Besides, it is also proposed to introduce new leading enterprises which could locate their research and development sectors locally. To increase the attraction for them, designated zones with specific favourable policies on tax, constructions and etc, have been proposed, which requires deeper discussions furthermore. In this way, the current industrial chains of the OVKC could be incorporated with the innovation networks, which will not only focus on increasing the competence of the existing dominating industries, but also stress the roles of the technological service industries and attempt to expand the boundaries of existing industries towards the future. Especially, stressing the roles of the technological service industries like finances would benefit the building of local innovation networks by enhancing the access of knowledge sectors to venture capitals.

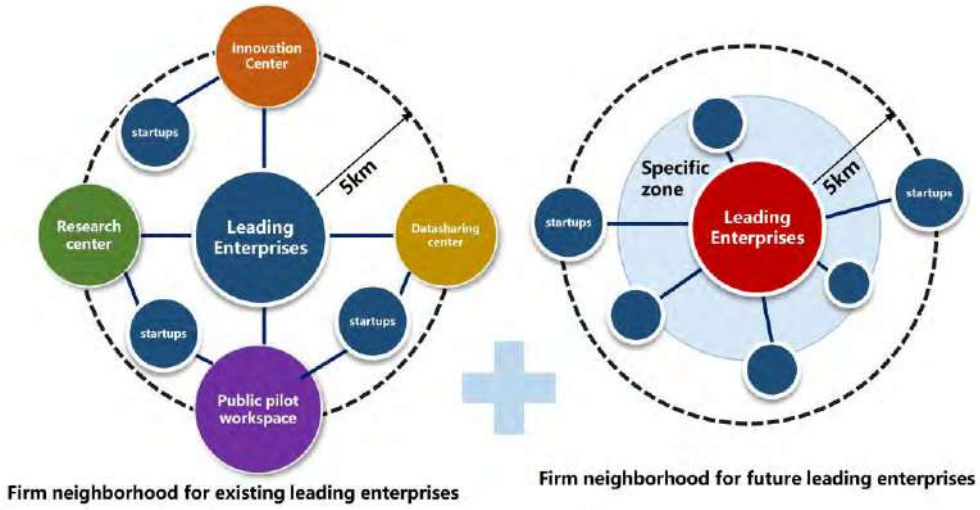


Figure 2 Local Neighbourhoods of Firms

4.3. Making Knowledge Corridors an Attraction for Knowledge Workers

Knowledge workers, with a higher level of education, have been known as one of the most important driving forces behind knowledge-based developments. Together with knowledge, they are sourcing from universities but are free to move anywhere favourable to their living expectations. Pleasant environments and well-established urban amenities have proved to be the major attractions for them. As for the case of Wuhan, it has been known for its

nickname as “the Forest of Campus” but suffering from the loss of undergraduates for a long time due to the lack of attraction for knowledge workers. Although the OVKC is surrounded with mountains, lakes and rivers, there is neither many high-quality city parks with easy access nor greenways linking the surrounding sceneries. Investigations indicate that public space is the most important aspect that the OVKC should be improved at, and the existing urban amenities fail to meet the requirements of knowledge workers. Not only there is a lack of basic urban amenities especially elementary schools and hospitals, but also the third places like coffee shops for knowledge workers to mingle are short-supplied compared to other knowledge corridors. Considering that the number of knowledge workers in the OVKC is increasing at a higher rate than that of local residents, it is necessary to supply with customized urban amenities to meet the requirements of knowledge workers.

Thus, to make the OVKC an attraction for knowledge workers, it is suggested to establish a complex of “green”, “red” and “yellow” infrastructures towards the current problems. Firstly, “green” infrastructures including high-quality urban parks with multi-functions like culture and sports and easy-access pocket parks with communication spaces have been proposed to locate within the corridor, linked by greenways (Figure 3). Secondly, “red” infrastructures which mean basic urban amenities for local residents should not only be supplemented according to the whole evaluation of the current facilities but also be required to be built with high standards. Thirdly, “yellow” infrastructures specifically targeting towards local knowledge workers are suggested to locate around workplaces within 15-minutes walking distances. According to the investigation with knowledge workers, the functions of “yellow” infrastructures are supposed to include not only retails, apartments, sports and so on for basic livings, but also encouraged to provide coffee shops, art galleries, book stores and libraries for knowledge workers to minge between and after work. This complex of “green”, “red” and “yellow” infrastructures will furnish the innovation networks by keeping attracting knowledge workers.

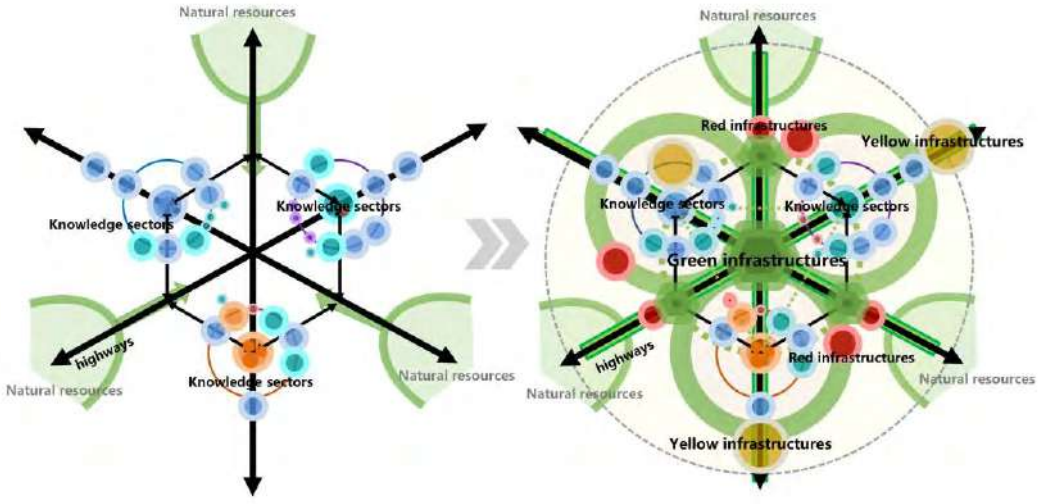


Figure 3 The Complex of “Green”,” Red” and “Yellow” Infrastructures

4.4. Making Knowledge Corridors a Freeway for Innovation Flows

Based on a bundle of infrastructures, knowledge corridors should become a freeway for innovation flows owing to the connectivity. With nodal points equipped with a transportation hubs playing the roles of attracting flows, the infrastructures of corridors could provide a freeway for innovation flows, so as to improve both the local and regional innovation network as a result. Aimed to be the national and international innovation centre, the OVKC still has a long way to go due to its current weak connection locally and regionally. Although with 3 high-speed train stations and 10 intercity train stations, the OVKC has taken the position of transportation hub in Central China, which will be threatened due to the construction of new super highspeed railways in nearby cities. Although there is the Tianhe Airport which is supposed to become the biggest passenger airport in Central China and will be the Shunfeng Airport which aimed at ranking the third among freight airports in Asia, this area is weakly connected to both the airports. Due to the rivers as natural barriers, the transportation system of highways, subways and greenways are all underdeveloped, leading to the traffic jams in rush hours let alone easy access to nodal points.

Therefore, to realize the goals of the national and international innovation centre, the first thing to do would be improving the strategic position in national and international transportation systems by speeding up the construction of the Shunfen Airport and locating super highspeed railway stations within the boundary of the OVKC. Besides, the network density of highway systems is proposed to be improved so as to improve the connection between nodal points especially airports, train stations and other hubs. More efficient public transport systems are also proposed to be built by extending the subway line to link with most nodal points and establishing greenways to connect subway stations with workplaces and housing areas. In particular, a specialized public transport system including subways and bus lines is suggested to establish door to door between universities, research institutions and major knowledge sectors, towards the problems of low efficiency of current public transport. A smart transit system is also suggested to build upon the existing roads, towards the problems of traffic jams in rush hours. In this way, the goal has been set that it will take not more than 60 minutes to reach nodal points especially the airports, train stations and other transportation hubs from anywhere within the boundary of the OVKC.

4.5. Making Knowledge Corridors a Mutual Force for Urban Governance

The tricky parts of governing knowledge corridors lie not only with the uncertainty of innovation but also the cross-bordering issue of linear developments, which is like a dynamic, participatory and strategic process and it requires a careful and delicate orchestration (Sarimin & Yigitcanlar, 2015). As the boundary of the OVKC crosses the borders of two cities, a mutual-force between central governments vertically as well as the two municipalities and the public horizontally has been missing due to the institutional issues. Although the public policies concerning to the innovation activities in the OVKC have been issued at a number of more than 100, only less than 10 percent of the policies are related to the governance of spaces for innovation activities. This has led to the difficulties in the whole process of knowledge-based urban development, due to the lack of flexibilities to adapt to the uncertainty of innovation. For example, the current land use regulation has set up a rigid upper limit for the mixed-use functions while investigations indicate that the requirements of the existing enterprises to improve the proportions of mixed uses are difficult to meet with. This has also increased the institutional cost for enterprises to be engaged more in innovation activities.

To form a mutual-force for urban governance, it is suggested that a “one-stop-agency” for the operational management of the OVKC should be established at first to enhance the organizational capacity, which involves not only the provincial government of Hubei, the municipal governments of Wuhan and Ezhou, but also local universities, enterprises and the public. Besides, the flexibilities of current land use regulations have been proposed to be enhanced by increasing the upper limit of mixed-use functions and adding a new type of land use to the existing system, which could be undefined of land use and applying for specific policies to locate key technological infrastructures, leading enterprises and etc. Beyond this what needed most is not only the adjustment of current public policies but also a continuous policy monitoring system to recognize the current development stage as well as the problems and ensure that the objectives can be achieved. In correspondence to the understanding of knowledge corridors, the system of 36 indexes which can be measured every year and compared with other cities have been established in 5 dimensions corresponding to the interpretations of knowledge corridors (table 1).

Table 2 The Indexes of the Monitoring System

Category	Sub-category	Index
Innovation Resources	Innovation Input	Number of key technology infrastructures
		Number of Incubators
		Number of Public Spaces for Startups
		The percentage of research and development expenses in GDP (%)
	Innovation Output	Valid patents per 10000 people per year
		Number of PCT patents per year
		Number of invented international standards
Industries	Industrial Structure	Percentage of the added value of strategic industries in GDP(%)
		Percentage of the added value of new economies in GDP(%)
		Percentage of high-tech service industries incomes(%)
	Innovative Enterprises	The Increasing rate of gazelle enterprises(%)
		Number of unicorn enterprises
		The Increasing number of high-tech enterprises per year
		Number of enterprises with venture capitals
Physical Environments	Public Spaces	Areas of parks per person(square meters)
		Coverage of urban parks with an area of more than 5000 square meters to residential districts within 500 meters(%)
		Number of urban parks with an area of more than 10 hectares per 10000 people
		Coverage of greenways to residential districts within 5-minute walking distances
	Urban amenities	Number of international schools per 10000 people
		Number of hospital beds per 10000 people
		Number of larger urban amenities(including exhibitions, libraries, art galleries, theaters and etc.) per 10000 people
		Coverage of urban amenities to residential districts(%)
		Areas of the third places(like coffee houses) per person (square meters)
Transport	Accessibility	Coverage of airports within 60-minute travel(%)
		Coverage of train stations within 45-minute travel(%)
		The Density of high-way network(meters per square meters)
	Connectivity	The Density of branch network(meters per square meters)
		Milestones of subways(kilometers)
		Percentage of travel by public transport(%)
		Milestones of public transport per 100000 people(kilometers)

Governance	Spaces	Percentage of increased spaces for innovation activities in office buildings per year(%)
		Percentage of increased apartments for knowledge workers in housings(%)
	Policies	Percentage of policies for innovators (%)
		Percentage of policies for capitals
		Percentage of policies for related issues (%)
		Percentage of policies for coordination(%)

To implement the strategies at local scales, short-term, mid-term and long-term targets for the index system have been made respectively and an action plan for the next year has also been established especially. As a complex of long-term vision, plans and short-term actions together with effective policies, knowledge corridor strategies would require a long span of time to achieve progress. Within the first phase of development, the projects listed in the action plan for the OVKC are about to launch or still in progress though. However, what's obvious right now is that both local governments of Wuhan and Ezhou are preparing to collaborate with each other with the establishment of the strategic plan, which indicates a good start for the implementation of the strategic plans. With the strategies been proposed elevated to national agenda while keeping sinking locally and regionally, this would also improve the competitiveness, sustainability and liveability of the megacity of Wuhan and its metropolitan area.

5. Conclusions

How to understand the concept of knowledge corridors in the new economies driven by science and technological clusters, which do not rely on traditional factors like before? How to make knowledge corridor strategies towards a more liveable, sustainable and efficient megacity based on the local conditions? The two questions above have been answered by the literature review and case studies in this paper. Although the corridor concept, with a long history, has evolved from linear or belt patterns to networks, one thing which has never changed is its character of connectivity. Greatly inspired by the success of the Silicon Valley, M80 and other technology clusters in corridor patterns, there has been a trend of using the spatial instruments of knowledge corridor with its connectivity to improve the regional roles of megacities in developing countries especially like China. Based on the original concepts and case studies, knowledge corridors, as the combination of knowledge-based urban development and corridor development, could be interpreted as corridors with various knowledge resources to establish local and regional innovation networks, clustered leading enterprises which could nurture start-ups to boom knowledge economies, pleasant environments and urban amenities to attract knowledge workers, well-connected transit systems to improve the efficiency of innovation flows and co-governing mechanism to adapt to the uncertainty of innovation. Based on the five dimensions of the understanding, the case study of the OVKC has been used to elaborate the knowledge corridor strategies, which are proposed to be made as a loop for innovation networks, a boom for knowledge economies, an attraction for knowledge workers, a freeway for innovation flows and a mutual force for co-governance, towards a more liveable, sustainable and efficient megacity. As a complex of visions, plans and actions together with effective policies, knowledge corridor strategies should not be phased according to its own circumstances but also require continuous monitoring.

As there will a span of time to access the achievements or failure of the strategic plans of the OVKC, what the case study would like to contribute is the framework in making knowledge corridor strategies rather than the wholesale packages. Like an orchestra, the implementation of knowledge corridor strategies does not only require a conductor to vision, lead, monitor and make adjustments constantly but also a group of music players to collaborate. Although the music books like the framework of the strategies may not change in different theatres, the performances will be not the same with different audiences like the country-specific social, cultural, economic and technological circumstances, which are the key factors to determine the final effects.

6. References

Albrechts Lousi, Coppens Tom (2003) "Megacorridors: Striking a Balance between the Space of Flows and the Space of Places". Journal of Transport Geography, Vol.11 No. 3(September).

Castells Manuel (1999) The Information Age, Oxford: Wiley-Blackwell.

Castells Manuel, Halls Peter (1994) Technopoles of the World, London: Routledge.

Carrillo Francisco (2006). The Century of Knowledge Cities: Approaches, Experiences, and Perspectives. Carillo (Ed.). New York: Butterworth–Heinemann.

Chapman David, Pratt Dick, Larkham Peter, Ian Dickins (2003)" Concepts and Definitions of Corridors: Evidence from England's Midlands", Journal of Transport Geography. Vol.11 No. 3 (September).

Corey Kenneth, Mark Wilson (2006). Urban and Regional Technology Planning. New York: Routledge.

Cornell University, INSEAD, WIPO (2018) Global Innovation Index 2018, Energizing the World with Innovation, from https://www.baidu.com/link?url=dAMQnK3rfmHAsAEKLJroUcCn5eJrj3pfwf6Qu74Dfo3u7X-jwLC5vMMJDJr6RFHJQnWNQnVzJ7QXXFODG3_dRK&wd=&eqid=e05e388f0000cdac000000055d13623d

Haug Peter (1986) "US High Technology Multinationals and Silicon Glen". Regional Studies. Vol.20 No. 2(February).

Huggins Robert, Thompson Piers (2015) "Entrepreneurship, Innovation and Regional Growth: A Network Theory". Small Business Economics. Vol. 41 No. 5(June).

Lambert Christine, Boddy Martin (1998) "Planning for Major Urban Expansion: A Case Study in the UK's M4 Growth Corridor", Planning Practice and Research. Vol.13 No.4 (August).

Malairaja Chandra (2003) "Learning from the Silicon Valley and Implications for Technological Leapfrogging the Experience of Malaysia". International Journal of Technology Management and Sustainable Development. Vol.2 No. 2 (October).

Priemus Hugo, Zonneveld Wil (2003) "What are Corridors and What are the Issues? Introduction to Special Issue: The Governance of Corridors". Journal of Transport Geography. Vol. 11 No.3(September).

Pyka Andreas, Scharnhorst Andrea (2009) Innovation Networks – New Approaches in Modelling and Analysing. Heidelberg: Springer-Verlag, Springer-Complexity.

Sarimin Muna, Yigitcanlar Tan (2011) “Knowledge-based Urban Development of Multimedia Super Corridor, Malaysia: an overview”. International Journal of Knowledge-Based Development. Vol. 2 No. 1 (January).

Sarimin Muna, Yigitcanlar Tan (2015) “Multimedia Super Corridor, Malaysia: Knowledge-Based Urban Development Lessons from an Emerging Economy”. VINE. Vol. 45 No. 1 (January).

State Council of China(2016) National Innovation-driven Development Strategy Outlines (No.15) , Retrieved May 19, 2016, from http://www.gov.cn/gongbao/content/2016/content_5076961.htm

Winden Van. Berg Van (2004). Cities in the Knowledge Economy. Rotterdam: European Institute for Comparative Urban Research.

Zonneveld Wil, Trip Jan (2003) Megacorridors in North West Europe: Investing a New Transnational Planning Concept. Housing and Urban Policy Studies 27: The Netherlands: DUP Science.

Case Study / Project

How to Plan Ahead for an Efficient and Livable Metropolis:

Wuhan Experiences

Wenjing LUO

Abstract

Speakers: Yongdong QIU, Wuhan Planning & Design Institute, China; Yun WANG, Wuhan Planning & Design Institute, China; Haijun LI, Wuhan Planning & Design Institute, China; Wenjing LUO, Wuhan Planning & Design Institute, China The seemingly unlimited growths of metropolises have put great challenges on their efficiency, livability and sustainability. With the rapid emergence of metropolises worldwide, how to best plan ahead for an efficient and livable metropolis has become a global key issue for planners and policy makers. With the rapid developments of megacities in China, policies and guidelines have been published towards making an efficient and livable metropolis recently. Local experiences in China have shown that there are two aspects of strategies that could be spread to the world. On one hand, with the changes in national administrations, there has been a trend of transformation of master plans which tends to focus more on regional collaborations out of the boundaries and urban growths within the boundaries. On the other hand, local governments in lots of Chinese metropolises have realized the benefits of big data and set up online planning platforms for metropolises to upgrade the traditional planning methods.

This session focuses on how to best plan ahead for an efficient and livable megacity by taking the experiences of Wuhan which is a typical growing metropolis and can shed some lights on other cities worldwide. During the first part of the session, Wenjing LUO will introduce the backgrounds of making an efficient and livable metropolis in China, followed by a quick introduction of Wuhan. During the second part, Yun WANG, the head of Master Plan Division of WPDI will give a presentation on the master plan of Wuhan metropolis. Then, Haijung LI, the head of East Lake Branch of WPDI and Wenjing LUO will talk specifically about on how to collaborate out of the boundary and grow within the boundary, with the topic of corridor strategies and boundary defining for metropolitan areas. This is followed by Yongdong QIU, the chief engineer of WPDI, who will give a presentation about Wuhan Planning Lab which helps establishing and implementing master plans by online platforms. The last part of the session will be a moderated round table discussion, open for all interested parties, aiming at summarizing replicable experiences from Wuhan and exploring the effective strategies towards planning ahead for an efficient and livable metropolis.

Research Paper

COMPARATIVE ANALYSIS OF BEIJING-TIANJIN-HEBEI URBAN AGGLOMERATION, YANGTZE RIVER DELTA URBAN AGGLOMERATION, GUANGDONG, HONG KONG AND MACAU BAY AREA BASED ON GRAVITY MODEL

Nan Huihui; Urban Space Architectural Planning & Design Co. LTD.; China
Lu Qing; Urban Space Architectural Planning & Design Co. LTD.; China
Zhao Qian; Urban Space Architectural Planning & Design Co. LTD.; China

Abstract

Beijing-Tianjin-Hebei urban agglomeration, Yangtze River Delta urban agglomeration and the Guangdong, Hong Kong, Macau Greater Bay Area are China's three major urban agglomerations, including China's political, economic, financial and technological centers, which are important engines of the Chinese economy. The purpose of this study is to compare these three urban agglomerations from the economy, government management and spatial interactions. The major methodology of the study is gravity model. Since there are no clear official regulations for the scope of the three major urban agglomerations, we should define the scope and core areas at first, making them at a comparable level. First of all, the economy of the three major urban agglomerations in the wide-area range are similar, while the core area of Beijing-Tianjin-Hebei urban agglomeration is the weakest in per capita GDP. In the perspective of government management, the Beijing-Tianjin-Hebei urban agglomeration is policy-oriented and pays more attention to regional balanced development. The Yangtze River Delta urban agglomeration mainly focus on economic development. Under the policy of reform and opening up, Guangdong, Hong Kong, Macau Bay Area is seeking more regional cooperation with Hong Kong and Macau. In terms of spatial interactions, the Beijing-Tianjin-Hebei urban agglomeration presents a dual-core structure between Beijing and Tianjin. The other urban nodes in Hebei Province are not obvious, and the regional connections are weak, leading to unbalanced development. The Yangtze River Delta urban agglomeration presents the characteristics of a networked structure, and the cities in the entire region are closely connected and have a tendency to be integrated both in economy and transportation. The Guangdong, Hong Kong and Macau Greater Bay Area has formed a strong core composed of cities such as Guangzhou, Shenzhen, Hong Kong, Macau and Dongguan, which are closely linked with each other, but weakly connected with external region.

Keywords

Comparative analysis, urban agglomerations, gravity model

1. Introduction

Due to different translations and personal comprehension, scholars have a variety of understanding of the names of urban agglomerations and related concepts, such as megalopolis (Zhou, 1991), metropolitan interlocking region (Yu & Ning, 1983), and urban agglomerations (Gu, 2011). Although the name is different, most of them indicate that the urban agglomeration is an interconnected whole formed by cities of different grades, types and sizes, with the help of the regional transportation network. In this paper, we use “urban agglomeration” to refer to this phenomenon, and introduce the top three major urban agglomerations in China.

Beijing-Tianjin-Hebei urban agglomeration, Yangtze River Delta urban agglomeration, Guangdong, Hong Kong and Macau Bay Area are the top three urban agglomerations in China. The focus of our study is to introduce them from sizes and formation and development history. Then, we apply gravity model to examine the spatial interactions between cities inside the urban agglomerations, and how they act on the overall operation of the urban agglomeration.

The purpose of this study is to compare these three urban agglomerations from economy, government management and spatial interactions.

2. 2. Theoretical Background of Spatial Interaction Models

Spatial interaction is a movement or transmission over space, which is resulting of a decision process involving different influences (Vobruba, Körner, & Breitenecker, 2016). This paper uses spatial interaction to measure the strength of economic linkages between regions. The spatial connection can reflect the radiation capacity of the central city to the surrounding area, and it can also reflect the acceptance of surrounding areas to central city (Meng, 2009).

Spatial interaction is widely studied in geography, urban science and other disciplines. For example, when determining the relationship between regions, Thünen suggests a concentric structure of crops distributed around urban areas from an agricultural perspective (1986). Weber explores the mechanism of industrial activity distribution from an industrial perspective (2002). Other studies, such as Perroux 's growth pole theory (1950), Hagstrand's spatial innovation diffusion model (1967), Friedmann's "core-edge" theory (1966), etc. are all research and discussion on spatial interactions.

In the quantitative study of spatial interaction, two methods are commonly used: urban flow intensity and gravity model.

Urban flow generally refers to the flow of people, material, information, capital, technology and other elements within urban agglomeration. The formation of urban flow takes the regional transportation network as carrier, and city’s radiation mechanism as the main driving force. Urban flow intensity is used to describe the quantitative impacts of urban outward function. Liang Chen and Zeng Jian (2019) used urban flow intensity model to study

the outward service function of Beijing-Tianjin-Hebei urban agglomeration. Lu Jun and Luo Qi (2017) used the urban flow theory to evaluate the traffic links and economic linkages of cities in Jiangxi Province using Tencent's location big data and traditional statistical data.

Gravity model is based on the gravitational equation of Newton's law of universal gravitation. In the gravitational equation, the gravity between two objects is positively related to mass and negatively related to distance. Henry Charles Carey (1852) first introduced gravity model to spatial connection studies when studying the issue of immigration behavior. Stwewart (Martin, 2008) uses gravity model to describe the magnitude of the population force between two regions. Subsequently, gravity model was widely applied in research on transportation, retail, immigration, and marketing. Since 1990s, Chinese scholars started to use gravity models to measure spatial interaction between cities or regions (Wang & Zhuang, 1996; Miao & Wang, 2006).

3. Methodology and Estimation Strategy

3.1. Construction of gravity model

In the study of spatial interaction, we need to consider the flow of people, logistics, technology, information between cities, which is a complicated process. Due to the poor availability of data such as technology flow and information flow, this paper compares spatial interactions of the three major urban agglomerations from population and economy.

$$G_{ij} = K_1 \frac{E_i E_j}{D_{ij}^b} + K_2 \frac{P_i P_j}{D_{ij}^b}$$

Where G_{ij} represents the gravity between two cities, E_i and E_j are the economic mass of city *i* and city *j*, P_i and $P_i$are population mass of city *i* and city *j*. D_{ij} refers to the distance between the two cities (in this article, we use linear distance). K is gravitational constant of each variable. This paper assumes that the role of the economy and population have equal influence on cities' external connection, so $K_1 = K_2 = 0.5$.. *b* is the coefficient of friction, in this study, and *b=2*. By calculating the gravitational values of each city, we will get a gravitational matrix G_{ij} of three urban agglomerations.

3.2. Determination of the comprehensive influence of cities

Through the comprehensive gravity of the city, we can figure out the comprehensive influence of each city. The higher the gravity of the city, the higher the influence. The formula for the city's overall gravity is:

$$G_m = \sum_{i=1}^{n} G_{mi}$$

G_m represents the comprehensive gravity of city *m*. G_{mi} represents the gravity between city *m* and city *i*.

4. China's Three Urban Agglomeration

In the past 40 years, China's urban population has increased five times. In 2018, China's urbanization rate is close to 60%. China has a new plan to re-plan the national city map. According to the plan, China will promote large-scale urban agglomerations, and urban agglomeration will become the growth pole of economy in the future. At present, Beijing-Tianjin-Hebei urban agglomeration, Yangtze River Delta urban agglomeration and the Guangdong, Hong Kong and Macau Bay Area have become increasingly urbanized, and play very important roles in promoting regional development.

4.1. Defining the boundary of three agglomeration

Since the officially determined urban agglomerations are subjective and related to political strategies, the comparison of the three major urban agglomerations will results in large data bias. In order to ensure that the comparison is fair, we need to redefine the boundaries of the three major urban agglomerations so that they are at a comparable level. Through comprehensive consideration of population, GDP, and area, we finally obtained the scope of the three urban agglomerations (Tab.1), and defined core areas based on the level of urban development and regional influence (Tab. 2).

Table 1 Statistical Data of Urban Agglomerations

		Beijing-Tianjin-Hebei	**Yangtze River Delta**	**Guangdong, Hong Kong and Macau Bay Area**
Total Area	Area (10,000 km^2)	21.8 (Beijing/Tianjin/ Hebei)	21.9 (Shanghai/Jiangsu/ Zhejiang)	18.1 (Guangdong/Hong Kong/Macau)
	GDP (Trillion Yuan)	8.21	17.01	12.49/9.52 (Hong Kong, Macau Not Included)
	Population (10,000)	11159	16090	11980/ 11174 (Hong Kong, Macau Not Included)
	GDP Per Capital (Yuan)	73573	105718	104257/85198 (Hong Kong, Macau Not Included)

Source: Chinese Statistical Yearbook (2017)

Table 2 Statistical Data of Urban Agglomerations

		Beijing-Tianjin-Hebei	**Yangtze River Delta**	**Guangdong, Hong Kong and Macau Bay Area**
Core	Area	6.9 (5 Cities)	10.8 (16 Cities)	5.6 (11 Cities)

Area	(10,000 km^2)			
	GDP (Trillion Yuan)	5.98	11.96	10.55/7.58 (Hong Kong, Macau Not Included)
	Population (10,000)	6025	11154	6956/6150 (Hong Kong, Macau Not Included)
	GDP Per Capital (Yuan)	99268	107193	151719/123265 (Hong Kong, Macau Not Included)

Source: Chinese Statistical Yearbook (2017)

Beijing-Tianjin-Hebei urban agglomeration is the weakest and most immature urban agglomeration among these three urban agglomerations. Although Beijing and Tianjin, two municipalities, are included in this area, the overall GDP is less than Guangdong, Hong Kong and Macau Bay Area without Hong Kong and Macau, and is half of the Yangtze River Delta urban agglomeration. The reason for its poor development is the lag of the integration of Beijing-Tianjin-Hebei, which we will elaborate later.

Yangtze River Delta urban agglomeration is the top one urban agglomeration with largest scale, greatest economy and highest level of integration in China. The development of cities is relatively balanced among three urban agglomerations. Shanghai ranks first in the country with more than 3 trillion yuan of GDP. At the same time, there are 4 cities have more than 1 trillion, and 7 cities have more than 500 billion. In the future, Shanghai will still be the core of this area, together with Nanjing, Hangzhou and Suzhou as the sub-centers. The integration process will keep going on.

In terms of GDP, the economic aggregate of Guangdong, Hong Kong and Macau Bay Area has become the second largest bay area in the world second to San Francisco Bay Area. In 2017, the GDP of Guangdong, Hong Kong and Macau Bay Area reached 12.49 trillion yuan. At the same time, Guangdong, Hong Kong and Macau Bay Area has the highest urbanization rate in China. In 2017, the urbanization rate is close to 85 %.

Figure 1 Beijing-Tianjin-Hebei urban agglomeration

Figure 2 Yangtze River Delta urban agglomeration

Figure 3 Guangdong, Hong Kong and Macau bay area

4.2. Formation and development

The three urban agglomerations are formed and developed under different circumstances, representing the different periods' political characteristics in China.

Beijing-Tianjin-Hebei urban agglomeration was formed with the support of national policies. Since the poverty problem in Hebei Province is very prominent, Chinese government plans to drive backward areas through developed regions, and has tried several regional integrations plans. "Bohai Economic Zone" is the earliest attempt. Initially, Bohai Economic Zone only included Beijing, Tianjin and Tangshan. In 1986, the Economic Union Mayor of the Bohai Economic Zone was established. In 1988, six cities including Beijing, Baoding and Langfang established the "Beijing Economic Cooperation Zone", starting a new attemp. In 2011, the National Development and Reform Commission proposed the establishment of the "Capital Economic Circle", including Beijing, Tianjin and, Baoding, Tangshan, Langfang, Shijiazhuang, Zhangzhou, Qinhuangdao, Zhangjiakou, Chengde, Handan, Xingtai, Hengshui of Hebei Province. Among them, Beijing, Tianjin, Baoding and Langfang are defined as central functional areas, having the prior developing opportunities. In 2015, the "Beijing-Tianjin-Hebei Collaborative Development Program" was approved. The target is to build a world-class urban agglomeration.

Yangtze River Delta urban agglomeration was spontaneously formed under the promotion of the market economy. With its developed land and water transportation conditions and abundant resources, the Yangtze River Delta has already had the prototype of the urban agglomeration in the middle and late period of China's feudal society. After the Opium War, foreign trade started in the Yangtze River Delta region due to its superior geographical position. Shanghai gradually became the trading center and a modern city of the time. After the reform and opening up, Yangtze River Delta seized this new opportunity of development. Shanghai is still the central city of the whole region, and the statuses of cities such as Hangzhou, Nanjing, Suzhou and Ningbo are also becoming increasingly important. It can be seen that the development of the Yangtze River Delta urban agglomeration is based on its

important transportation and trade resources, which makes the whole region open and grows in the market competition.

Guangdong, Hong Kong and Macau Bay Area is a successful work of the Chinese government to carry out reform experiments. From 1978 to 1985, in the early days of reform and opening up, Shenzhen, Zhuhai and Shantou were designated as special zones, directly undertaking industrial transfer in Hong Kong and Macau, forming a development model of "front and back factories" between Guangdong and Hong Kong, driving backward areas through developed regions. At that time, Shenzhen has become the economic center and innovative city of China from the original fishing village, and the urbanization rate has reached 100% recently. The take-off of Shenzhen has also led to the reform and development of the surrounding areas. Until now, Pearl River Delta region keeps exploring the path of innovation and creating a miracle, and becomes the region with the highest degree of openness and the strongest economic vitality in China.

5. Exploring Spatial Interaction of Three Urban Agglomeration

This paper uses the statistical yearbook data of three urban agglomerations in 2017 to establish the gravity model. Through the results of the gravity model, we can not only get the spatial interactions of the three urban agglomerations, but also form a network of connections between cities, which could be presented in the drawing and reflected spatial structures.

5.1. Model results of Beijing-Tianjin-Hebei urban agglomeration

The overall connection of Beijing-Tianjin-Hebei urban agglomeration is weak. Beijing and Tianjin form a strong twin core a radial relationship, affecting surrounding areas. The connection between cities is positively related to the physical distance. The closer the distance, the stronger the connection.

Beijing is closely connected with Tianjin, Langfang and Tangshan, and is weakly connected distant cities, such as Handan, Xingtai and Hengshui. Shijiazhuang, as the capital city of Hebei Province, is a sub-central city in the region. Shijiazhuang only has strong links with the well-developed Baoding, and cannot influence more areas around it.

As China's political, economic, science and technology center, Beijing has gathered resources all around the country. Tianjin has undertaken a series of national strategic projects and projects. The development environment of Beijing and Tianjin is better than Hebei province. However, their influences did not lead to the development of Hebei Province. The Beijing-Tianjin region is still in the agglomeration stage. People, finances and resources keep flowing to Beijing and Tianjin, especially to Beijing. Consequently, Hebei province lost its resources, and the economy of the region is extremely unbalanced. What's worse, the infrastructure such as transportation in Hebei province is also poor, limiting their further development, forming a "poverty belt" around Beijing. There is a huge gap from the goal of "building a world-class urban agglomeration".

With the launch of the national plan of Xiong'an New District, it is expected to help Beijing ease the pressure and promote regional integration of Beijing-Tianjin-Hebei. Xiong'an New District is located in Baoding, Hebei Province, the hinterland of Beijing, Tianjin and Baoding, with obvious location advantages and convenient traffic. The development of Xiong'an New

District will assist on the optimization of the urban layout and spatial structure of Beijing-Tianjin-Hebei urban agglomeration, and complement the shortcomings of Hebei'. In the latest “13th Five-Year Plan”, there has three high-speed rail will layouts from Beijing to Zhangjiakou, Beijing to Shenyang, and Beijing to Shangqiu, helping breaking the blind spots, and increasing the influence of central cities.

Figure 4 Spatial interaction of Beijing-Tianjin-Hebei urban agglomeration

In terms of the city's comprehensive influence, Beijing, Tianjin, Langfang and Tangshan have the greatest influence. These four cities are also well-developed areas in this region. Shijiazhuang’s influence is at a medium level and has not exerted the influence as a provincial capital. Tangshan is an old industrial city of Hebei province, and its GDP is higher than Shijiazhuang. Langfang, located in the central part of Hebei province, has convenient access to the north and south, and its influence on surrounding areas is higher than that of Shijiazhuang. Shijiazhuang is just a small village in history. Due to the construction of railways in modern times, Shijiazhuang has become a “city on the train”, traffic fortress and resource distribution center, and has favorable conditions for development. But compared to the old developed cities, Shijiazhuang's strength is relatively weak.

5.2. Model results of Yangtze River Delta urban agglomeration

Yangtze River Delta urban agglomeration has formed the initial shape of network structure, the internal links between cities are the strongest among the three urban agglomerations. Yangtze River Delta urban agglomeration has formed a high-intensity contact zone with "Shanghai, Nanjing, Hangzhou" as its core, and its regional influence is decreasing toward both sides along the "Shanghai-Nanjing" and "Shanghai-Hangzhou". The connection between Shanghai and Jiangsu is slightly stronger than the link with Hangzhou.

Shanghai is the core city of the region and the largest commuting destination. Suzhou residents are the main source of commuters to Shanghai, so Shanghai has the strongest contact with Suzhou. Also because of commuting, Shanghai has strong links with Nantong, Jiaxing and Zhenjiang. Shanghai's radiation range is almost all over the region, and is only weakly connected with marginal cities, like Lishui, Zhangzhou, Lianyungang, Suqian, Huai'an.

Hangzhou and Nanjing are the provincial capitals of Zhejiang province and Hangzhou province, respectively, and are secondary centers of urban agglomerations. They influence cities inside the province, and their connections with cities close to Shanghai are significantly stronger than those of marginal cities.

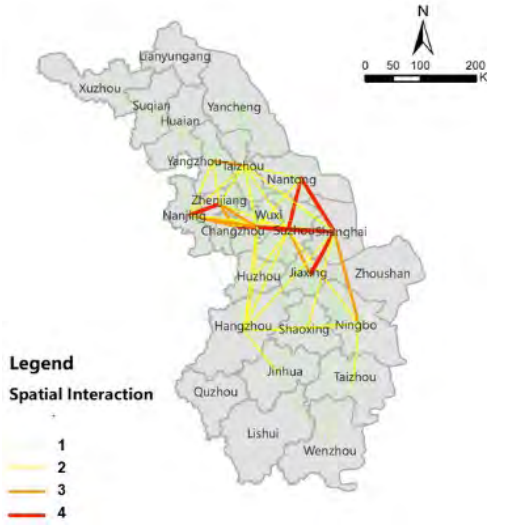


Figure 5 Spatial interaction of Yangtze River Delta urban agglomeration

The comprehensive influence of Shanghai, Suzhou, Wuxi, Changzhou, Nanjing, Nantong, Zhenjiang and Hangzhou in the region is in the high level of the urban agglomeration. Among them, Suzhou, Wuxi and Changzhou are close to Shanghai and have strong regional advantages. They are an important metropolitan area in the Yangtze River Delta urban agglomeration. At the same time, around Nanjing and Hangzhou, regional metropolitan areas have also been formed respectively, which plays a leading role in the surrounding areas.

5.3. Model results of Guangdong, Hong Kong and Macau Bay Area

Guangdong, Hong Kong and Macau Bay Area is the most dynamic and urbanized areas among three urban agglomerations. Shenzhen is the strong core. As the provincial capital of Guangdong Province, Guangzhou relies on political advantages to influence the surrounding areas. Hong Kong and Macau are the core area of the region because of their strong big economic strength and positive influence towards mainland China. Therefore, the spatial connection in the Greater Bay Area are mainly around Guangzhou, Shenzhen, Hong Kong and Macau.

However, uneven development still exists within the urban agglomeration. There is a serious gap between eastern and western sides of the Bay Area. Cities in core areas are closely linked, but cities far from the core area have weak connection. Compared with the Yangtze River Delta urban agglomeration, the radiation capability of the core area is obviously insufficient, and it is unable to provide more resources for the peripheral cities to promote their economy.

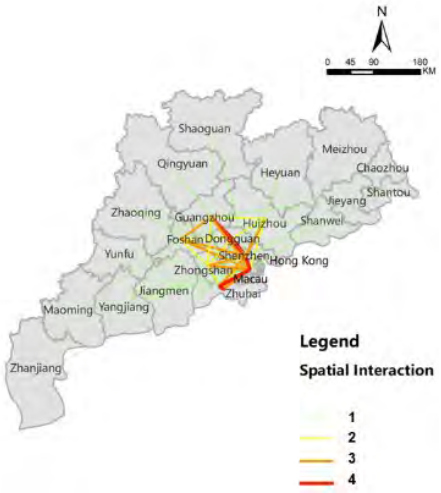


Figure 6 Spatial interaction of Guangdong, Hong Kong and Macau Bay Area

Shenzhen, Hong Kong, Dongguan, Guangzhou, Macau, Zhuhai and Foshan are the most influential cities in the region. In recent years, the integration processes between Shenzhen and Dongguan, Guangzhou and Foshan have been accelerating, and the boundary has become increasingly blurred, which are crucial the growth pole of the region. As an international financial, shipping and trading center, Hong Kong has a very comprehensive and mature international cooperation system, resources and experience, which is irreplaceable by any other citiesy in the Bay Area. Macau is a customs zone that implements low-tax policy. Macau has the superiorities of flexibility, convenience and affordability in finance, and will play an important role in the foreign trade of the Bay Area. Zhuhai is the only city connected with Hong Kong and Macau by Pearl river delta bridge. Zhuhai is a significant node in the cooperation between Hong Kong, Macau and mainland.

6. Conclusion

6.1. Comparison of three urban agglomeration

The integration of the Yangtze River Delta urban agglomeration, and Guangdong, Hong Kong and Macau Bay Area is obvious, and major cities are tightly related to each other. In contrast, the Beijing-Tianjin-Hebei urban agglomeration is concentrated in Beijing and Tianjin, other cities are distributed isolated in the region and rarely connect with outside cities. By comparing the night light indices of the three urban agglomerations, our conclusions are once again confirmed:

In the night light index of the Beijing-Tianjin-Hebei urban agglomeration (Figure 7), we can see more clearly that the Beijing-Tianjin region has a very high light index and is concentrated in central cities. The integration trend is clear and obvious. Most cities in Hebei are scattered around in the form of points and have not been fully developed.

Yangtze River Delta urban agglomeration has the most massive night light coverage (Figure 8). Night lights in the core area are beyond borders of the city and have a tendency to be one part. The brightness of other cities is also higher than that of other urban agglomerations.

Guangdong, Hong Kong and Macau Bay Area has a strong core around Guangzhou, Shenzhen, Hong Kong, Macau, Dongguan and Zhuhai (Figure 9). Like Yangtze River Delta urban agglomeration, it has broken through borders and gradually joined together. The lights in the peripheral cities are obviously dim and scattered.

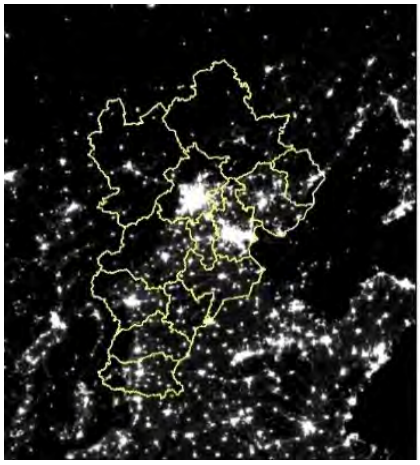


Figure 7 Night light index of Beijing-Tianjin-Hebei urban agglomeration

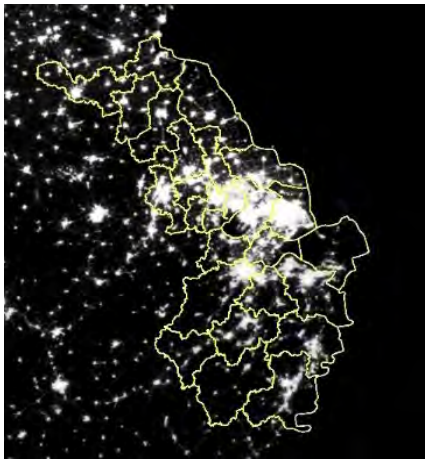


Figure 7 Night light index of Yangtze River Delta urban agglomeration

Figure 7 Night light index of Guangdong, Hong Kong and Macau Bay Area

6.2. Future improvement suggestions

The gravity model of this paper also has room for improvement.

This paper studies the linear distance between cities, and does not consider the situation of attenuation with distance. In the future, distance could be taking into account in the model.

The gap between cities is not only a result of economy and population of the city, but also affected by many factors such as education, medical care, and infrastructure construction. Therefore, more variables can be added in the future to measure the connections between cities.

7. References

Wang, W. & Lu, H. (2013). Research on the coupling of metropolis circle rail transit and the spatial system. Urban Development Studies. 20(4).

Zhou, Y. X. & Bradshaw, R. (1991). The metropolitan interlocking region in China: a preliminary Hypothesis, in the extended metropolis: settlement transition in Asia. Honolulu: University of Hawaii Press, 12-126.

Yu, H. Y. & Ning, Y. M. (1983). Introduction to urban geography. Anhui Science & Technology Press.

Gu, C. L. (2011). Study on urban agglomeration: progress and prospects. Geographical Research, 30(5), 771-784.

Vobruba, T., Körner, A., & Breitenecker, F. (2016). Modelling, analysis and simulation of a spatial interaction model. IFAC-PapersOnLine, 49(29), 221–225. https://doi.org/10.1016/j.ifacol.2016.11.054.

Thunen, V. (1986). Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalo konomie. The Commercial Press.

Li, J. G. (2002). Alfred Webber's industry theory of the location and its significance for the study of China's regional economy. Journal of ChongQing Three-Gorge University, 18(2), 73-76.

Chhristaller, W. (1998). Central places in southern germany (Chang, Z. W. & Wang, X. Z.., Trans.). The Commercial Press. 34-100.

Perroux, F. (1950). Economic space: theory and applications. The Quarterly Journal of Economics,64(1):89-104.

Hagstrand, T. (1967). Innovation diffusion as a spatial process. Chicago: Chicago University Press.

Friedmann, J.(1966). Regional development policy: a case study of venezuela. Cambridge: MIT Press.

Martin. G. J. (2008). All possible Words: a history of geographical ideas (Cheng, Y. N. & Wang, X. M., Trans.). Shanghai Century Publishing Group.

Carey, H. C. (1852). Principles of social sciences. Philadelphia, Pennsylvania.

Liang, C. & Zeng, J. (2019). Measurement of network connection of Beijing-Tianjin-Hebei urban agglomeration based on urban flow. Urban Problems, 282(01), 80-85.

Wang, D. Z. & Zhuang, R. X. (1996). The preliminary probe into the quantitative analysis of regional economic links. Geographical Science, 16(1), 51-57.

Miao, C. H. & Wang, H. J. (2006). On the direction and intensity of urban economic contacts in Henan Province. Geographical Research, 25(2), 222-232.

Miao, H. L. & Zhou, H. (2017). A comparative analysis on economic linkage and hierarchical structure of the top three urban agglomerations in China-using a synthesized gravity model. Economic Geography, 37(6), 52-59.

Case Study Paper

The role of sprawl towards the megacity

Eastern-European sprawl, the case study of Bucharest, Romania

Manuela NEGRILA, UAUIM; Romania

Abstract

Cities nowadays are either growing at a never-before seen rate or shrinking due to technology, globalization and increased mobility. Some of these changes are planned but, most of them are not, thus the quest for a planned and structured megacity can be tedious. Amongst the forces that shape cities, urban sprawl is one of the less analysed but most definitely the least planned. Seeing how the forces that drive this phenomenon are in their majority economic, how can we, as planners integrate this chaotic element into a planned and structured megacity?

Urban sprawl is an issue that has been studied in North America since 1950 due to its environmental, economic and social impact. More recently, this subject has attracted the attention of urban researchers and policy makers all over the world (Ewing et al. 2016; Liu et al. 2018). The phenomenon is even more fascinating because, depending on the geo-political background, it can differ a lot in terms of spatial layout and structure, but the main characteristics are the same. Still, the question remains, why in the last 70 years, urban sprawl has been a phenomenon that has caught on world-wide, even in the face of professionals protesting its downsides? Some evidence can be found in the fact that, from an urban economist's point of view urban sprawl is not a vicious force that disrupts the city, but rather an efficient adjustment to a change in conditions (Lechner & Maier, 2009)

The study aims to better understand the role of urban sprawl towards the megacity by making a comparison between the current development in the northern part of Bucharest, Romania which has obvious urban sprawl features, and the development of the southern area. As Romania tries to align its policies for urban planning to European trends, a study on urban sprawl is necessary. Moreover, in the Bucharest Strategic Concept (local policy), there is a need to rethink the gap between the city and the adjacent areas, defining the limits of Bucharest that no longer fall within the current administrative boundaries and 'regaining the territorial identity of the periurban area' (CSB, Vol.1, pg. 85).

Urban sprawl evidence in Bucharest could only be observed after 1990, when free market and private property were reinstated and has taken effect at first and in larger quantities in the north of the city. With the background of the negative effects the end of the economic and real estate crisis in 2009 left on the northern sprawl and given this part of the metropolitan area is becoming saturated, the current study is based on the precondition, which will have to be validated along the way, that the expansion of Bucharest will take a greater magnitude to the south (Vânau, 2009). It is important to draw attention to the fact that the southern suburbs are in danger of reaching the same situation as the northern suburbs in the next 10 years.

As Bucharest is viewed as a city between the orient and occident (Haroiu, 1997) we believe the study will offer a great insight in both the eastern and western perspective and layout of urban sprawl.

The aim of this research is to understand and better integrate policies towards a metropolis. Even though urban sprawl seems like such an artificial construct, planned design can integrate it in a megacity if we can answer the following questions. How can we, as planners and policy makers integrate the urban sprawl in a megacity? How can this phenomenon, that now is an unplanned mess, help the development of megacities?

Keywords

Urban sprawl, Eastern European cities, keyword 3 (3-5)

1. Introduction

1.1. Context

In the context of the ever growing cities, urban sprawl is one of the phenomenons that draws constant attention to it and gives a deeper meaning to the idea of limitless city. Even when the city has caught up with some previous form of sprawl, a new and more different form of the phenomenon takes shape even further away from the newly developed megacity. It is this snowball effect that is the subject of this study, the correlation between the megacity, urban sprawl and the limitless city. The phenomenon is even more fascinating because, depending on the geo-political background, it can differ a lot in terms of spatial layout and structure, but the main characteristics are the same.

To better illustrate the purpose of this study the first task is to provide a theoretical framework for research. In clarifying the origin and definition of the urban sprawl concept, a brief analysis of the origin and evolution of urban sprawl is necessary.

Furthermore, the case study of urban sprawl in Bucharest and a comparative analysis between the extension of the city to the north and south will be provided in order to demonstrate the effects in an Easter-European city. As Bucharest is viewed as a city between the orient and occident (Haroiu, 1997) we believe the study will offer a great insight in both the eastern and western perspective of the layout of urban sprawl.

1.2. Definitions of urban sprawl

Urban sprawl is an issue that has been studied in North America since 1950 due to its environmental, economic and social impact. More recently, this subject has attracted the attention of urban researchers and policy makers all over the world (Ewing et al. 2016; Liu et al. 2018). Still, the question remains, why in the last 70 years, urban sprawl has been a phenomenon that has caught on world-wide, even in the face of professionals protesting its downsides? To answer this question, a short review of the origin and definitions that were given to urban sprawl along the way is deemed necessary.

In the 1950s and 1960s, suburban expansion was defined as "a contiguous expansion of existing development from a central core" (Self, 1961). Harvey & Clark (1965) saw the sprawl rather as a stage in the development process and not a static state, just as we see it today in the context of the limitless city. It is suggested that some parts of the urban area can go through a stage where they are considered sprawl to evolve and become part of the city. In

the 1970s, sprawl is considered any development outside the "urban core" (Clawson & Hall 1973)

In the early 1990s, especially in North American literature, the term began to be so often used that it does not have a precise meaning, and defining it becomes a challenge for specialists. (Audirac et al, 1990).

Galster et al.(2001) notes that literature confuses the causes, consequences and conditions of sprawl. Thus they note that sprawl is a complex concept that can be defined in many ways (whether positive or negative) and that "sprawl has become the preferred metaphor for the suburban shortcomings and the frustrations of monocentric cities "(Galster et al., 2001, p. 681). Although there are many definitions of sprawl, they all conclude that not all urban development should be considered sprawl. In addition, there are several types of sprawl with different features. „Sprawl (n.) is a pattern of land use in a urban area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses, and proximity. ”(Galster et al., 2001, p. 685).

Bruegmann (2006) defines urban sprawl as a type of peripheral growth characterized by low density, mono-functionality, unlimited extension and non-contiguous (leapfrog) away from the city centre, consuming the agricultural space surrounding the city.

Couch et al. (2007) notes that the term urban sprawl is generally used with a negative connotation and describes suburban, inefficient, low-density developments around the outskirts of cities. The authors identify definitions that emphasize the idea that sprawl is a pattern of urbanization and other definitions that see sprawl as a process of urban change. In their work, they claim that sprawl is the process of expanding the city.

But sprawl is not always seen negatively, because "from the economists' point of view, space expansion of the city is not necessarily seen as an unwanted work. It is rather an effective adaptation to changing a condition. "(Lechner & Maier, 2009, pg.3).

After reviewing the different approaches to define urban sprawl over time, it is noted that the term is complex and difficult to define because it encompasses many aspects, and is not just a state of development, but rather a process of evolution of the city. However, the European Environment Agency (2006) definition succeeds in summarizing the main physical characteristics of sprawl observed by different authors over time. In trying to remain objective, the European Environment Agency definition does not take into account the impacts of the sprawl on the environment and the city, nor does it provide any quantification of the phenomenon. In conclusion, it is a comprehensive but general definition, leaving room for interpretation when it comes to defining a limit of sprawl analysis.

2. The case study of Bucharest

2.1. Background

The study aims to better understand the role of urban sprawl towards the megacity by making a comparison between the current development in the northern part of Bucharest, Romania which has obvious urban sprawl features, and the development of the southern area. As Romania tries to align its policies for urban planning to European trends, a study on urban sprawl is necessary. As mentioned in the introduction, depending on the geo-political

background, the phenomenon can differ a lot in terms of spatial layout and structure, yet the main characteristics are the same. Considering these factors, it is important to first understand the geopolitical and administrative context of Bucharest, Romania before proceeding to the analysis of urban sprawl in this city.

The metropolitan area considered for this study has an area of approximately 1,450 km^2 and a population of 2,301,255 in 2018 (Eurostat database). In the current administrative territory, the metropolitan area consists of the major city, the capital of Romania, Bucharest, and other adiecent cities in the Ilfov county: Bragadiru, Chitila, Magurele, Otopeni, Pantelimon, Popeşti-Leordeni and Voluntari. In order understand the territory that will be studied, we must first understand the administrative, geographical and sociological aspects of this metropolis. Further, we will expose some general data, first about Bucharest than about the Ilfov county so that further on we can discuss them together, as an entity.

It is necessary for the purpose of this study to clarify some aspects of the urban planning practice in Romania. According to the territory and urban planning law 350/2001, there are three forms of urban plans that have to be designed by private urban planners and then approved by the administration. These plans are:

- P.U.G. –the general zoning master, it is commissioned by the city council and designed by private urban planners and it used to plan the entire city/town/village and to draw the strategic vision for the next 10 years;
- P.U.Z. –the zoning masterplan, it is used by private investors of commissioned by the city council to justify the need for different developments in an area, sometimes it can be used as a derogatory tool to modify or better define zones already defined by P.U.G. .The changes that can be made by a P.U.Z. are in respect to density, height and overall volume of the future development. These cannot exceed with more than 20% the regulations of P.U.G.;
- P.U.D. –the masterplan for a land plot, it is used by investors as a means to show how their future development respects the norms and regulations of the designated zoning as regulated by P.U.G. and P.U.Z. of the area.

Another aspect to consider is the administrative structure of the city and its surrounding areas. Bucharest is the capital city of Romania and it is governed by a central administration, a mayoralty that takes decisions trough the city council. From an urban planning point of view, the responsibility of the city council is to oversee the general urban plan of the city – including zoning and major infrastructure routes– and to analyse and approve or not the different zoning projects that are submitted by public or private investors. The city is further divided into six districts, each with a local council that is responsible for its zoning masterplans. It is important to note that in order to be installed, a P.U.G. has to be approved by the city council of Bucharest and all the committees involved (infrastructure, parks and recreations, culture), the P.U.Z. has to be approved by the city council of Bucharest and the district local council and the committees, the P.U.D. has to only be approved by and the district local council and some committees if it is the case. The Ilfov county has a similar top down administrative structure, as in the county has a county council and each township has a local council. In this case all masterplans have to be approved by both the county and local council and the committees. Therefore, all planning in the metropolitan area considered for

Bucharest are following top down approval in the administration and are often initiated by private developers.

2.2. Beyond the city, towards metropolis

In order to understand the extent to which urban sprawl exists in Bucharest, a series of spatial, functional and socio-economic analyses of the area are needed. To begin with, a geographical and sociological analysis will be made followed by a historical review of the city's expansion in this context.

Bucharest, the capital of Romania, is located in the south of the country, in the central part of the Romanian Plain. The city has an area of 228 km^2 (0.8% of Romania's surface). The urbanised area consists of more than 70% while the remaining is being made up by green spaces (parks, urban forests), vacant land or patches of agricultural land absorbed by the rapid urban development. According to the last national census, in 2011, the city of Bucharest as defined by the administrative boundaries has 1,883,425 inhabitants (this only refers to the residents of the city), 8.8% of the country's population. As additional data from the census, only 51% of the inhabitants of the city are the active population and of these, 18.5% work in the industrial branch, 18.6% in commerce, 12.3% in construction, 3.4% are civil servants (data provided by The National Institute of Statistics/INSSE). The population density is 8,5 inhabitants/ km^2.

Geographically, Ilfov county is situated in the immediate vicinity of the capital city and encircles the it. This used to be more or less the "green and yellow belt" of the city with mostly agricultural land an forestry, but nowadays this territory is as part of the city as any.

The accessibility of the Bucharest metropolis is very good, the major road axes that penetrate the city are represented by the European class roads, national class roads and radial roads, these, in addition to the outer ring road, which circularly arranged.

Bucharest, being the capital city of Romania, is profoundly linked in its developement with the history of the country. From this consideration, in the interest of this case study, a brief history of the expanion of Bucharest will be provided.

Since its inception in 1459, Bucharest has started to grow further north, having a physical limit in the south, namely the Dambovita river. Gradually, it goes beyond this physical limit, and so the southern expansion begins. Before the First World War, the city begins to develop concentrically until it reaches the next natural limits in 3 directions the lakes in the north and the one in the west. In 1918, the year of the unification of the historical provinces, Bucharest becomes the capital of the Romanian state. This is a period of economic prosperity, which is also reflected in the expansion of the built environment, but also in the administrative perimeter of the city. In the interwar period the major traffic routes (Mogoşoaia Bridge, Brătianu Blvd., Coltea Blvd., Lascăr Catargiu Blvd., and others) are modernised and recalibrated to withstand more traffic. This is the area of transition from manufacturing to industrial economy, tact that can also be observed in the fabric of the city. But as Vânau (2009) observes, the modernization of the city does not follow a specific model of spatial organization but rather has heterogeneous influences (Balkan, French, German, Russian) with a pronounced imbalance between the center and the periphery. Bucharest reaches the natural barrier of the North, the Colentina River and manages to overcome it. This is the period when we start seeing that there is a more pronounced spatial development in the north than in the south.

The 1947-1989 period is marked by centralized planning. This started with administrative reorganization, "Bucharest Municipality becomes an autonomous administrative-territorial unit, and Ilfov county, becomes a distinct territorial-administrative unit with a main focus on agriculture. Forced industrialization and urbanization, as phenomenon specific to the communist era, have also imposed on Bucharest the transformation of the built environment, both in quantitative and qualitative terms. "(Vânau, 2009, p. 40). Thus, Bucharest extends its administrative boundaries to those it has today to accommodate the large population. During the communist era, the city's growth was compact, without exceeding the administrative boundaries of the city, largely following the urban planning principles of the Charta of Athens. The expansion was materialized by the construction of the workers' quarters that were meant to accommodate the growing population. Between 1966 and 1977, the population of Bucharest, including that of Ilfov County, increased from 1,596,457 to 2,094,977 (according to the National Institute of Statistics), which means an increase of 23.8% .

After the fall of the communism regime in 1989, by reactivating the economic circuits of real estate supply and demand a new era of development begins for the city. Changing the political regime, privatization processes, and deepening social disparities influence the city's development. The new landowners are looking for the cheapest properties they find in the localities around Bucharest. Thus, uncontrolled expansion spreads to neighbouring localities, guided largely by changes in user values, land prices, and lack of urban planning. As a result of the privatization of industrial areas, there is a phenomenon of urban renewal of the former factories within Bucharest. But the lack free land and urban planning constraints have led entrepreneurs to investment outside the city.

The first developments outside the city are in the form of individual luxury dwellings, mostly in the northern part of the capital. Then gated communities begin to appear. Most of these are marketed as a house close to nature or nature in your yard and are located at considerable distances from the city but do not have access or basic infrastructure. Real estate speculation and the quality of the natural environment in the north of the capital make this area highly sought after by investors. Thus, from 2000 to the present, there is an uncontrolled expansion of the city, especially in the north, west and east. In addition to residential complexes built at considerable distances from the city, logistics parks and logistics platforms or commercial and industrial clusters also develop. From the point of view of accessibility and utilities infrastructure, local governments rarely provide these facilities before the new residential developments are built. For the most part, this type of facilities appears to be a long way after building the residential complexes. There are cases where some residential districts do not have access to such facilities, such as the Henri Coandă Residential Quarter or portions of the private developments in Mogoşoaia, Bragadiru s.a.

This rapid expansion of Bucharest, in particular residential projects, can be explained by the changing of the political regime and citizens' values but also by an increase in population as a result of migration to the urban environment (Vânau, 2009).

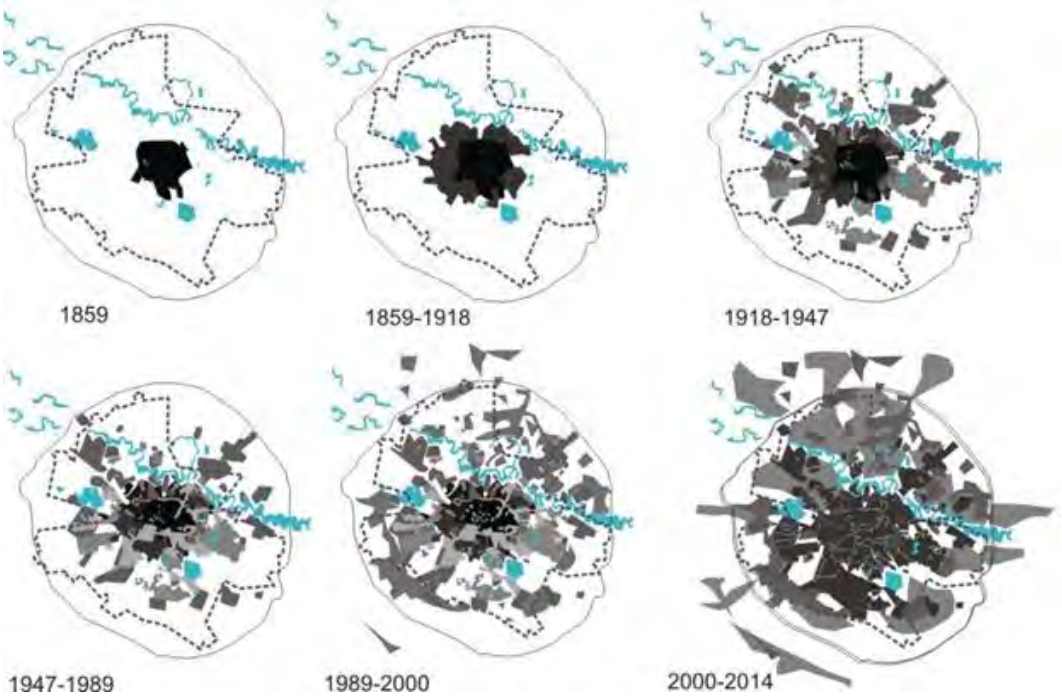


Figure 1 Spatial evolution of Bucharest

The city has extended gradually, sometimes linearly alongside major roads but mostly by fragmentation trough economic speculation. As the analysis progresses, there is clear physical evidence that the north has developed more in density and in the amount of land development.

2.3. Differences in the north and south sprawl

The factors that influence the expansion of urban sprawl in Bucharest are: increased habitation standards (attractiveness), land price, town planning regulations (including the availability of cheap farmland and the possibility of changing their destination), demographic growth, accessibility and access to urban infrastructure. For an analysis of the sprawl situation in Bucharest, these factors need to be taken into account.

Elements of the environment greatly influence the attractiveness of the area. For example, the northern part of Bucharest benefits from several natural elements than the southern part, and this is noticed in the spatial distribution of the sprawl around Bucharest.

There is a strong link between the upward trend in land prices and the area of expansion of the built area (Vânau 2009). In addition, as new residences appear and local governments build or renovate portions of access roads, the price of land increases. As Vânau (2009) remarked, the increase in land price is for developers and individuals is an indicator of the level of attractiveness of an area. Thus "a constructive price-space spiral is established which determines both the price increase and the expansion of the built space" (Vânau, 2009, p. 53).

Considering the discrepancy between the development of the city in the north compared to the south, we consider that a detailed analysis of the differences between the two parts of the city is necessary. This analysis is useful for the study to understand the factors that have led to the development of the north, and how to avoid transforming the southern suburb into an area with the same dysfunctions as the North.

Several natural elements of attraction are present in the northern direction: more than 16 forests (Tunari, Baneasa, Petreşti, Corbeanca, Tamaşi, Andronache, Boldu-Creţuleasca, Ştefăneşti, Bogdana, Moţoc, Costeasca, Mogoşoaia-Chitila, Ileana, Branesti , Pantelimon, Cernica), while in the south these elements are fewer (only 5 forests: Cornetu, Magurele, Jilava, Sinesti and Cretesti and a lake, Mihăileşti lake). In the south, the Glina household waste storage ramp is an unattractive element for potential investors.

Due to the attractive environmental features in the north of the capital and the high demand for land in this part of the metropolitan area, the price of the land in the northern suburbs is higher than in the south. For example, in the Pipera-Tunari area, the average land price is around 250 euro / m2, while in Popesti-Leordeni the average land price does not exceed 110 euro / m2. The discrepancies between the two suburbs are very high in terms of land price.

Residential projects in the northern part of Bucharest are very different from those in the south. First, individual single-family dwellings in the north are built on land generally over 500m2 and have a lower occupancy rate than in the south. This can be observed by comparing the satellite images of the two areas. The lots pattern is clearly different and the density is much lower in the north than in the south.

As for closed communities, the northern ones are developed in the form of parcels meant to save space, but also to suggest a hierarchy of typical houses - from individual dwellings with a larger garden, to coupled dwellings to those that are few in number and have the smallest courtyards. In the south, closed communities are more rare and are usually organized as dormant homes.

Collective dwellings of the gated community in the north of the capital are usually of a very large size (for example, Cosmopolis) and are promoted by being close to nature and having luxurious facilities (swimming pool, sports ground). In the south of the capital, however, collective housing units are smaller in size and have no common outdoors as large as those in the north. Additionally, the distance between buildings is at the minimum allowed by law. Many of these homes are located on Drumul Fermei Street in Popesti-Leordeni. This street has been transformed a lot over the last 10 years, sheltering a lot of real estate investment, not yet fully paved.

As for closed communities, the northern ones are developed in the form of parcels meant to save space, but also to suggest a hierarchy of typical houses - from individual dwellings with a larger garden, to coupled dwellings to those that are few in number and have the smallest courtyards. In the south, closed communities are more rare and are usually organized as dormant homes.

From the observations on the ground, the effects of the economic crisis in the northern suburbs on residential projects are noticed. There are many cases where developer careers have not been fully occupied. For example, the Henri Coandă neighbourhood is inhabited by less than 50% of the rest of the houses being unoccupied even unfinished. This phenomenon is not so common in the southern part of the peripheries since most developments are done through punctual interventions.

The results of field analyses and observations are also supported by the results of the questionnaire conducted for this study. The questionnaire was conducted on a sample of 50 people, of whom 20 lived in the southern outskirts. In terms of habitation, for the northern suburbs, 70% of those surveyed live in a closed residential community - at home or in a block

- while the percentage of those living in a privately-built home is only 28%. However, in the southern part, none of the respondents reside in community-based residential complexes, but 67% live in privately owned houses.

Large commercial projects in the vicinity of Bucharest are located along the major traffic arteries in the northern part of DN1 - Baneasa Shopping Center complex and in the west on the A1 motorway - the Carrefour Militari and Mobexpert complexes and the West Park Militari shopping center the first Designers Outlet in Romania). In the southern suburbs of the capital no such projects were built.

Because of the land price and the attractiveness of the northern area, here are the office parks, such as the North Gate Busines Center on Pipera Boulevard, Voluntari. The southern area, however, is preferred for the development of logistics clusters near the Ring Road, for example in Bragadiru, Popeşti Leordeni, Berceni.

3. Conclusions

The evidence of urban sprawl can also be seen in the data of new development in the city. Since the free market has been established, more and more new housing developments have been pursued. As seen in figure 2, after the economic crisis in 2008, the housing market has taken a fall but in recent years has regained its former glory. A further analysis of the development states that more than 50% of the housing project happened in the sprawled area around the city. This further more highlights the evidence of urban sprawl in Bucharest.

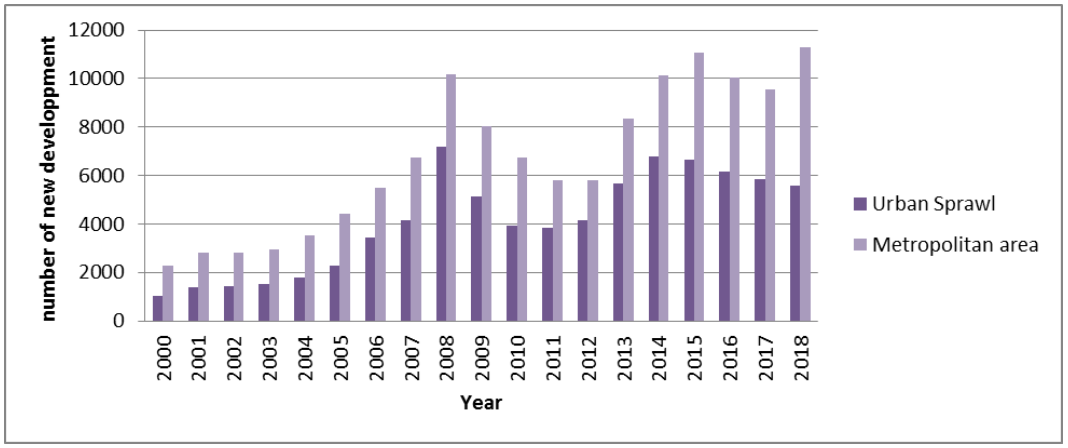


Figure 2 Comparative new development in Bucharest metropolitan area and the sprawled area, data provided by the National Institute of Statistics.

In closing, the research has shown the case of an Eastern-European metropolis and its struggle with the phenomenon of urban sprawl. As we draw the conclusions that this particular metropolis has yet to have coherent policies towards its current chaotic development, some questions still remain for further exploration and for extrapolation to a more global context. How can we, as planners and policy makers integrate the urban sprawl in a megacity? How can this phenomenon, that now is an unplanned mess, help the development of megacities?

4. References

Bruegmann, Robert (2006), Sprawl: a compact history, The University of Chicago Press, Chicago

Clawson, Marion & Hall, Peter (1973), Planning and Urban Growth: An Anglo American Comparison, Johns Hopkins Press, Baltimore.

Couch, Chriss; Leontidou, Lila; Petschel-Held, Gerhard (2007), Urban Sprawl in Europe: Landscapes, Land-Use Change & Policy, Blackwell Publishing, Oxford.

European Environment Agency (ed.) (2006) Urban sprawl in Europe. The ignored challenge. EEA report No. 10/2006, European Environment Agency, Copenhagen.

Ewing, Reid H. (1994), 'Characteristics, Causes and Effects of Sprawl: A Literature Review', Environmental and Urban Issues. FAU/FIU Joint Center

Galster, George; Hanson, Royce; Ratcliffe, Michael R.; Wolman, Harold; Coleman, Stephen & Freihage, Jason (2001), Wrestling Sprawl to the Ground: Defining and Measuring an Elusive Concept, Housing Policy Debate, Volume 12, No 4

Ivanov, Catiuşa; Stoian, Elena; Bălteanu, Florin; Pascariu , Gabriel (2010) “Zona metropolitană Bucureşti”, Observatorul Urban, Vol.1 No. 5 (July-September)

Self, Peter (1961), Cities in Flood: the Problems of Urban Growth, Faber and Faber, London.

Vânău, Gabriel O. (2009), Interfaţa spaţial-funcţională dintre municipiul bucureşti şi teritoriul suport al acestuia, lucrare doctorat, București..

Research Paper

BRINGING CREATIVE ECONOMY TO COMMUNITY RESILIENCE TOWARDS BETTER URBAN GOVERNANCE

The Case of Semarang City, Indonesia

Prihadi NUGROHO, Department of Urban and Regional Planning UNDIP; Indonesia

Abstract

As a growing metropolis in the north coast Java region, Semarang City has been transforming from a port city to a multifunctioning city. Mercantilism tradition has brought forward the local economy into trade and service dominance, shifting the city to become an important marketplace beyond the peripheral boundaries. Interestingly, the city's urbanisation growth does not follow 'a common trend' in Indonesia (and many parts of the world) characterized by modernized urban fabrics with mixed land use. The city is suffered from fragmented physical urban transformation and separated formal and informal economy. The urban sprawling forces are scattered around the city outskirt while the inner city's development filled up by discontinued commercial properties. On the other hand, there is 'a new direction' of urban movement based on the bottom-up kampong revitalisation. Instead of encouraging more modernized physical and economic space, these kampong settlements have proposed creative economy from below useful to (re-)organising the economic space of the urban region. This paper aims to examine how the recent urban transformation in Semarang City has been fuelled by creative economy activities through which the kampong settlements promote local community resilience. Desk study method accompanied by focus group discussions and field observations is completed in pursuit of data collection and analysis. The primary data source is taken from the Local Development Planning Authority project on creative kampong development since 2016. The preliminary results show that kampong-based creative economy movement at the urban scale is beneficial to enhancing the informal economy and urban settlement development. Participatory governance has been strengthened following income generation in situ even though their contribution to community resilience in the long-term still requires further explorations.

Keywords

Creative economy, community resilience, kampong revitalisation, Semarang City

1. Introduction

As a growing metropolis in the north coast Java region, Semarang City has been transforming from a port city to a multifunctioning city. Located next to the Java Sea, the early urban transformation originated from seaport development and coastal settlement in Simongan-Bergota area since the sixth century. Until the mid-1500s, this area remained the city's sea

transportation and trading hub when the ruling administration moved the government quarter to the north in Bubakan kampong settlement. For the next half-century, the urban settlements in the northern Semarang developed intensively, occupying the vacant lands resulted from sedimentation towards the Java Sea. This period marked the rise of the city's dual functions of political-economic governance until the present days (Pemerintah Daerah Kotamadya Dati II Semarang, 1979).

The legacy of the Dutch Colonization era (1602-1942) has created social-spatial segregation of urban transformation. A new urban centre built around the former municipal government quarter – currently known as the old city precinct Little Netherlands – and surrounded by well-developed urban settlements for the upper-to-middle class society including the Dutch officials and European nationalities (first class), and the foreign class of Chinese, Arab, and India (second class). Meantime, the lower class society belonged to *pribumi* (indigenous) citizens who lived in slum kampong settlements outside the urban centre and suburbs. Later, a new residential area built for the upper-class citizens in the hilly Candi area of the Upper Semarang, particularly due to cholera and malaria outbreaks for nearly two decades until 1918 and increased population density in the Lower Semarang area (Pemerintah Daerah Kotamadya Dati II Semarang, 1979; Amalia, Purnomo and Shokheh, 2016; Nugroho, 2016).

To date, a mixed urban land-use in the urban centre surrounded by unorganised kampong settlement pattern has featured the contemporary Semarang city landscape. Mercantilism tradition has brought forward the local economy into trade and service dominance, shifting the city to become an important marketplace beyond the peripheral boundaries. Although the manufacturing industry has remained the leading sector in forming Gross Regional Domestic Product (GRDP) with more than 26 percent share, its contribution tends to decline annually. On the contrary, the share of the trading sector (14 percent) and service sector (16 percent) are growing steadily. Together with the population growth rate at 1.6 percent per annum, the local economic change has accelerated urbanisation pressures across the city. Increased growth of population density from 3.343 lives/km^2 (1990) to 4,628 lives/km^2 (2017) has accelerated urban land conversion to built-up area side-by-side with the economic performance growth (Badan Pusat Statistik Kota Semarang, 2018). Therefore, this paper aims to examine how the recent urban transformation in Semarang City has been fuelled by creative economy activities through which the kampong settlements promote local community resilience.

2. Methods

2.1. Data collection

This research collected data primarily from secondary sources of government publications (i.e., policies, regulations, statistics, and project reports), previous studies, and media news using a desk study method. *Badan Perencanaan Pembangunan Daerah* (Local Development Planning Authority/Bappeda) of Semarang City Government was of the key informant in providing those secondary data and facilitating focus group discussion (FGD). The local development policies included for analysis were *Rencana Pembangunan Jangka Panjang Daerah* (Long-term Development Plan/RPJPD) of Semarang City Year 2005-2025, *Rencana Pembangunan Jangka Menengah Daerah* (Mid-term Development Plan/RPJMD) of Semarang City Year 2000-2005, 2005-2010, 2010-2015, 2016-2021 (RPJMD-2000, RPJMD-2005, RPJMD-

2010, RPJMD-2016), *Rencana Induk* (Masterplan) of Semarang City Year 1975-2000 (RIK-1975), *Rencana Tata Ruang Wilayah* (Spatial Plan) of Semarang City Year 1995-2005, 2000-2010, and 2011-2031 (RTRW-1995, RTRW-2000, and RTRW-2011). A number of regulations concerned with kampong improvement/revitalisation, creative economy, and city resilience were examined and triangulated with previous studies and media news as well.

After completing the desk study phase, the acquired knowledge was verified through FGD and field observations. Both were undertaken by involving multiple stakeholders, i.e., the local kampong activists, village leaders, business entrepreneurs, *Kelompok Sadar Wisata* (Tourism Activist Group/Pokdarwis), *Pembinaan Kesejahteraan Keluarga* (Women's Group on Family Welfare Improvement/PKK), youth groups, community-based organisations (CBOs), and government agencies. This phase focused on 10 out of 177 creative kampong development projects initiated by Bappeda since 2016. Such combined data collection was expected to provide a fuller understanding of the creative economy project at the city level.

2.2. Methods of analysis

Content analysis and descriptive statistical analysis were completed to examine all those data collected through desk study method. Both focused on examining the patterns of urbanisation trend in terms of demographic and land-use change, urban sprawling forces, and the government interventions on directing spatial development and controlling the urban development impacts. Policy coordination and consistency were of the important issue during the research so that the implementation of policies and regulations associated with the urban transformation became critical to the rise and persistence of kampong-based creative economy movement. Subsequently, the case study method applied to explore how the kampong communities respond towards the impacts, particularly their initiatives on reforming the urban fabrics. Their struggle and adaptive capacity to maintain the urban kampong livelihood were interesting to feedback the future urban development policies.

3. Results and Discussion

3.1. Demographic profile of the urbanisation trend

Population size in Semarang City has been growing rapidly for the last five decades. The size recorded in population censuses was 646,590 inhabitants (1971) and rose to 1,024,940 (1980), 1,249,230 (1990), 1,348,803 (2000), and 1,555,984 (2010). In 2018, it was 1,668,578 inhabitants and predicted to reach 2,100,000 by 2030 (Biro Pusat Statistik, 1962, 1972; Badan Pusat Statistik Kota Semarang, 1982, 1991, 2001, 2012; Handayani and Rudiarto, 2014; Badan Pusat Statistik Provinsi Jawa Tengah, 2018). As shown in Figure 1, the increasing population trend occurred at declining growth rate from 2.83 percent (1961-1971) to 0.70 percent (2010-2018) annually, with exception to the period of 1971-1980 when it reached 5.25 percent due to territorial extension in 1976. Referring to *Peraturan Pemerintah* (Government Regulation) of the Government of Indonesia No. 16 Year 1976 about Territorial Extension of Semarang City Administrative Boundaries, the city's region was extended to include additional *kecamatan* (subdistrict) and *desa/kelurahan* (village) of the neighboring Kendal Regency (2 subdistricts, 24 villages), Semarang Regency (2 subdistricts, 26 villages), and Demak Regency (1 subdistrict, 16 villages). Consequently, Semarang City extended from 99.41 km^2 (1950) to 364.81 km^2 (1976) and 373.70 km^2 (1990-present) consisting of 16

subdistricts and 177 villages (Pemerintah Republik Indonesia, 1976; Nugroho, 2016; Badan Pusat Statistik Kota Semarang, 2018).

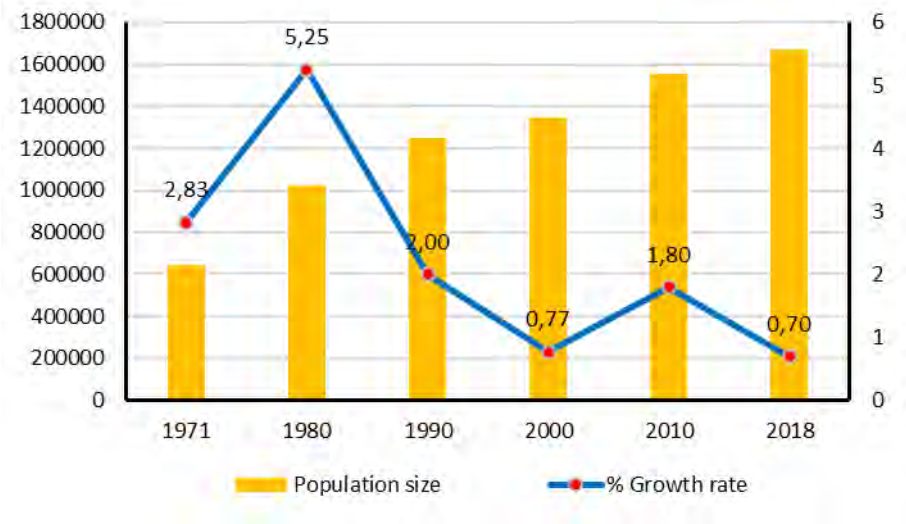


Figure 1 Population size and growth in Semarang City, 1971-2018

Source: Biro Pusat Statistik (1962, 1972), Badan Pusat Statistik Kota Semarang (1982, 1991, 2001, 2012), Badan Pusat Statistik Provinsi Jawa Tengah (2018)

Such territorial extension has led to a significant change of the city's demographic profile. In 1971, the city population lived in an urban area but since territorial extension around 20 percent was living in a rural area (1980-1990), especially in the extended peripheral regions of Semarang City. However, such phenomenon lasted shortly for two decades when the urban population has increased faster to reach more than 90 percent since the 2000s at the lower growth rate (Figure 2).

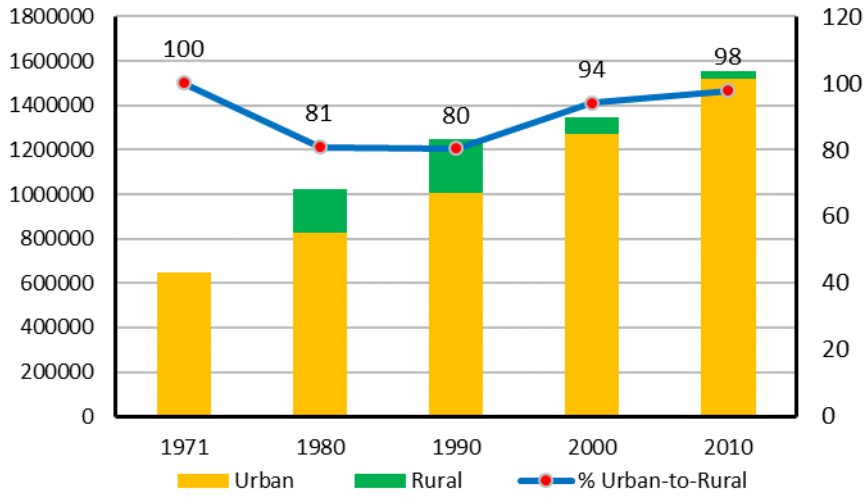


Figure 2 Urban and rural population growth in Semarang City, 1971-2010

Source: Biro Pusat Statistik (1962, 1972), Badan Pusat Statistik Kota Semarang (1982, 1991, 2001, 2012)

3.2. Urban land-use change and sprawling phenomenon

Land conversion from agriculture and rural land to the built-up area is an immediate impact of urbanisation trend in Semarang City. Intensified land use change concentrates on the city centre area, started from the former central business district (CBD) growth triangle Johar-Pemuda-Simpang Lima and dispersed towards the urban fringes, i.e., East Semarang, Genuk, and Pedurungan Subdistricts (east-southeast zone), Banyumanik and Tembalang Subdistricts (south-southwest zone), and West Semarang and Tugu Subdistricts (west zone). Typical land-use change of Semarang City represents radial-concentric pattern when the urban growth spreads out along the axial primary roads and new urban settlements and commercial zones which emerged sporadically close to the existing settlements.

Since the late 1990s, the unorganized urban growth pattern has become prominent in the following years. Initially, both RIK-1975 and RTRW-1995 have divided clearly the urban land parcels into different land use zones. The urban growth direction was plotted to the east-west for industrial development zones supported by low-density settlements in Genuk and Tugu Subdistricts, and to the southeast-south for miscellaneous urban services supported by medium-density settlements. The southwestern part of Semarang City was restricted for the built-up area development and preserved for the water catchment area supported by low-density settlements in Gunungpati and Mijen Subdistricts. Meantime, the CBD development remained to concentrate around the city's growth triangle area consisting of the earliest subdistricts, i.e. East Semarang, West Semarang, Central Semarang, North Semarang, and South Semarang Subdistricts, for mixed land use functions of commercial, public services, transportation hubs, and high-density settlements. In practice, the local government policy shift and massive capital investment accelerated land conversion responding the pursuit of the city's long-term vision to become a modernized metropolis underpinned by religious, orderly, and cultured society by 2025. New town development to build a satellite city in the peripheries, new growth centres in the suburbs, large scale housing projects, industrial estate development projects, and commercial building blocks were built across the city scatteredly. The absence of sound zoning regulation and strict law enforcement of building permit made the urban growth uncontrolled, leaving the development control interrupted by the conflicting interests of private investors, neighbourhood communities, and individuals. As a result, the urban sprawling phenomenon has unavoidably occupied the agriculture and rural areas, green open spaces, and vacant or less productive lands.

Figure 3 illustrates the phenomenon clearly where the development of built-up areas in the peripheries is poorly unanticipated, causing the urban discontinuum persistence. Numerous landed housing projects built by private developers and individuals outnumbered the public housing projects. Following the land rent curve law, cheaper landed houses (and commercial buildings) were found in the so-called peri-urban areas. Despite supported by adequate public facilities and infrastructure, such sporadic market-based development has promoted a dual-face urban form portraying a disharmonious mixture of the orderly modernized urban space against the ill-developed peri-urban area and the in-between kampong neighbourhood. Unbalanced public investment has forced population in the peri-urban areas to access the public facilities and infrastructure more expensively. In contrast, the kampong dwellers living around the CBD area have surrendered their livelihood towards poor public goods in the slum neighbourhood. Consequently, the city is suffered from fragmented physical urban transformation and separated formal and informal economy.

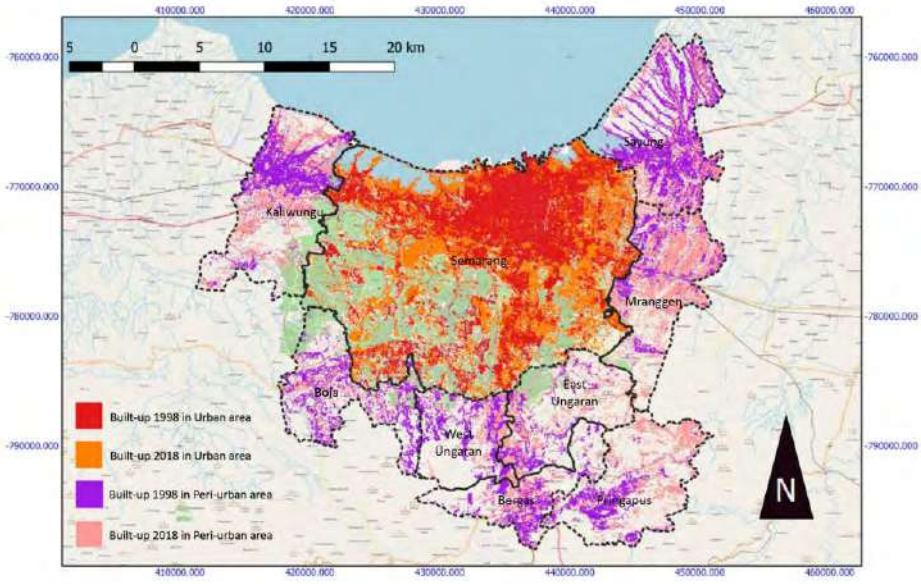


Figure 3 Built-up area growth in Semarang Metropolitan Region, 1998-2018

Source: Sejati, Buchori, and Rudiarto (2019)

3.3. Implementation of the creative kampong development program

To overcome urban poverty and slums, the city government introduced a creative kampong development program in 2016. Under the city's mid-term development program called by *Gerakan Bersama Penanggulangan Kemiskinan dan Pengangguran Melalui Harmonisasi Ekonomi, Edukasi, Ekosistem, and Etos Bersama Masyarakat* (Social Program for Eradicating Poverty and Unemployment through Harmonization of Economic, Education, Ecosystem, and Ethos Aspects of Local Development) – abbreviated with GERBANG HEBAT – the government addressed a kampong-based community empowerment approach to encourage the local residents in designing kampong revitalisation program suitable to the local condition. Hence, each kampong would have a specified thematic kampong development program to promote local uniqueness for household income generation through various social and economic activities such as tourism attraction, local entrepreneurship, and civic engagement.

It was a social innovation program aimed at lowering poverty and unemployment rates, improving slum upgrading, promoting local wisdom for managing potentials and resolving problems at the neighbourhood level, and creating new tourism destinations. The program outputs included the improvement of synergetic collaboration between actors responsible to poverty eradication programs, the integrated implementation of poverty eradication programs, the improved coverage of targeted poverty groups with reference to available poor citizens database, and the achievement of program implementation monitoring. A multidimensional approach was completed to support program implementation through community empowerment of the kampong dwellers to build self-organising groups in coping with the local neighbourhood problems and potentials (social approach); the cultivation of local entrepreneurship atmosphere at the kampong neighbourhood level for stimulating the creation of new business startups (economic approach); beautification of public space in the kampong neighbourhood combined with the improved public facilities and infrastructure

(physical approach); and civic engagement in building the localized identity and social character (cultural approach).

By 2018, a program evaluation conducted by the local Bappeda found that economic reasoning dominated program implementation (53 percent), followed by social (35 percent) and infrastructure (12 percent). The economic reasoning was supported by the facts that there were economic potentials driven by the community-based creative economy group and the availability of natural and human resources in each kampong. On the social dimension, the key indicators included community participation, high poverty rate, and the immediate social problems in kampong neighbourhood. For infrastructure concern, the selected kampong featured slum neighbourhood, unorganized settlement pattern, and less green space occupation. In fact, the evaluation, which administered public perception from multiple stakeholders involved in the program implementation, revealed that the most likely goal achievement of the creative kampong development program was local economic sector generation (42 percent). The social empowerment goal posed the second rank (40 percent) and followed by physical kampong improvement (18 percent). This finding indicates that program implementation has fulfilled public expectation (Badan Perencanaan Pembangunan Daerah Kota Semarang, 2018).

The key actors responsible to the program implementation were local entrepreneurs (45 percent), public servants/retired (26 percent), businesspersons (10 percent), housewives (7 percent), industrial employees (7 percent), and the others (5 percent). Mostly they came from the middle age group 41-55 years (48 percent) and the elderly group above 55 years (40 percent) while the youth group below 40 years participated in the program was only 12 percent. They represented various CBOs, i.e, *Kelompok Swadaya Masyarakat* (Community Self-Organising Group/KSM), PKK, Pokdarwis, small and medium enterprise (SME) group, and youth group with direct support from village and subdistrict government and some external actors from universities, state-owned enterprises, and private companies. Such composition authorised the kampong society to take control of the program implementation from the beginning. Our recent survey has found that the determinants of program implementation are civic engagement (37 percent), business activity (29 percent), public infrastructure provision (22 percent), and external actors' support (12 percent). Surprisingly, the largest budget allocation for realising the program was spent on physical projects. Around 60-75 percent of the program expense was for public facilities and infrastructure upgradings like road access, drainage system, entrance gate, public park and lighting, and mural decoration. The rest expense was for community empowerment projects in forms of various training in business development and entrepreneurship. In fact, the major obstacles that have inhibited the program implementation came from the lack of kampong community capacity in terms of their willingness to participate, knowledge and skills, and technological adaptation. As a result, the program implementation heavily relied on the roles of local champion or smaller community group in driving the overall project planning and implementation from below (Badan Perencanaan Pembangunan Daerah Kota Semarang, 2018).

Of the overall targeted kampongs, 91 kampongs focused on local economic development projects (51 percent), 58 kampongs on environmental conservation projects (33 percent), and 28 kampongs on social development projects (16 percent). The economic projects were generated by the local SMEs and home-based enterprises (HBEs) which produce food and beverages (52 percent), handicraft (28 percent), and service (20 percent). In contrast, more homogeneous projects were found in the environmentally-based kampong development

projects with waste management and urban farming activities, and the social-based projects with children an elderly person caring activities and cultural event attractions. Regardless of thematic focus, all kampongs observed showed social cohesion persistence in daily life. To some extent, they could manage social interactions well but this fact has not contributed directly to their moderate participation in the program implementation. They have realised the importance of civic engagement during the decision-making process from below, but their reluctance to get involved more actively was associated with self-pragmatism to obtain the individual benefits of the program implementation. Hence, the roles of local champion and the elderly group – to whom the kampong society have surrendered the decision-making process – have remained dominant in directing it. In turn, such hierarchical social structure has led the creative economy manifestation was overshadowed by these driving actors' interest. Alternatively, their roles were replaced by village government even though it jeopardised the program's spirit of kampong-based community empowerment into top-down structuralist governance.

3.4. Kampong neighbourhood as an alternative urban space

The rise of creative economy movement within the recent kampong development program in Semarang City Kampung may provide a solution to fix disharmonious urban space. This could be seen as an evolutionary kampong development program. The first generation called as Kampung Improvement Program (KIP) was introduced during the colonial government in the 1920s as a response towards the Dutch Parliament members of the opposition parties who demanded better living conditions for urban populations in the colonies. Surabaya and Semarang were among the first cities which promoted KIP implementation by the municipal government before it was extended to other cities until the next two decades. In 1969, the Government of Indonesia announced a comprehensive KIP under *Rencana Pembangunan Lima Tahun I* (the first Five-Year Development Plan/Repelita I) by introducing participatory approach due to the limited resources that the government had to continue the former top-down KIP implementation. Jakarta was the first city which adopted such participatory KIP implementation. These early KIP forms featured physical improvements in the basic urban infrastructure and services within the kampong neighbourhood and funded by foreign lending. Due to the successful achievement of the first generation of KIP, between the 1980s and 1990s, it was extended to secondary cities and smaller towns ('Kampung Improvement Program: Policy Issues and Local', 1989; World Bank, 1995; Reerink and Gelder, 2010).

Distinguished from the early KIP models, the Semarang case has gone further by embedding place bonding of the kampong dwellers with their settlement, economic activities, and social cohesion. The enhanced public facilities and infrastructure in the kampong settlement are likely to increase the residents' sense of belonging and attachment to their neighbourhood due to the increased quality of life (Amalia, Purnomo and Shokheh, 2016). This could be more intensified because of beautification decorative projects on the kampong's public space from which new tourism spots may exist as well. As the local business growing, many more residents will be interested in doing business from their homes, either as a primary or secondary source of income generation. With the support of social cohesion manifested in the local CBOs' activities, collective awareness for maintaining the improved kampong's physical appearance and urban services as well as the local business sustainability may persist.

Unfortunately, the so-called physical improvement in the kampong's settlement utilities and vibrancy does not fit the economic functionalities that the local business demands for. The

local SMEs and any other home-based enterprises (HBEs) depend on supply chain networks from their close neighbourhood in order to lower their production cost (Harvey, Hawkins and Thomas, 2012; Pratt and Hutton, 2013). They also require specific utilities such as logistic warehouse, workshop, waste treatment unit, parking lots for customers, and marketing gallery, which are commonly attached to their residential homes. In the Semarang case, the program has failed to resolve such basic requirements for the local business. Rather, these issues have remained on the business owners' responsibility to resolve so that in many places this situation has raised social conflicts with the neighbours. The program failure to offset the economic benefits with social amenities could be harmful to community participation and social cohesion. This situation has contributed to lowered or even dysfunctional organisational capacity of the local CBOs to administer the program implementation.

However, the recent creative kampong development program in Semarang City has founded principle approaches to build community resilience in the kampong neighbourhood. Both direct and indirect impacts resulted from place-based local business and tourism attraction have created an alternative urban space to shelter, work, and foster social cohesion within the embedded society at once. Instead of replacing the former kampong appearance with the modernised urban fabrics, the program supports more integrated networks of urban services by preserving the prevailing social cohesion and place bonding. Local wisdom and uniqueness of the kampong settlement are maintained along with the growing economic viability and organisational capacity of the local CBOs to further the program sustainability.

4. Conclusion

Three years of the program implementation are too short to examine the creative kampong development program in Semarang City to come up with such an overarching conclusion regarding its contribution to theoretical building and evidence-based policymaking. It is too early to claim that such renewed KIP model is successful in slum upgrading and poverty eradication in the city. However, the preliminary results have shown that kampong-based creative economy movement at the urban scale is beneficial to enhancing the informal economy and urban settlement development. The kampong residents can continue their local business without being threatened by the extended urbanisation forces across the city. Rather, could have maintained the on-going informal economy side-by-side with the modern urban sectors. In addition, participatory governance encouraged by the program has been strengthened following income generation in situ even though their contribution to community resilience in the long-term still requires further explorations.

5. References

Amalia, Rizky; Purnomo, Arif; Shokheh, Mukhamad (2016) "Kampongverbetering dan Perubahan Sosial Masyarakat Gemeente Semarang Tahun 1906-1942", Journal of Indonesian History, Vol. 5 No. 1, pp. 43–51.

Badan Perencanaan Pembangunan Daerah Kota Semarang (2018) Kajian dan Evaluasi Kampung Tematik di Kota Semarang. Semarang: Badan Perencanaan Pembangunan Daerah Kota Semarang.

Badan Pusat Statistik Kota Semarang (1982) Penduduk Kota Semarang Hasil Sensus Penduduk

1980. Semarang: Badan Pusat Statistik Kota Semarang.

Badan Pusat Statistik Kota Semarang (1991) Hasil Sensus Penduduk 1990 Kota Semarang. Semarang: Badan Pusat Statistik Kota Semarang.

Badan Pusat Statistik Kota Semarang (2001) Penduduk Kota Semarang Hasil Sensus Penduduk Tahun 2000. Semarang: Badan Pusat Statistik Kota Semarang.

Badan Pusat Statistik Kota Semarang (2012) Hasil Sensus Penduduk 2010 Kota Semarang. Semarang: Badan Pusat Statistik Kota Semarang.

Badan Pusat Statistik Kota Semarang (2018) Kota Semarang dalam Angka Tahun 2018. Semarang: Badan Pusat Statistik Kota Semarang.

Badan Pusat Statistik Provinsi Jawa Tengah (2018) Provinsi Jawa Tengah dalam Angka 2018. Semarang: Badan Pusat Statistik Provinsi Jawa Tengah.

Biro Pusat Statistik (1962) Sensus Penduduk 1961 Republik Indonesia. Jakarta: Biro Pusat Statistik Republik Indonesia.

Biro Pusat Statistik (1972) Sensus Penduduk 1971: Penduduk Diperintji Menurut Propinsi dan Kabupaten/Kotamadya. Jakarta: Biro Pusat Statistik Republik Indonesia.

Handayani, Wiwandari; Rudiarto, Iwan (2014) "Dynamics of Urban Growth in Semarang Metropolitan – Central Java: An Examination Based on Built-Up Area and Population Change", Journal of Geography and Geology, Vol. 6 No. 4, pp. 80–87. doi: 10.5539/jgg.v6n4p80.

Harvey, David C.; Hawkins, Harriet; Thomas, Nicola J. (2012) "Thinking Creative Clusters Beyond the City: People, Places and Networks", Geoforum. Elsevier Ltd, Vol. 43 No. 3, pp. 529–539. doi: 10.1016/j.geoforum.2011.11.010.

"Kampung Improvement Program: Policy Issues and Local" (1989) Journal of Planning Education and Research, Vol. 9 No. 1, pp. 79–83. doi: https://doi.org/10.1177/0739456X8900900112.

Nugroho, M. Luthfi Eko (2016) Pergeseran Kebijakan Tata Ruang Kota Semarang 1975-2011: Dari Pembangunan Sektoral Menuju Keterpaduan Ruang, Tesis. Universitas Diponegoro.

Pemerintah Daerah Kotamadya Dati II Semarang (1979) Sejarah Kota Semarang. Semarang: Pemerintah Daerah Kotamadya Dati II Semarang. Available at: http://ebook.perpus.jatengprov.go.id/2018/sejarah-kota-semarang/#/6.

Pemerintah Republik Indonesia (1976) Peraturan Pemerintah Republik Indonesia Nomor 16 Tahun 1976 tentang Perluasan Kotamadya Daerah Tingkat II Semarang. Jakarta: Pemerintah Republik Indonesia.

Pratt, Andy C.; Hutton, Thomas A. (2013) "Reconceptualising the Relationship Between the Creative Economy and the City: Learning from the Financial Crisis", Cities. Elsevier Ltd, Vol. 33, pp. 86–95. doi: 10.1016/j.cities.2012.05.008.

Reerink, Gustaaf; Gelder, Jean-Louis van (2010) "Land Titling, Perceived Tenure Security, and Housing Consolidation in the Kampongs of Bandung, Indonesia", Habitat International. Elsevier Ltd, Vol. 34 No. 1, pp. 78–85. doi: 10.1016/j.habitatint.2009.07.002.

Sejati, Anang Wahyu; Buchori, Imam; Rudiarto, Iwan (2019) "The Spatio-temporal Trends of Urban Growth and Surface Urban Heat Islands Over Two Decades in the Semarang Metropolitan Region", Sustainable Cities and Society. Elsevier, Vol. 46 (July 2018), p. 101432. doi: 10.1016/j.scs.2019.101432.

World Bank (1995) Enhancing the Quality of Life in Urban Indonesia: The Legacy of Kampung Improvement Program, Indonesia Impact Evaluation Report. Washington, D.C.

Case Study / Project

Metropolitan Management:

Expansion, Governance and Finance

Pedro B. ORTIZ

Abstract

Metro-Urban expansion is challenging world development. Only 3 cities in world history have been one million-plus inhabitants. Now we have 500. These Metro-Cities produce 75% of world GDP. Many are expanding at a 5% annual rate. They double their size every 14 years. Lack of a methodology for expansion is producing an uncontrolled pattern, jeopardizing development and equity. Challenges and alternatives will be discussed.

Research Paper

Chinese Megablock Urbanism

a Tool of Limitless Urbanization at an Unprecedented Speed and Scale

Yixuan PENG, The Hong Kong Polytechnic University; Hong Kong, China
Gerhard BRUYNS, The Hong Kong Polytechnic University; Hong Kong, China
Darren NEL, The Hong Kong Polytechnic University; Hong Kong, China

Abstract

In what way can the study of megablock typologies in the PRD deliver better insight in terms of process and scales of Chinese urbanization?
In the Chinese context, the 'collective' has stood central to its urbanisms and processes of urbanization (Lu, 2006). As a state where ownership and territoriality are retained by a socialist system, the basic elements of this (urban) model have remained the creation of collective housing founded on publicly owned land. From the 'neighbourhood-unit' (邻里单位) and 'working-unit' (单位大院), to 'commodity housing' (商品房) (Lu, 2006), these practices gradually shape Chinese cities in "Socialism with Chinese characteristics" into what can only be termed 'megablock' urban fabrics.
Where, 'Mega' infrastructure in cities, or better yet, megablocks, embody the antithesis of open and transparent entities. Beyond its organization with the physical network (transportation or public service), they impact the urbanization process in terms of speed and scale. The Chinese urban population has risen from 18% in 1978 to 58.5% in 2017 (National Bureau of Statistics of China, 2018). Between 1991 and 2000, 83% of Shanghai's residential compounds became enclaves, with the Guangdong Province alone witnessing the formation of 54,000 closed-off compounds, covering more than 70% of the city surface and housing more than 80% of its population (Miao, 2004).
Broadly speaking, former and ongoing studies of Chinese urbanization are yet to provide a clear perspective of megablock development, both in terms of the unprecedented context and its spatial impact.
This paper aims to address concerns pertaining to the megablock phenomenon: its impacts on urban morphology as well as its prevalent strategies as an urban model. The argument presented here hopes to touch upon the links between planning and the eventual morphological expression of megablock development, and possibly argue for the cultivation of an urbanization practice that needs to become systematic in its sustainable focus and outcomes.

Key words

Chinese megablock urbanism, scale, rapid urbanization

1. Introduction

There is no denying the significance of understanding "scale" in urban studies in China (Miao, 2013). In either daily life or theoretical analysis, the 'mega' scale has become part and parcel of the Chinese context intuitively observed by researchers, citizens or even outsiders as a key and foundational role in all dimensions and formats of urban issues. However, scale, at the same time, is often overly underestimated in many studies of Chinese urbanization.

When examining the form of Chinese urbanism and its spatial organization, one should understand both the meaning and roles of scale and its mechanization in any type of urban development. This brings in its wake other questions that pertain to whether the elements of scale can be fully conceptualized and theorized to act as the basic conceptual framework and analytical tools for analyzing the historical conditions pertaining to Chinese urban form as well as future trajectories of Chinese urbanisms and their evolution processes. In addition, it questions whether it is possible to conduct a secondary level of research that can reveal the opportunities and threats of this 'scalar' model, not only applicable to the Chinese context but also relevant to other urban settings elsewhere. Moreover, what perspectives are implicitly hidden behind the study of Chinese mega scale? The above questions would ultimately lead to the study of the "ultra-large-bigness" as a factor for accessing all formats of Chinese urban forms.

In traditional Western philosophy, relatively, the size of a city or country should be controlled to a reasonable scale. Plato had a thorough discussion about the size of the polis which has been regarded as one of the most classical and influential theoretical frameworks in understanding Western cities. Plato's *The Republic* (380 B.C.) regards the expansion of the city-state as the ultimate cause of the segmentation between the rich and the poor, or political factions within the city. In his view, the polis is suitable to be built in a place that is neither too close nor too far to the port and the population size should be around 20,000. Aristotle further agreed with Plato's opinion that cities should not expand too far away from their designated scale. Therefore, when the size of a polis is too large, some sort of procedure would be required to redistribute the populous to form another secondary polis, so that the size of the city-state can always be kept to an appropriate size.

Inherited with such concepts of social organisms and their limits, the Western perception has difficulty in digesting the material dimensions when observing Chinese city scales. They seem to be unfamiliar with this civilization form, almost equivalent in size to an entire European territory, that has already functioned and operated as a territorial 'unit' for more than a thousand years. This scale challenges the urban philosophy and common sense of Western scholars. As a result, the perception and interpretation of "ultra-large-scale" have emerged.

The majority of existing studies place more emphasis on the challenges and complexity that scale brings to China's urban problems (Wang & Zhang, 2016). When examining and discussing China's super-large scale, many researchers would often state that due to China's huge scale and volume, the urban space remains "big and unreasonable" (Ibid). As such, the basic research paradigm is to appropriate the various criteria of "normative urban morphology" to investigate the challenges and difficulties that are brought about by the "ultra-large-scale" tolerance and function in the conventional spatial scales (Guo, 2019). Based on this typology, a large number of Chinese urban special theories are built upon this or its extension.

The broader framework of this research starts touching upon the question of Chinese 'mega' scale as a discernible scale paradigm. The assumption is based on the following three facts: firstly, the mega scale is inherited from the traditional city-state ideology evident from the historical project; secondly, the socialist public system of the New China has by default had to address the mega phenomena as part of its social-spatial mandate; thirdly, China remains the world's most populated country resulting in the majority of the territorial strategies being mega developments. Collectively these contribute to rethinking the question of scale, more specifically the impact of how and in what terms the 'mega' is utilized in the Chinese context.

Focusing on its radicalness of speed and scale, this paper specifically aims to investigate the formative and material definitions of Chinese mega-development at the urban block scale. Two cases are highlighted of what is defined as Chinese megablock urbanism (CMU), as a model of Pearl River Delta (PRD) urban agglomeration. As such, CMU has become instrumental, as a tool of limitless urbanization, that as yet remains undefined.

2. Background of Chinese Megablock Urbanism

2.1 Definition of "Megablock"

Scale is a fundamental requirement for urban study. Not only is scale essential for conceiving actual proposals and projects, but it remains crucial to inform the diversity of spatial nomenclatures to comprehend and access space itself. The term "Mega" has been widely used in describing spatial forms. In the domain of architecture, *S,M,L,XL* by Rem Koolhaas and Bruce Mau (1995), weaves together OMA projects according to "size", challenging conventional understanding of architecture, scale, and the city. Examples listed within the 'size' category are: small – Villa Dall'Ava, St. Cloud, Paris, 1991; medium – Kunsthall, Rotterdam, 1992; large – Congrexpo (Lille Grand Palais), Lille France, 1994; and extra-large – Bijlmermeer Redevelopment, Amsterdam, 1986 (see Table 1). Koolhaas discusses 'Bigness' in an intriguing way:

> *"Beyond a certain scale, architecture acquires the properties of Bigness. ... Of all possible categories, Bigness does not seem to deserve a manifesto; discredited as an intellectual problem, it is apparently on its way to extinction - like the dinosaur-through clumsiness, slowness, inflexibility, difficulty. But in fact, only bigness instigates the regime of complexity that mobilizes the full intelligence of architecture and its related fields." (Koolhass and Mau, 1995, p495-497).*

Scale	S	M	L	XL
Example	Villa Dall'Ava, St. Cloud, Paris, 1991	Kunsthall, Rotterdam, 1992	Congrexpo (Lille Grand Palais), Lille France, 1994	Bijlmermeer Redevelopment, Amsterdam, 1986
Image				

Table 1. Examples of architectural projects classified by the scale of S,M,L,XL by Rem Koolhaas and Bruce Mau (1995)

Moreover, the use of "mega" as a descriptive term is more commonly associated with overall city definition and not sub-components of what constitutes the city. We trace the origins of the concept of 'mega' to Patrick Geddes (1915). Later the concept was repackaged into the term 'megalopolis' referred to first by Spengler (1918) and later by Lewis Mumford (1938) in Lewis' book *The Culture of Cities*. Lewis uses the megalopolis to describe the excessive development and expansion of cities, and how this has direct bearings on the decline in social quality. Mumford provides six stages in the growth of a city: 1. Eopopis, 2. Polis, 3. Metropolis, 4. Megapolis, 5. Tyrannopolis, and 6. Necropolis. They all refer to single entities as cities operating and functioning under their own operative logic. In more recent definitions, the United Nations (2014) defines each 'megacity' as urban agglomerations that exceed 10 million inhabitants. This essentially shifts the meaning from a single-entity reading

of the mega into a dimension of multiple territories as parts of mega and urban development.

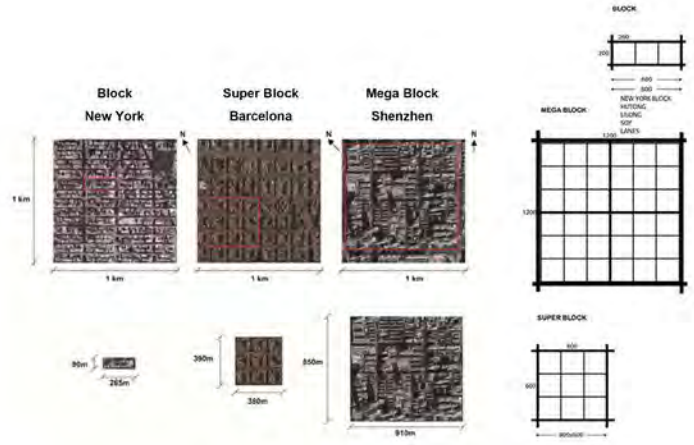


Figure 1. Diagram of a block-superblock-megablock. Left: aerial photos of New York block, Barcelona superblock and Shenzhen megablock. Right: diagram of the block system from Shane 2014. Source: author; Shane (2014)

Shifting focus to the intermediate scale; more specifically, between building and city, at the level of street block; the concept of "mega-block" has been widely mentioned. Still, 'mega' and its relation to the 'block', something we postulate as the 'megablock', remains undefined in its actual properties of morphological characteristics. An urban block can be defined as a plot of land enclosed by streets (definition by for example *Code of Urban Residential Areas Planning & Design* GB50180-2018). A block system is commonly seen as the model that differentiates urbanized from unurbanized area development. Adopting the block principle, urban blocks allow buildings to be located along the perimeter of blocks with entrances facing streets, which attempts to provide ideal social interactions between people (Frey, 1999). Block development is referenced by a variety of scholars. For instance, Alzraikat (2016) indicated a changing capacity and scale of urban organization over time associated with terms such as block, superblock, and megablock. Accompanied with the growth of cities, an urban hierarchy is defined by block sequences. While Siksna (1997) conducted research on the effects of block size and form with samples from North America and Australia. Shane (2014) defined the enlarging and nesting blocks by the city's expansion. He demonstrated

> *"The scale of the block dimensions shifted over time, enlarging its area from its small scale-early beginnings with 1.6acre blocks in grid formations, to 16acre super blocks to 160 acre or more megablocks". (Shane, 2014. see Figure 1).*

2.2 Urbanization at an Unprecedented Speed

In general, urbanization is divisible into three stages according to the level of development: 1. initial period, 2. rapid development period and 3. stable saturated period (Zhu, 2004). Empirical studies in Western urban planning and development processes have demonstrated that the focus of urban planning corresponds to its urbanization level (Tortora et al., 2015). In 1978, accompanied by the economic reformation and opening-up policies, China's first national urban planning guideline emphasized acceleration of the urbanization process. At a global scale this remains unprecedented. In the past four decades, China experienced the largest and fastest industrialization and urbanization process in the history of the world. From 1978 to 2017 (38 years), China's urbanization rate increased from 17.9% in 1978 to 58.5% in 2017 (40.6% growth), with the number of permanent residents in urban areas increasing from 170 million to 810 million (476.47% growth) (National Bureau of Statistics of

China, 2018). Echoed within the urban dimension, this accounts for roughly 40 years of reform that was accompanied by four decades of radical Chinese urbanization (see Figure 2).

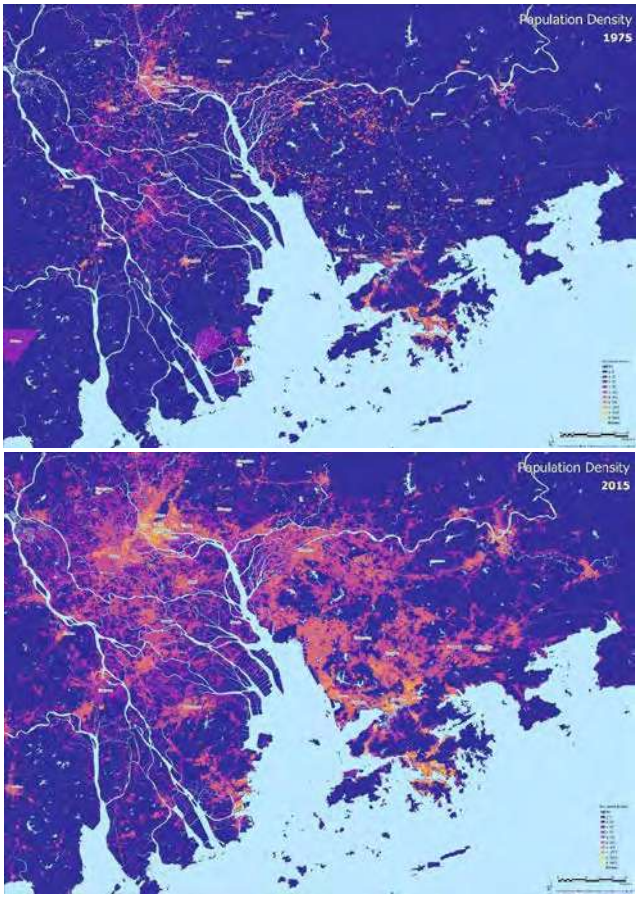


Figure 2. Forty years' urban population density change in the PRD, left: 1975, right: 2015. Source: data from GHS and maps from author.

In a 'modern' sense, radical and mega conditions of Chinese urbanization have emerged with distinct characteristics evident in its spatial and morphological complexes. Rapid urbanization in the Chinese context, starting from the Reform and Opening-up in 1978 has shown levels of urban growth, leaping from 17.9% to 40.5% in 2003. China's 'Great Leap Forward of City' in 25 years, has reached the level of urbanization (from 20% to 40%) equivalent to what The United Kingdom achieved over 120 years, or the United States over an 80-year period (Yin, 2010, p2). After 1992, which is the year the official market economy replaced the former planned economic incentives, Chinese urbanization accelerated to 1.2% per year (three times the world's average in the same period (Ibid)).

2.3 A Tool of limitless Urbanization in Terms of Scale

To achieve this unprecedented rapid urbanization, interventions and new tools are indispensable. Globally, there is a growing phenomenon that is being discussed under the heading of "Big Plans" as stated by Kolson (2001). From the changing nature of urbanization in scale, we witness other qualities emerging in the Chinese context. For example, it has become standard practice for Chinese planning to develop a megacity that is six times larger than Paris or ten times that of London (Li & Li, 2006). Within the framework of big-plan, the development of mega urbanization requires the incorporation of surrounding villages or adjacent cities as part of one administrative boundary. As a consequence, mega-projects entitled 'development districts' (开发区), 'new towns' (新城), 'university towns' (大学城), oversize plazas, lawns, infrastructures, amongst others, courbanize (Yin, 2010), pushing

megablock development as *the* dominant form of planned urbanization. Within the 'Great Leap Forward' context, urbanization relies on a housing model that has shifted from the planned work unit into market-driven real estate. Megablocks claim the titles of the "largest compound in China", and constantly surpass the sizes and scales of conventional planning in a Western sense. For instance, the Clifford Estate (CE) developed in the 1990s captures 100,000 residents within 5 km², with the Huaguoyuan development in the 2010s capturing 420,000 residents in 4 km². If we compare the scale of urban blocks in China with other big cities around the world, the differences are evident (see Figure 3).

Compared to European cities of the same period, Chinese city blocks have always been much larger, in both ancient times (Guo, 2019) and after the 1949 establishment of the People's Republic of China (PRC). Existing models of development easily exceed more than 20 hectares, which is regarded as a tribute to the ancient Lifang (里坊, neighbourhood) system (Sun & Liang, 2003). The adaptation of the Soviet Union's models of 'microdistrict' within the PRC's planning practice, on one hand merged with Chinese traditional collective housing, whilst on the other hand, gradually easing planning into more real estate-driven megablock systems. Morris (2013) pointed out that, in traditional European cities, every small plot of land is orientated along the street to promote a sense of equality to ensure that every resident has a view or access to the street. However, with the limited depth of buildings, the short edge of the street also faces its limit, forming a relatively small scale of blocks. Herein the smallness of plot and block remains the essential planning component.

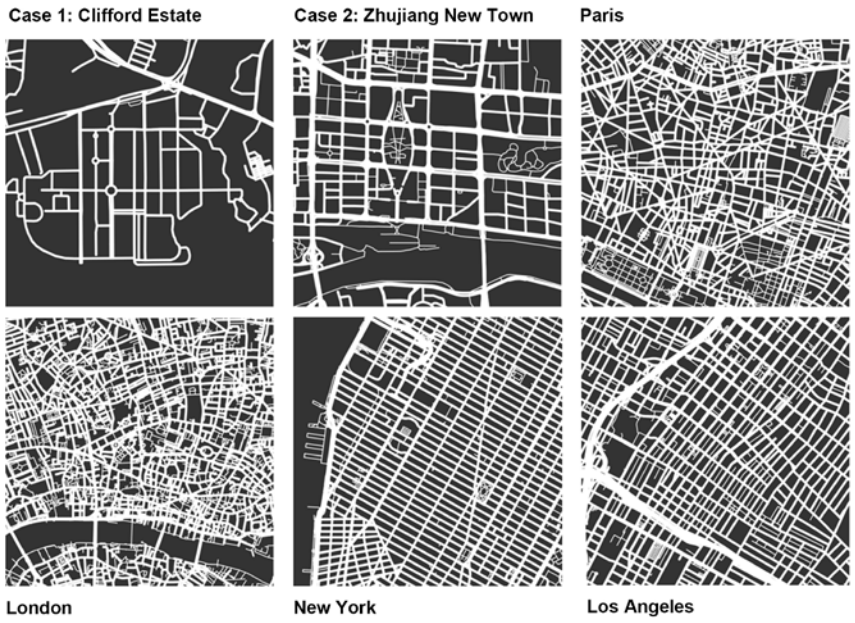


Figure 3. Density of the road-plot within CMU cases versus Paris, London, New York, and Los Angeles. Road width reflects the hierarchy of the road network. Source: author.

According to Table 2, which shows the Chinese planning code for designing residential blocks, and which also exceeds the European standard. This scaling up of block size implies that policies and technical standards have shifted the understanding of planning scale. In February 2016, the State Council and Communist Party's Central Committee adopted new guidelines that call for; (a) compacter cities with denser networks of streets, (b) more pedestrian and cycling lanes, better public transport, mixed-use zoning, and (c) more green space (Normile, 2016). This new planning policy would indicate a conceptual shift in terms of the 'block'. As Table 2 shows, the increase for all spatial dimensions remains a key difference in the new planning codes, currently advocated by the central government to all the planners and planning schools within China.

Distance / Scale	15min Living zone	10min living zone	5min living zone	Living neighbourhood
Walking distance (m)	800-1000	500	300	—
Population	50,000-100,000	15,000-25000	5,000-12,000	1,000-3,000
Dwelling number	17,000-32,000	5,000-8,000	1,500-4,000	300-1000

Table 2. Renewed planning code in 2018 controlling the size of blocks at multiple levels. Source: Code of Urban Residential Areas Planning & Design (GB50180-2018)

3 Research Scope and Methodology

3.1 Scope of Study

As a second part to this paper, the main aim here is to set up an operative framework for urban morphological study of Chinese Megablock development. The emphasis to date has concentrated on the PRD region in its newly established Greater Bay Area Framework, which includes the Guangdong-Hong Kong-Macau Greater Bay Area. The two selected cases referred to herein are the Clifford Estate (CE) in Panyu, and the Zhujiang New Town (ZJNT) in Tianhe. This paper attempts to cover the basic characteristics of megablock examples to demonstrate the CMU model, as well as to conduct options of spatial analysis to test certain qualities of megablocks. These aspects derive from a larger body of research related to mega development, that questions:

(1) In what way can the study of megablock typologies in the PRD deliver better insight in terms of processes and scales of Chinese urbanization?

(2) By studying cases in the Pearl River Delta region of south China, would it be possible to deliver other insight that are able to explain how megablock urbanism shapes Chinese cities with the current urbanization practices' unprecedented speed and scale?

3.3 Research Methodology

The research presented herein draws from the discipline of urban morphology to demonstrate the spatial characteristics of the CMU model. By evaluating selected factors and variables, the focus is to understand what CMU actually stands for in urbanization practices.

The CMU empirical methodology takes into account the configurative properties of the urban plot in regard to various factors. As shown in Table 3, megablock properties are expressed using plot dimensions in relation to land use, functional configurations and mobility, each with their distinct variables and measure sets.

Data were collected through multiple sources which included: local government regulatory plans, OpensStreetMaps, open access maps and the statistical data website Map World (https://www.tianditu.gov.cn/), run by China's State Bureau of Surveying and Mapping (SBSM), Google Earth, big data extracted from Baidu Map (map.baidu.com) and real-estate websites including Fang Tianxia (fang.com), Lianjia (lianjia.com), and Centaline Property (centanet.com), field work and proofreading of data conducted during the data collection phase.

Case analysis was conducted using the following steps:

(1) Visualization of the site including building type and 3D model;

(2) Preparing base maps from aerial photos and online maps;

(3) Mapping the main features and facilities of the case;

(4) Calculation of centrality with sDNA in ArcGIS;

(5) Reflection of data analysis leading to the findings of the study.

In combination, the tentative findings relate both formal and spatial findings that combine to form new datasets with variables.

Theme	Concept	Indicator type	Name	Scale	Formula
Land use	Urban form	Intensity	Human density	District /Neigh-bourhood	$\frac{Nb\ of\ People}{surface\ of\ selection\ (m^2)}$
			Building density (FAR)	D/N	$\frac{Floor\ Area\ (m^2)}{Selection\ Area\ (m^2)}$
			Housing density	D/N	$\frac{Nb\ of\ Buildings}{surface\ of\ selection\ (m^2)}$
			Coefficient of land occupancy	D/N	$\frac{Coverage\ Ratio\ (m^2)}{Selection\ Area\ (m^2)}$
		Diversity	Subdivision intensity	D/N	$\frac{Nb\ of\ Subdivisions}{Selection\ Area\ (m^2)}$
			Diversity of subdivision size	D/N	$\frac{1}{Cat}\sum_{i=1}^{Cat}\left[1-\frac{S_{tot\,i}S_i^m}{A}\right]^2$
			Diversity of land use	D/N	$\frac{1}{Cat}\sum_{i=1}^{Cat}\left[1-\frac{S_i}{S_i^{obj}}\right]^2$
Mobility	Urban form	Intensity	Surface occupied by the road network	City/D	$\frac{Road\ Area\ (m^2)}{Selection\ Area\ (m^2)} * 100$
		Connecti-vity	Connectivity of the car grid	D	$\frac{Interesection\ Number\ of\ Car\ Grid}{Selection\ Area\ (m^2)}$
Configuration	Urban form	Centrality	Closeness	C/D	$MGL(x)=\frac{\sum_{y\in R_x} d_M^E(x,y)W(y)P(y)}{\sum_{y\in R_x} W(y)P(y)}$
			Betweenness	C/D	$Betweenness(x)=\sum_{y\in N}\sum_{z\in R_y} W(y)W(z)P(z)OD(y,z,$ $OD(y,z,x)=\begin{cases}1, if\ x\ is\ on\ the\ shortest\ path\ from\ y\ to\ z\\ \frac{1}{2}, if\ x=y\neq z\\ \frac{1}{2}, if\ x=z\neq y\\ \frac{1}{3}, if\ x=y=z\\ 0, otherwise\end{cases}$

Table 3. Criteria of urban morphological study, selected by author, reference: Salat (2011); sDNA

4 Case Studies in the PRD

4.1 Case Study 1: Clifford Estate (CE), Panyu

Land use							Mobility		Configuration	
Intensity				Diversity			Intensity	Connectivity	Centrality	
Human density	Building density (FAR)	Housing density	Coefficient of land occupancy (Coverage)	Subdivision intensity	Diversity of subdivision size	Diversity of land use	Surface occupied by the road	Connectivity of the car grid	Closeness	Betweenness
20,000/km^2	0.8-5.3	Figure 4-A/B	Figure 4-A/C	Figure 4-A/C/D	Figure 4-A/C/D	Figure 4-C	Figure 4-A/C/D	Figure-5	Figure 5-left	Figure 5-right

Table 4. Indicator of case study 1: CE

The Clifford Estate (CE) is a residential compound developed by Clifford Group and is situated within the Panyu District, Guangzhou. It is a mega gated community with a low density occupying over 5 km²; the total Floor Area Ratio (FAR) is 0.8 with Green Ratio (GR) of 75%. Its planning strategies include big environment, large supporting facilities and mega transportation (official website). Since its establishment in 1991, it has sold more than 30,000 units, with a permanent population of more than 100,000 people, and 200,000 owners. Facilities include clubs, stadiums, banks, police stations, fire stations, hospital, shopping mall, international schools, and shuttle bus terminals.

Results from mapping and collected data are crosschecked by empirical field work, shown in Figure 4. CE is regarded as a mega residential development with only parts alongside the arterial road open to the public, and with the majority area enclosed and further sub-divided into 26 gated communities. From the analysis of building changes over time, distinctive characteristics include: early phase development (around 1991-2002) has been driven at the most rapid speed and scale on over 60% of its total area, with mainly low-density four storage buildings of 0.8 FAR. After that, project number and intensity drop, occupying less land but elevated building floors and FAR, as high as 5.3 for the Clifford Wonderland built in 2017. The land use map shows that there is a limited mix of functions across the whole mega compound. At the same time, through the mapping of its facilities, the results demonstrate an inequitable spatial distribution of its communal resources, alongside insufficient diversity of jobs and business.

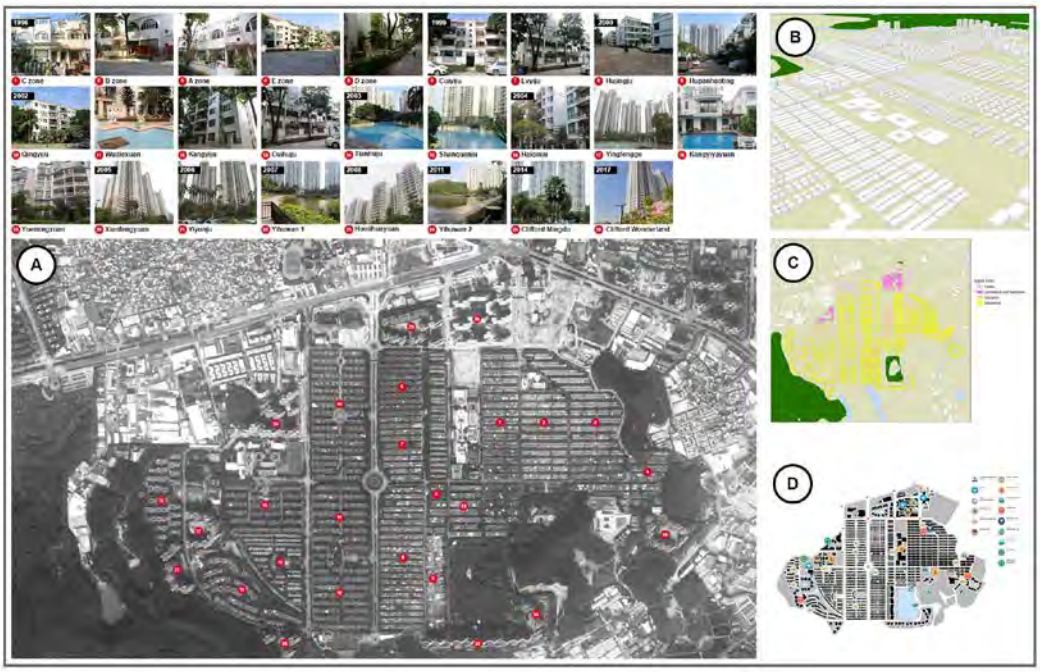


Figure 4. Clifford Estate. A: Aerial photo with building types ordered by constructed year; B: 3D building volume model; C: Land use; D: Main features and facilities. Source: author.

The CMU model's characteristics were further tested by means of other measures. For this effect, we used the Spatial Design Network analysis (sDNA) in ArcGIS to calculate the centrality analysis of closeness (a measure of access) and betweenness (potential flow along a route). The centrality was calculated at two kilometres and ten kilometres network radii, with the former being equivalent to about 25 minutes of walking and the latter to 10 or 20 minutes of driving. Other radii were tested but due to the large size of urban blocks in the region they did not represent the local and mezzo scales well. In the results shown in Case study 1, the closeness within the internal area of CE is relatively high, indicating relative access internally. However, the closeness at the larger scale indicate that CE is isolated from the larger network. Similar results can be seen for betweenness, which future confirms CE isolation from the urban road network.

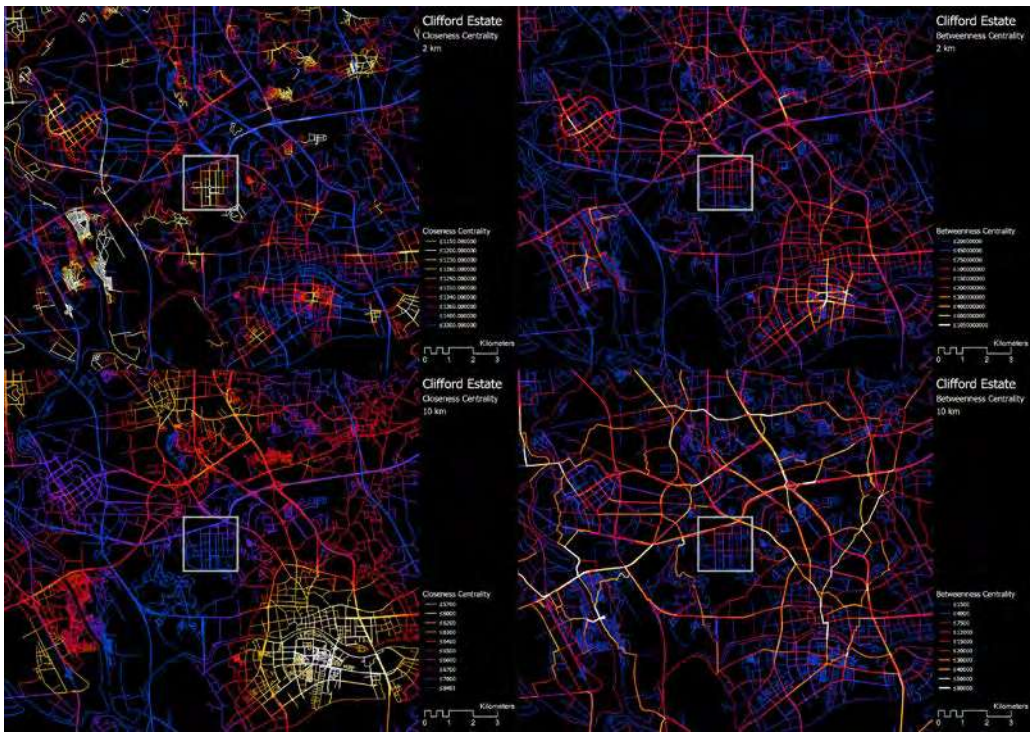


Figure 5. CE centrality analysis of closeness and betweenness in 2/10 km. Source: author.

4.2 Case Study 2: Zhujiang New Town (ZJNT), Tianhe

Land use							Mobility		Configuration	
Intensity				Diversity			Intensity	Connectivity	Centrality	
Human density	Building density (FAR)	Housing density	Coefficient of land occupancy (Coverage)	Subdivision intensity	Diversity of subdivision size	Diversity of land use	Surface occupied by the road	Connectivity of the car grid	Closeness	Betweenness
56,000/km^2	3.4-14.9	Figure 6-A/B	Figure 6-A/C	Figure 6-A/C/D	Figure 6-A/C/D	Figure 6-C	Figure 6-A/C/D	Figure-7	Figure 7-left	Figure 7-right

Table 5. Indicator of case study 2: ZJNT

Zhujiang New Town (ZJNT) is the main component of Guangzhou Tianhe Central Business District (CBD). Tianhe CBD is one of the three national-level CBDs approved by the State Council, and serves the Pearl River Delta Economic Zone. ZJNT has an area of 6.6 square

kilometres and a total floor area of 13 square kilometres (Fang et al., 2009). In 1992, the municipal government decided to develop a regulatory plan for ZJNT based on Thomas Planning Services, Inc.'s proposal. According to this plan, it would reach a residential population of 170,000 to 180,000 and provides nearly 350,000 to 400,000 jobs.

Mappings and analysis of the ZJNT area are shown in Figure 6. In general, this case shows a higher intensity of development in regard to both speed and scale compared to case study 1. Due to the accessibility of data, the focus of the architectural type is residential developments. Despite its initiation from the early 1990s, the earliest commodity housing compound was built in 1999. Mixed with gated and open communities, buildings, in this case, are high-rise with FAR from 3.4 to 14.9, declining from the central axis on both sides. The mix of land use, diversity and intensity equity distribution of facilities all show higher degrees compared to the CE.

Figure 6. ZJNT. A: Aerial photo with building types ordered by constructed year; B: 3D building volume model coloured by FAR; C: Land use; D: Main features and facilities. Source: author.

The centrality test of ZJNT results demonstrate how the megablock differs from the smaller urban block. In two-kilometre centrality tests, the ZJNT internal network placed at a medium level; however, it revealed a separation from the historical core of the city (Yuexiu), while also creating a new urban node at the lower level. The closeness test at the ten kilometres

radii indicated a lower level of proximity between spaces in ZJNT compared to old districts (Yuexiu and Tianhe) and showing the influence of modern planning on access at the mezzo level. In addition, the ten-kilometre betweenness test showed that ZJNT is surrounded by a clear super-grid structure, showing a high dependency on arterial roads.

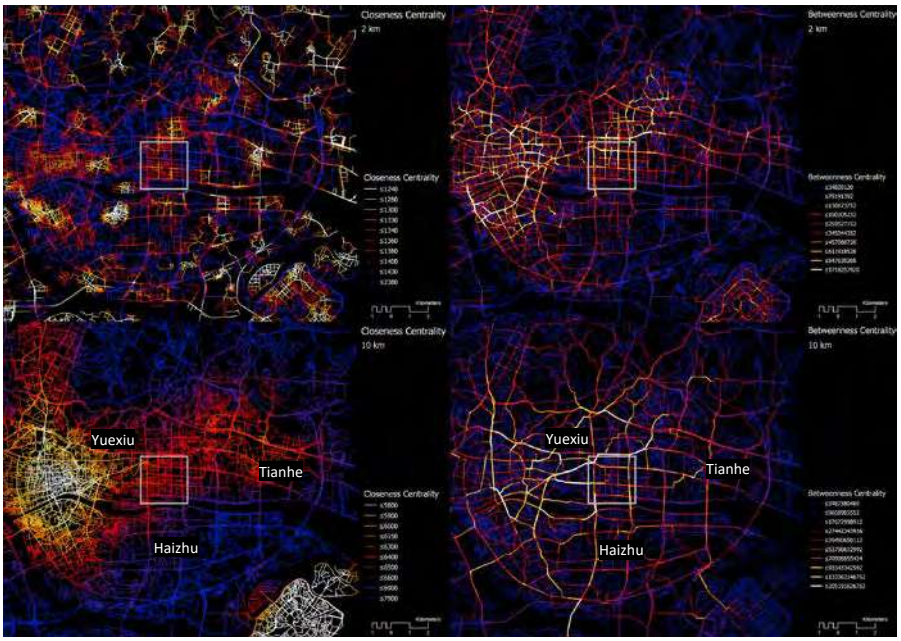


Figure 7. ZJNT centrality analysis of closeness and betweenness in 2/10 km. Source: author.

5 Conclusion and Discussion

The results from both cases show that Chinese rapid urbanization has taken place at an unprecedented speed and scale. Development models and tools differ from other countries, and moreover, the scale of the mega forms a contributing planning factor thanks to radical urban growth. Through the study of its evolutionary tract and the two cases shown, CMU reveals intriguing spatial characteristics and qualities that are worth being further investigated. Adaptations and interventions of analysis tools for CMU are essential for the future study. This requires not only new tools, but also new methods as well as conceptual framing. However, current lessons that we could learn from the Chinese rapid urbanization have not raised enough attention from either Western nor Chinese scholars, especially under the nation's exporting strategies, such as for example, "The Belt and Road" initiatives. Future research will continue to explore the phenomenon of CMU, under the perspective of urban morphology, in a more systematic and sustainable direction.

References

Lu, D. (2006) Remaking Chinese urban form: modernity, scarcity and space, 1949-2005. Routledge.

National Bureau of Statistics of China (2018) Statistical Communique of the People's Republic of China on the 2017 National Economic and Social Development. China National Bureau of Statistic Press.

Miao, P. (2004) Cancer of urban life: problems of gated communities in China and their solutions. Time Architecture, 5, pp.46-49.

Miao, P. ed. (2013) Public places in Asia Pacific cities: Current issues and strategies (Vol. 60). Springer Science & Business Media.

Plato. et al. (2000) The Republic, Cambridge: Cambridge University Press.

Wang, J. and Zhang, Y. (2016) Optimization & control of large-scale urban spatial form based on decision support system for land development intensity. Scientia Sinica (Technologica). Vol. 6.

Guo, L. (2019) "Review of the Studies on Ancient Chinese Urban Form in the Western World Since the Mid-20th Century", Urban Planning International, Vol. 3 (February).

Koolhaas, R. et al. (1995) Small, medium, large, extra-large : Office for Metropolitan Architecture, New York: Monacelli Press.

Patrick, G.(1915) Cities in evolution. London: Williams & Norgate.

Spengler, O. (1918) The Decline of the West, trans. Charles F. Atkinson.

Mumford, L. (2016) The culture of cities (Vol. 19). Open Road Media.

Frey, H. (2003) Designing the city: Towards a more sustainable urban form. Taylor & Francis.

Alzraikat, S.A.S. (2016) The garden block: A new model of superblocks towards socioecological cohesion. Illinois Institute of Technology.

Siksna, A. (1997) The effects of block size and form in North American and Australian city centres. Urban morphology, 1(1), pp.19-33.

Shane, D. G. (2014) Block, Superblock and Megablock, A short history. Retrieved from http:// http://www.arcduecitta.it/world/2014/01/block-superblock-and-megablock-a-short-history/

Zhu, J.M. (2004) The Logic of the Development of China's Urban Planning Theories under Market Economy. Journal of Urban Planning Association, 2004(06).

Tortora, A. et al. (2015) Rural landscape planning through spatial modelling and image processing of historical maps. Land Use Policy, 42, pp.71-82.

Yin, G. J.(2010) The Great Leap Forward of City. Wuhan: Huazhong University of Science & Technology Press.

Kolson, K.L. (2001) Big plans: The allure and folly of urban design. JHU Press.

Sun, H. and Liang J. (2003) Urban Morphological Analysis of Chang'an Lifang in Tang Dynasty. City Planning Review. Vol. 10.

Morris, A. E. J. (2013) History of urban form before the industrial revolution. Routledge.

Normile D. (2016) China rethinks cities. Science 352(6288): 916–918

Salat, S., Labbé, F. and Nowacki, C. (2011) Cities and forms: on sustainable urbanism. CSTB Urban Morphology Laboratory.

Fang, H. et al. (2009) Zhujiang New Town Planning and Development Review. City Planning Review. Vol.S2

Research Paper

Integrating Vertical Farming at Scale in Urban Food Planning

Practical Considerations for Planners

Daniel Petrovics, MSc; Hungary/Netherlands

Abstract

At all stages of food production and consumption, resources are utilized in an inefficient manner and at an unprecedented rate, clearly affecting urban food systems. This raises future concerns in terms of climate change, and in terms of long-term food security and availability for growing urban populations. A supply-side solution to these issues - with particular potential in megacities - is Vertical Farming (VF), a high-yield form of controlled environment agriculture with promised potential to produce fruits and vegetables within cities, ultimately reducing their resource intensity. This research builds on an Urban & Regional Planning MSc thesis conducted at the University of Amsterdam. The research aims to provide a practical guide for planners, who aim to integrate Vertical Farming into urban food planning. Through this, an indication of whether and how VF can contribute to reducing the impact of food systems in terms of anthropogenic climate change is provided, and ultimately, it helps to understand if and how VF can be up-scaled for further impact. The research utilized an abductive approach with a qualitative design, where 17 experts working in the field were interviewed. These experts represent academia, consultancy, municipal officers, entrepreneurs, and investors. The findings are particularly applicable to planning with VF in cities in and integrative manner. The findings relate to 26 separate factors, along the lines of categories developed by van Doren et al. (2018). These categories include: Measures for Low-Carbon Urban Development, Operational Arrangements, Policy Context, Market Context, Social-Cultural Context, and Natural and Built Context.

Keywords

Vertical Farming, *Urban Food Systems*, *Up-Scaling*, *Sustainability*, *Low-Carbon Urban Development*

1. Introduction

The growing complexity of global food systems has produced a number of undesired social and environmental externalities in the past. This is particularly true for how food is consumed in urban areas, ultimately building a global network of extensive and resource intense supply chains (Steel, 2013; Ilieva, 2016). The amount of resources consumed in the process, raises future concerns in terms of the climate impact of food systems as well as in terms of availability of staple foods for growing (urban) populations.

Ultimately these problems require the assessment of potential interventions in light of multiple considerations and integrated systems perspectives, whilst keeping the goal of sustainable urban development in mind. To illustrate the wicked nature of this problem, an urban food systems lens can be utilized for assessing a potential technological intervention, which promises to contribute to greening the way food is produced and consumed in cities. This specific intervention is that of Vertical Farming (VF) – a form of closed environment agriculture (CEA), capable of producing fruits, vegetables, and medicinal plants (Despommier, 2010) on multiple physical layers. This technology is particularly suitable for urban environments, as it allows for the efficient use of space, as the surface area of the given farm is not a limiting factor anymore when it comes to food production. Next to this, VF promises to reduce the resource use of global supply chains due to its localized nature, can provide year-round supply of produce, and does not require the use of pesticides (Ibid.). Nevertheless, questions have been raised as to how the high energy demand resulting from the use of aquaponics systems and LED lighting among other unaccounted for externalities should be considered for if one plans for truly sustainable urban food systems (Al-Kodmany, 2018).

This paper outlines, based on the framework developed by van Doren et al. (2018), what practical factors need to be taken into consideration when it comes to successfully planning for the up-scaling of VF, and through this embedding this technology in the city as a Low Carbon Urban Initiative (LCUI). Van Doren et al. (2018) outline two pathways to up-scaling – horizontal and vertical. Horizontal up-scaling entails the spatial reproduction of a given technological intervention, both in terms of quantity, as well as in terms of size. Vertical up-scaling describes the institutional embedding of a technology, be that in terms of policy, culture, or economy among others. In total van Doren et al. (2018) outline 19 factors, which should be considered – these factors have been amended with 7 additional factors, which emerged throughout the data analysis period. This is due to the structuring of the research design through an abductive approach. The principle data collection method was that of semi-structured key informant interviews, with a total of 17 having been conducted with the informants' perspectives representing different geographies as well as constituencies.

This article focuses primarily on practical considerations, which urban planners should consider when planning to apply the technology of VF to transitioning to sustainable urban food systems. The research is based on the data collected as part of an MSc thesis, forming a part of the Urban and Regional Planning MSc degree at the University of Amsterdam. The theoretical findings of the research are presented in a separate publication (Petrovics & Giezen, forthcoming), and for this reason this article should be utilized as a practical guide primarily.

In the following, the article discusses the theoretical framework in more detail, summarizes the methodological approach taken, outlines the practical considerations for planners in detail, and briefly concludes.

2. Theoretical Perspective

In an attempt to accelerate urban development trajectories towards low-carbon pathways, it is essential to understand what pioneers, innovators, and ultimately urban planners need to take into consideration whilst planning for socio-technical interventions. Van Doren et al. (2018) outline that such Low Carbon Urban Developments (LCUDs) are informed by scalable Low Carbon Urban Initiatives (LCUIs). As mentioned in the process of scaling these initiatives, two types of pathways exist: horizontal and vertical. Horizontal pathways entail the spatial reproduction of LCUIs (e.g. through introducing physically larger interventions, or through introducing a higher number of initiatives in a given city). Vertical pathways entail the institutional embedding of these initiatives (e.g. through transitioning the policy landscape, establishing favourable market conditions, or affecting the levels of awareness when it comes to a new innovation).

The linkage and relationship of vertical and horizontal pathways to up-scaling LCUIs does not follow in a linear relationship; rather the two pathways interact in a dialectic manner reinforcing each other in a virtuous cycle. This framework can also be linked to Geels' (2002, 2011) Multi-Level Perspective (MLP) on sociotechnical transitions, in that it describes the specific interactions between *niche* and *regime* level dynamics, and in particular helps one understand the process of scaling *niche* initiatives into a *regime*.

In order to analyse these potential pathways the up-scaling framework of van Doren et al. (2018) has been amended with a set of factors, which emerged throughout the data collection process – marked with an asterisk. In total 6 categories, exploring 26 factors allow for understanding how urban planners should assess LCUIs and in particular work with VF for the sake of sustainable urban food systems. The categories and factors are as follows:

Measures for LCUD

- Financial Advantage
- Reliability
- Low Complexity
- Integrative Functions*

Operational Arrangements

- Leadership
- Stakeholder Involvement
- Resource Mobilization
- Communication
- Logistics*

Policy Context

- Regulatory Policy Instruments
- Financial Policy Instruments
- Informative Policy Instruments
- Political Leadership
- Trust in the Policy Framework

Market Context

- Low Capital and Instalment Costs
- Expertise and Skills of Supply Actors
- Information Availability
- Access to Credit
- Energy Price
- Market Dynamics and Conditions of Peripheral Industries*
- Insurance*

Social-cultural context

- Environmental Awareness and Values
- Consumption Culture*
- Product Qualities*
- Social- and Power Relations*

Natural and Built Context

- Technical Compatibility

3. Methodology

As mentioned, the research is based on the data collected for the completion of the thesis as part of the MSc degree in Urban and Regional Planning, completed at the University of Amsterdam. The research design took an abductive approach, and by this not only produced findings related to VF but also amended the set of factors outlined above. The primary method for data collection was semi-structured key informant interviews. These interviews were conducted with 17 experts working with VF in different geographical regions and capacities. The perspectives of these accounts span academia, consultancy, municipal officers, entrepreneurs, and investors. The anonymized accounts of these interviewees are marked with 3-digit codes. The practical considerations outlined below build on their accounts in combination with the slim literature existing on the applicability of VF as an innovation.

4. Practical Considerations for Urban Planners

The following section outlines the findings based on the amended theoretical framework of van Doren et al. (2018). As mentioned, the findings are based on the 17 interviews conducted in the spring of 2018, which follow three-digit codes for reference. The section outlines, factors falling under measures for LCUD, operational arrangements, the policy context, the market context, the social-cultural context, and the natural and built context.

4.1. Measures for LCUD

Financial Advantage. The financial advantage and profitability of vertical farms is generally dependent on external factors and the business model of the farm. The external factors can be categorized on the lines of real estate and land availability, economic conditions affecting this availability, food scarcity, and the scale at which the operation takes place. As is generally the case with Urban Agriculture (UA), VF is also directly dependent on land availability and is hence receptive in periods of economic downturns, as vacant buildings and lots are more available, and accessible at lower prices in these times (004). This directly affects the viability and profitability of VF as well, especially if the business models consider the availability of vacant space necessary (017). Flipping this logic on its head, economic peeks produce competition in the real estate sector, which makes land less available to UA and VF (e.g. Amsterdam in the recent years) (012, 017). Next to this the scale of the operation also counts, as small-scale installations are not likely to be profitable. This is a typical example of capital expenditure intense industries becoming profitable at scale (011).

The business model related factors can be categorized on the lines of pricing and the ability to charge a premium, the potential for integrating multiple sites within one business, and the potential for integrating functions. Food scarcity and the distance fresh produce has to travel directly impacts the profitability of VF, as this is where premiums can be charged for local and fresh produce (011). If a city is dependent on imports it is sensible to introduce VF and there is potential to charge premiums on the fresh produce. Moreover, dependent on the economic conditions (as is outlined above), business models, which integrate different types of land availability can produce a financial advantage. For example, combining a small-scale, downtown demonstration project, which showcases the technology and produce to consumers, with a large-scale peri-urban

production facility can off-set the incurred financial weight of high land prices in the centres of cities (013). A further type of integration, which can enhance the financial advantage of VF is to integrate functions by for example including some form of hospitality directly linked to the farm (017). This type of integration is explored in detail further below.

Reliability. In terms of horizontal pathways VF is reliable to a certain extent if the installations generally work in self-contained, replicable units or blocks, which allow for easy scalability. This is necessary, as VF is a form of CEA, as is discussed above, which requires tight control over all growth parameters. The production logic of CEA in terms of produce quality directly contributes to the reliability of VF, as the physical aspects of crops are fully controllable, meaning that the visual and aesthetic, the taste, the health and nutritional value, and the shelf life of produce can be directly controlled (010). Due to these factors, the logic of self-contained units has proved successful in the industry on various scales – e.g. InFarm introduced these types of units directly in super markets (InFarm, 2018), CoolFarm utilizes plug-and-play farms (CoolFarm, 2018), while Agrilution has created household level units the size of a small fridge (Agrilution, 2018) (008, 014, 016). The following account from an Innovation Manager from a large tech company working with VF components fittingly describes how this dynamic creates tensions, when one aspires to repurpose vacant space in cities:

> *"I love the whole idea that you take space and transform it into a vertical farm. I love it but I don't believe in it, because with that it's not scalable. I always think you can take an existing old warehouse and build into it another house for vertical farm. But to make it really scalable you need to have always the same set up. […] You need to standardize modules which you can put somewhere, but it always needs to be and in itself an existing ecosystem and not relying on the real infrastructure which the warehouse has given." (016)*

This means that the reuse of vacant spaces is only possible if a self-contained unit is built within the given structure. This way the installation can fulfill the requirements of CEA and can contribute directly to the scalability of the initiative. All these points are however dependent on the knowledge of optimal growth recipes (light, temperature, humidity, nutrition, etc.), which is not yet present in the industry (004). Once these recipes are developed to a sufficient extent, automation and robotization can also enhance the effectiveness of VF (004, 013).

In terms of vertical pathways, the availability of horticultural technolgy and knowledge (e.g. extensive multi-generational knowledge in the Netherlands) can serve as a catalyzer as VF follows many of its principles (008). This being said, a structural restraint persists in terms of staple foods:

crops, such as rice, potatoes, and corn are still difficult to grow in VF (008). Finally an urban planner responsible for green projects in Amsterdam suggested that viable, existing, and functioning examples make municipalities receptive to the technology, as this directly proves it's reliability in the eyes of public authorities. The mentioned example is GROWx in Amsterdam, and the way it is perceived by the municipality as a functioning farm (017).

Low Complexity. As mentioned before the availability of horticultural technology makes the technology utilized in VF available and reliable as well (009). This means that highly developed greenhouse and horticulture industries, such as the Dutch one, can catalyze technological developments as well and can play a great role in ensuring the reduced complexity of VF (015). Nevertheless a key caveat in the industry is that many startups and companies try to develop all of the technology themselves and by this try to reinvent the wheel, ultimately increasing complexity (013). This is unnecessary and risky, as it is better to focus on the core business model of a farm, instead of on developing every single component when such an industry is in the period of innovation (016).

In terms of horizontal up-scaling firstly inefficient practices are common, which reduce the effectiveness of individual plants (e.g. double scissor lifts moving up and down multiple times during harvest) (006), and secondly CEA makes it difficult to make use of vacant spaces due to hygiene considerations (bacteria and plant diseases), if not utilizing the above-outlined self-contained units or blocks (004, 016). Next to this, a further factor that contributes to excessive complexity is that due to the recency of VF, start-ups typically work in silos and wind up developing all the components, which also means that there is no standardization for these components in the industry (e.g. trays, lights, piping etc.) (009, 006, 015). Nevertheless, initiatives are under way to remedy this – the Association for Vertical Farming (AVF) is pushing for industry level standardization (e.g. in components, and dataformats for control systems) (015, 016).

Integrative Functions. This emergent factors is essential, as multiple interviewees outlined that the reliability, viability, and most importantly profitability of VF in this phase of innovation is dependent on integrating food production functions of a farm with other functions (003, 009, 002). These integrative solutions include firstly, functions for marketability (e.g. proximity of the produce and a story) (003), secondly, functions for environmental sustainability (ecosystem services, biodiversity, enclosing nutrient cycles, etc.) (003), thirdly, thermodynamic functions (e.g. cooling water to be used for district heating, or utilizing excess energy and heat from logistical hotspots,

server systems, or airports) (001, 003, 009), and finally, functions for educating the public (e.g. nursery visiting center, VF at public institutions [schools or hospitals] and public space) (010, 002, 007, 014). As a professor working with horticulture explained,

> *"there is an advantage when your are very nearby where the consumers are; I think you should also take the opportunity to make the connection with the citizens, so make some part of your firm or the nursery open for public or that you have sometimes that they can visit so that they can see it. This is because they can't consider it as a factory, and in particular if nobody is allowed to have a look inside how it looks, they might have all types of ideas which are not correct." (010)*

Finally, functions for citizen engagement and community meeting points can also be introduced, in order to re-establish the social aspect of food in cities (009, 010). Such places are considered substantial, as this is "where people meet, discuss about food – this is extremely important for the evolution of community" (009).

In terms of vertical up-scaling this function mixing takes a different dimension. As a respondent outlined, dependent on desired goals, municipalities should directly push for and require function mixing (003). This respondent went on to describe the benefits as

> *"all of a sudden your urban farming is a means to many different ends […] maybe you don't want to optimize for efficiency but for social impact." (003)*

4.2. Operational Arrangements

Leadership. With regards to the role of leadership, the only opportunity outlined by interviewees was by a start-up working in Amsterdam, whose founder mentioned that next to their core three person team it is necessary to partner with visionary and powerful individuals who are vested in the project. He said this is absolutely necessary for the success of such an initiative (008). As he mentioned in explanation for why a tender for a farm was turned down,

> *"You need individuals that are both visionary and powerful. And we had powerful people in that process. I'm not sure if we had some visionary ambassador in that project." (008)*

This account highlights the necessity of fitting leadership qualities not only to the extent of power but also in envisioning what is required for the success of a VF initative. Nevertheless it becomes questionable where such individuals can be found, as an account from a member of the

Amsterdam Economic Board suggests, based on this logic cities would have to rely on "kind of superheroes, super engineers saving the planet" (001).

Stakeholder Involvement. Without conducting an extensive stakeholder mapping exercise, based on the accounts of the interviewees the following can be said. Generally the respondents indicated that the industry is disproportionately focused on engineering and technology, mostly dismissing social elements, which also results in a disproportionate focus on stakeholders in this realm (001). Nonetheless initatives exist, which can be understood as *niche* developments, such as OneFarm in Amsterdam, putting an inclusive approach as a centerpiece to its business model (008). Through engaging local community members in education activities and a volunteering program, they not only aim to open up the black box of the vertical farm to the public, but they also aim at utilizing locally available knowledge and social institutions (OneFarm, 2018). This logic was further extended to a systemic level by a member of the Amsterdam Economic Board. He suggested that outlining a vision for inclusive and participatory approaches to planning by involving all stakeholders from citizens through tech companies to farmers is the way to plan for the success of a food system (001).

In terms of engaging stakeholders necessary for conducting and maintaining operations to a sufficient and successful degree, it has been stated that due to the young nature of the industry, these necessary stakeholders (e.g. light engineers, data scientists, horticulture specialists, entrepreneurs) are not used to collaborating in this manner (015). Next to this there is no framework present yet for establishing this cooperation (015). This being said opportunities do lie in collaboration between *niche* experiments and *regime*-level actors, as was outlined by an Amsterdam based VF entrepreneur, who has set up a business relationship with one of the major lettuce producers in The Netherlands (009). In this sense it is not only resistance that originates from *regime*-level actors, but windows of opportunities also open for collaboration, which ultimately support the up-scaling of VF.

Resource Mobilization. VF carries an advantage in the sense that technical platforms (such as the control systems necessary for handling the production system) can be set up and run by relatively few people (008). This fact is furthered by the tendency of component prices to fall, enabling the per unit output of the VF industry to grow in financial terms. The recurring example for this dynamic is how the prices of LED lighting have decreased due to growing efficiency and broader availability (010, 011). Such developments can reinforce *niche* formation. Next to this due

to the small profit margin there is a general awareness in the industry of the necessity to utilize resources (human, electrical, and spatial) in the most effective and efficient manner (006). Nevertheless, as a sustainability consultant outlined, traditionally in the agricultural sector, there is a race to efficiency rather than quality. This means that there is a serious risk of recreating this dynamic in the VF industry, which could ultimately lead to a race to the bottom, hindering horizontal as well as vertical pathways to up-scaling (003).

Communication. The accounts regarding communication are not clearly categorizable as directly contributing to horizontal and vertical pathways, as they are applicable to individual plants as well as the resulting broader societal dynamics equally, if replicated sufficiently. In general, multiple intervewees suggested that there is a general lack of trust and fear towards new and innovative technologies from the public. The examples mentioned were primarily hydroponic growing systems and soiless cultivation methods (008, 014). Nevertheless with growing interest in local produce, great opportunities lie in communicating the proximity of VF produce (010).

Logistics. Once again, planning for interventions in the supply-side of food systems carries potential, if one thinks in systemic terms, which necessitates a focus on logistic systems as well (003, 006, 017). By looking towards integrated systemic solutions in terms of distribution logistics, and by creating an alternative scaled logistics system for distributing food in cities, the ultimate connection can be made between farmers and consumers. The principle *niche* experiment mentioned as an example for such a system is the FoodLogica experiment, which is a bike-based food delivery system aiming to “clean the last mile’s of Amsterdam’s local food system” (FoodLogica, 2018). If one aims at introducing VF from a sustainable urban food systems perspective, it is essential to conceive of this type of alternative logistic system. Next to this by connecting individual, local producers and end consumers, using such systems can result in "creating an economy of scale without actually needing to scale up yourself" (003). This is especially true as the larger a city, the larger the required logistics operation for scaling, and hence the more difficult it will be for individual plants to scale themselves (006). Next to this, as Steel (2008) outlines in detail, with the lengthy food supply-chains, countries such as the U.K. tend to create bottlenecks in the forms of food distribution centers. Hence, localizing food production and combining it with alternative logistic systems based on more decentralized solutions carries great potential in terms of establishing resilient urban and regional food systems as well.

4.3. Policy Context

Regulatory Policy Instruments. In terms of VF this factor can be understood broadly as the role zoning regulation plays and the way municipal institutions interact with VF in terms of up-scaling. Zoning is generally perceived as a barrier, however progressive municipalities have found ways to accommodate existing zoning codes. Moreover, establishing municipal level authorities responsible for food planning has pushed for more innovative approaches to city-level food planning and has created the *milieu* necessary for up-scaling VF. Nevertheless institutional barriers on the *landscape* level also persist mostly on the lines of bureaucracy, exemplified by difficulties arising from administrative boundaries, stringent health and labor regulation, and lacking harmonization of agricultural regulation across countries. In the following these points are outlined in detail.

First of all, most interviewees regardless of constituency suggested that zoning codes generally do not recognize VF, and do not fit directly in any category. It is not clearly industry, nor food processing, nor agriculture (008, 009, 010, 006, 011, 017). Next to this if vacant space is available, the zoning categorization (e.g. for a space originally intended for commercial use) becomes problematic in a similar fashion (009). Furthermore, the integrated use of electricity and water is a red flag for code enforcement officials, as was suggested by a supplier of horticulture technology components:

> *"you watch the eyes of the officials when you say 'hey I want to run electricity-water-electricity-water'- that's what you're saying right? You want to put irrigation systems and electricity together in a sandwich style" (006)*

Seeing that regulations are not yet ready to accommodate the socio-technical reality of VF it is also essential to take a step back from focusing solely on the codes and regulations, and to look at those resposible for applying them in practice. This same supplier cited above, suggested that the problem is not only with ill-suited and outdated regulation, but with administrators' and clerks' lacking awareness of how to apply them in the context of VF (006).

Despite this, flexible regulators who decide on zoning permits also exist as was outlined by a VF entrepreneur in Amsterdam (008). By utilizing categories of exception, VF can find its space within predefined zoning codes. This claim is further supported by what a municipal officer outlined: certain zoning plans allow for making case-by-case exceptions, as was the case in Amsterdam with GROWx (017). The same officer went on to describe the tendency of UA to gain prominence in zoning plans (017). He furthermore suggested that VF does not directly produce noise or smells that could be problematic for neighbourhoods (017).

In terms of vertical pathways, it has been suggested that the establishment of municipal level food councils can serve as an enabler, as these authorities can create fitting food strategies, where VF can become a key element (002). The primary example for this type of *niche* development mentioned was that of Amsterdam, which established its own council in December 2017 (FoodCouncil MRA, 2018). Next to this municipal level policy initiatives can also catalyze the development of VF. Pushes for sustainability and green agendas, as in the case of Amsterdam (Municipality of Amsterdam, 2015) and Singapore (Building and Construction Authority, 2014) were mentioned (015, 017), alongside the establishment of public food strategies, such as the *Good Food Strategy* in Brussels (Brussels Environment, 2016), or the *Voedselvisie* in The Netherlands (Natuur & Milieu, 2017) (015, 017). However, the key takeaway here is that it is necessary to make urban and vertical farming an explicit goal within public and municipal policies and strategies in order to see a systemic transfer of land to VF, as was outlined by an urban planner working with the Municipality of Amsterdam (017). A key consultant working at building networks within the VF industry fittingly suggested that,

> *"It's not so much about just creating a vertical farm, it's really building a totally different environment with institutions, organizations. […] in the end I hope that you can say there is a better contribution to delivering fresh foods from highly productive, highly sustainable, and circular ways with a very low footprint." (004)*

This being said the reality of the regulatory landscape is one of extensive red tape, which slows and blocks innovation (002). This boils down to the following. Firstly, municipal and administrative boundaries do not always overlap with those necessitated by urban and regional food systems, which ultimately results in lacking communication, influence, and coordination (002). Secondly, stringent health (006) and labor safety (014) regulations also hinder the cause of VF in terms of vertical pathways, and finally, difficulties also arise from the heterogeneity of agriculture related legislation and categorization between different countries, ultimately hindering the up-scaling of an industry already riddled by an inadequate legislative environment (015).

Financial Policy Instruments. Multiple sources of public and private funding exist and are available to VF. This section assesses the public instruments primarily, as the private ones are described in detail further down. Among the public instruments are municipal level subsidies and loans directly targetting urban agriculture (and VF), alongside peripheral subsidies targetting CO_2 reduction, EU level funding through the *Horizon 2020* program, the *SME Funding Instrument*, and potentially the *Common Agriculture Policy* (CAP). Nevertheless the scope of these funds is relatively limited, and in general confusion persists on the accessibility of these instruments.

In terms of municipal finance, the case of Amsterdam is illustrative, as small start-up subsidies targetting urban agriculture purposes, as well as larger loans for green innovation purposes targetting entrepreneurs in this field exist simultaneously (017). On the EU level, the *Horizon 2020* program has been mentioned multiple times as an available instrument (014, 015). Nevertheless it has also been criticized for the slow and inefficient processes, which can generally set back innovation (016). A living example for the success of this funding scheme is InFarm, a Berlin based VF company, which raised €2 million through this program (European Commission, 2017a). Moreover, an interviewee working closely with agriculture policy at the EU level suggested that the CAP is turning towards urban instruments and innovation in the field of agriculture more and more (015). This is exemplified by a Communication Paper published by the European Commission, titled *The Future of Food and Farming*, which mentions VF – for the first time – as an industry with potential for urban applications (European Commission, 2017b). Finally it was also mentioned by an entrepreneur that peripheral subsidies (targetting CO_2 reduction for example) also carry potential for this field and are an active consideration in their business model (009). Nevertheless, most of these subsidies generally target needs-based industry actors – for example the staple crop agriculture sector in the U.S. (006), or the large-scale farmers in the EU through the CAP (015), which can be understood as *landscape* level pressures creating resistance for up-scaling. Finally, the general accessibility of these funding schemes was accounted for as problematic by the same EU agriculture policy specialist (015).

In terms of vertical pathways, general willingness for municipalities to establish green agendas (017), the creation of platforms for knowledge sharing (e.g. Amsterdam Economic Board or the AVF) (003), and simple changes in EU legislation describing minimum acreage for qualifying as a farmer (015) can be mentioned as creating supportive environments for the dissemination of financial instruments.

Informative Policy Instruments. Based on the accounts of the interviewees informative policy instruments are clearly lax in the VF industry. This can be exemplified by the perception that vertical farms are generally seen as black boxes (009), which not only hinders societal acceptance, but also reduces the access to information on how to set-up and operate such an installation successfully. Next to this, simple information on for example the CO_2 reduction capability of VF is also not yet available, as was mentioned by a municipal officer working with the City of Amsterdam as well as multiple entrepreneurs (017, 008, 009).

A further problem arises from the general categorization of produce. There is industry-level confusion on how to categorize the produce, as it does not clearly fall into the pre-established

categories of organic, non-organic, processed foods, and the like. (008). Besides, simple elements such as a label for VF are also not yet existent. As the head of a large tech company working with lighting solutions outlined,

> *"it might be worthwhile seeing if there is a label that could on the one hand side guarantee quality and basically standardize quality a little bit. And on the other side trigger a discussion and explain to the consumers what it is you're doing." (013)*

This lacking label hinders both consumer acceptance as well as the necessary discussions that can push for the development and adjustment of food safety categorization and regulation (013, 014).

Finally, for vertical up-scaling it is essential to have supporting frameworks for initiating business processes. In established industries this would mean that farmers can turn to the ministries responsible for agriculture, and SMEs can go to the business bureau. Yet still, as a policy specialist outlined, VF has no such public contact point, which can setback the initial phase of starting-up vertical farms (015). As the policy specialist outlined,

> *"One of the administrations should take this field and say, 'Okay, you are interested in vertical farming. You want to set up an activity, so come to us and we will advise you on the different stages you have to go through and the different partnerships you can enter into.'" (015)*

Political Leadership. Once again in terms of political leadership, progressive and forward looking municipal officers and institutions are of great importance. City Councils carry the opportunity to enhance VF (004), hence in an ideal scenario such authorities should also focus their work on UA and VF. This also means that food strategies should be outlined by understanding the food related practices of the consumer and citizen (001), as is also outlined by Cohen and Ilieva (2015). This being said it was also mentioned that Urban Agriculture is generally not on the agenda of politicians (003). Closely related, a significant problem of the AVF is that governmental authorities and public figures are not present to a sufficient degree in the industry association (011). Next to this, extensive involvement of public authorities can also hamper developments, as was outlined by an interviewee:

> *"the government tends to want to be involved too much, so it really sometimes also slows processes down because they are so active in promoting it and trying to subsidize it that everything needs to be reported and that you can hardly do any work because you're continuously playing tour guide for the government." (013)*

Hence, political leadership is a necessary and a generally missing element in the VF industry, nevertheless if present it should be conducive to the goal of the farms, and not to the agendas of politicians and public authorities. Finally, the shifting nature from country level food diplomacy to city level food diplomacy was also outlined as a supporting factor (004).

Trust in the Policy Framework. In general, trust in the functioning of existing regulatory instruments is regarded as lax, considering that a fitting policy framework specifically targeting VF does not exist, as was outlined above. This is primarily due to the regulatory barriers that persist, the general policy landscape, and the fact that institutions tend to follow academic and entrepreneurial endeavors with a lag (008, 004). As the Chief Innovation Officer of an Amsterdam based start-up accelerator also working with VF mentioned, "the policy space usually follows the experimental phase" (008). In more systemic terms, this also means that considerations for food security, food planning, and the concept of a food chain generally are not integrated into the political and administrative systems of countries as of yet (002). Nevertheless, exceptions for these dynamics do exist as was explained by a researcher from the University of Wageningen: "There has been the example in the Netherlands for even a ministry on food. You know, not on agriculture but on food" (002). Such an institutional switch may seem of small nature, nevertheless concentrating on food rather than solely agriculture suggests systemic shifts, which could also prove conducive to the cause of VF. Next to shifting institutions it was also discussed that on a case-to-case basis soft-power mechanisms can come in handy exemplified by knowing government officials (013).

4.4. Market Context

Low Capital and Instalment Costs. Virtually all interviewees agreed that VF as the most technology intense form of UA carries high up front costs (001, 005, 008, 010, 002, 016). Seeing that components such as LED lights, trays, pumps, and control systems, among others are essential, costs per m^2 can add up to €2,500 (009). This ties in with the reluctance of traditional lending institutions to support the up-start of VF projects, as well as the emergent Venture Capitalist (VC) funding schemes present on the North American context, as is outlined in more detail below.

Expertise and Skills of Supply Actors. With regards to expertise and the skills of supply actors, it can be said that the VF industry is in the beginning of the innovation cycle. This carries certain defining characteristics, which are also applicable to the field of VF; such as lacking industry-

level integrated and shared knowledge, the development of certain types of partnerships with research institutes, tension with *regime* level industries – especially the greenhouse horticulture industry, multiple individual failures, and the emergence of alternative business models, which challenge the incumbent *regime* from within. These are outlined here-on.

Firstly, multiple interviewees mentioned that there is lacking integrated knowledge, which would be essential to VF. As a Sustainability Consultant working with aquaponics systems outlined, “I'm basically looking for a plumber, farmer, chef” (003) or in other words "in terms of skill sets you need a slightly different set of yet unavailable skills. It needs a rare combination of plant scientist, farmer, data scientists, etc." (008). These accounts highlight two points. On the one hand, integrating this type of diverse knowledge within a multi-disciplinary team can be challenging due to the different backgrounds of the individuals, while on the other hand this set of knowledge is more available and affordable at scale (014, 003). This tension however is being slowly resolved seeing that more and more partnerships are established for knowledge generation at the *niche* level for example, by universities such as the HAS University of Applied Sciences collaborating with companies such as Philips through Public-Private Partnerships (PPPs) (010, 013, 016).

Secondly, it can be said that a great source of resistance comes from the traditional greenhouse and horticulture industries, which carry much of the necessary knowledge, as well as technological components required and suitable for VF (010). As is outlined below, this resistance can be understood as the *regime* maintaining its position, something that is particularly visible in the Netherlands. As a lighting specialist working with both industries outlined,

> *“greenhouse growers are sceptical of vertical farming and they fear that as a kind of destructive instrument. These interest groups are not geared toward helping vertical farming.” (011)*

A potential way forward from this systemic resistance is through the creation of alternative business models, which are on the rise in the VF industry. These models are based on flat hierarchies (016) and partnerships (009), which essentially produce efficient, transparent and innovative workflows, as well as higher levels of aggregate knowledge, which can catalyze changes and progress in the field of VF.

Finally, the role of public authorities should also be outlined, considering conflicting accounts persist. On the one hand, the inherent inexperience of municipalities towards VF combined with an experimental and progressive setting can result in municipal officers being open to experimentation and innovation, and ultimately allowing for the licensing of innovative forms of UA (002). On the other hand, this total lack of public experience with the industry can create

tension seeing that municipalities generally struggle with various types of regulation, as evident from the afore-discussed issue on zoning. (002)

Information Availability. As previously mentioned, the principal problem with regards to information availability lies with the absence of knowledge sharing across the industry. This stems from 1.) entrepreneurs' lacking knowledge - closely linked to the required combination of specific but diverse types of knowledge, 2.) the structural conditions of the political economy, which push for working in silos, and 3.) the technological focus of the industry - rather than the required plant physiology focus. Nonetheless, certain pushes exist for uniting the necessary expertise and personnel, as well as to create a much-needed industry association. The first point – entrepreneurs lax knowledge – has been exhausted above; hence this section discusses the others.

With regards to the structural conditions of the political economy, it can be said that on the one hand, the trend towards neoliberalism has created a political economy geared towards competition, which inherently reduces opportunities for collaboration (001, 004). As a consultant working with business networks outlined, within this *landscape* pressure,

> *"Competition is a great good but if you do it in a collaborative way, you can learn from each other." (004)*

Hence, competitive elements are crucial in such an early stage of an industry; nevertheless certain forms of collaboration are necessary for optimal results. On the other hand, in certain contexts the VC mode of financing also creates silos for R&D on the *niche* level, seeing that this form of financing is geared towards producing and patenting intellectual property (006). As a supplier of horticulture technology described the North American context:

> *"In my experience 99 percent of the decisions made in the industry are about short term profit." (006)*

This account highlights that a pure profit-oriented focus is likely to produce an outcome of short-term returns, and not long-terms transitions, which could benefit the industry as a whole. Next to this, the AVF is still not perceived as a full-fledged functioning industry association, which would be crucial for overcoming these types of barriers for the advancement of the field (011).

Furthermore, the focus of the industry is disbalanced and too concentrated on technological solutions. More focus should be paid to plant physiology (006), as this should guide the development of growth systems and not *vice versa*. As the afore-mentioned supplier of components outlined, "the industry won't ever grow until we focus on the plants" (006). The head

of a lighting supplier company also outlined a misconception from the side of many entrepreneurs, namely that

> *"people think you can just put racks into a warehouse, start growing microgreens and you're in indoor vertical farming, and you're going to solve the world food hunger." (013)*

By failing to develop plant physiology centered knowledge and growth technology simultaneously (013), the process of businesses focusing on building farms solely has been exacerbated. The key point here is that without the fitting operational knowledge, no farm can function optimally and hence the transfer of this knowledge is also necessary (016). An example for how this knowledge transfer can function in a beneficial manner, is the business model adopted by Signify City Farming – Philips City Farming at the time of data collection – which focuses on lighting technology as their core business model, and offers knowledge services after setting up plants in order to maintain the functionality of their business partners' installations.

This being said, pushes for sharing knowledge and integrating and consolidating the necessary information are under way. On the one hand private companies have pushed for business ecosystem approaches to industry-level collaboration. For example, MeetingMoreMinds based in Amsterdam focuses on building business networks, and has initiated such a process in the VF industry as well. Next to this, companies directly working with VF components, as for example Osram, also put building a business network at the core of their business model (004, 015). On the other hand, as previously mentioned, the AVF is gaining more and more traction (009). Sharing knowledge, shaping policy and legislation, pushing for standardization, and providing networking opportunities all fall under their core activities (Association for Vertical Farming, 2018). Nevertheless, certain entrepreneurs are generally sceptical of the AVF due to its young nature and overlapping personnel with private VF initiatives (009, 011). Two explanations can be provided nonetheless. From a structuralist perspective, the inherent competition of industry actors embedded in the landscape of the neoliberal political economy creates a general perception of distrust, which can mean that such an initiative is treated with scepticism. From the perspective of the innovation cycle however, it can be argued that the critical mass of VF initiatives has not been reached yet, which in effect hinders pushes for standardization, knowledge-sharing, and the maturation of the AVF into a full-fledged industry association (006).

Access to Credit. With regards to access to credit and funding schemes external to the above outlined public financial instruments, it can generally be said that traditional lending institutions, such as banks are reluctant to invest in agriculture (006). This is especially true for

Europe, where banks will generally not fund VF due to the high sales price per product (013). In the U.S. the iconic exception to this dynamic is the $200 million investment by Softbank in Plenty, a *niche* VF initiative (Bloomberg, 2017). Despite the reluctance for traditional lending institutions to fund VF, other funding structures, which can be categorized as developments on the *regime* level also exist. Examples for this are large technology companies funding experiments, as is the case with BrightBox in Venlo supported by Philips (013), or start-ups receiving Foreign Direct Investment (FDI) as was the case of GrowX in Amsterdam (002). Next to this it was suggested that there is a growing trend for impact driven investment, which can qualify as a *niche* development (008). This being said in general it is still funding schemes originating in the public sphere that carry the potential to support the industry primarily, as is discussed above.

Energy Price. Energy is the most expensive factor when it comes to the operational costs of VF (009, 006, 002, 014). This means that any kind of dynamic present in the energy sector will affect the operations of a vertical farm to a great extent, and is worth exploring through the accounts of the interviewees. Without conducting an exhaustive review of energy sector market dynamics, those explicitly mentioned can be categorized in two clusters: price volatility and dependence on the energy price, and structural availability of (renewable) energy sources and their relation to the grid. In terms of price volatility, a general *landscape*-level trend of decreasing energy prices is perceived as conducive to the growth of the industry (008). Moreover, the high degree of dependence on local energy prices makes it questionable to what extent VF can be a solution deployable universally regardless of market conditions (010). This fact is further intensified by the conceived opportunity to make case-by-case energy deals in order to enhance the reliability of affordable energy access, however interviewees expressed that it is difficult to strike these case-by-case deals with energy companies (009).

This being said, the structural changes, which the energy sector is undergoing also have to be outlined as respondents highlighted tensions here as well. Firstly, decentralizing tendencies in the energy sector carry decentralizing tendencies for the supply-side of food systems as well (016). With growing availability of power in remote areas – where elements of food crises are also more present – the potential to set-up VF without dependence on centralized supplies of grid-connected power grows. Secondly, it was theoretically outlined that VF could balance energy peeks and dips in grids due to the flexibility of growth cycles by for example reversing the day-night rhythm in a farm to reduce the peek loads on the grid (016). However, this requires careful planning and understanding of the energy infrastructure, as well as the energy up-take requirements of farms, as VF can also put extreme pressure on the grid (002). Thirdly, with regards to renewable energy

sources, a number of entrepreneurs pointed out that in their experience it is not possible to cover energy demand by only renewable energy sources (009, 015). This is mostly due to the fact that most VF facilities are not yet at the scale where they can make use of on-site solar energy (006). Furthermore, utilizing on-site renewable energy sources increases the complexity of the farm, which seeing that the industry is still in the early phases of innovation increases the risk of failure (016).

Market Dynamics and Conditions of Peripheral Industries. This factor is essential to consider as seemingly peripheral industries carry great potential for developments in VF. Changes in other industries can affect the market for the produce and the prices or availability of growth components. The primarily example mentioned for this dynamic can be found in the North American context, where the legalization of cannabis is creating a new and controlled market for plant growers. As was outlined by a growth component supplier, the opening of a regulated market has attracted traditional horti- and floriculturists to grow cannabis, leaving their initial markets with an undersupply. The resulting changes in pricing have produced a market environment, which allows for new industry players to enter the market with more capital-intensive production methods, for example VF (006). This point highlights that seemingly external market dynamics can have a direct impact on one specific industry.

Insurance. The final point that did not fit the categorization of van Doren et al. (2018) is related to the role insurance companies and their requirements play in blocking VF. In general it was suggested that insurance companies set the requirements for extra technical additions from a health and safety perspective, by for example requiring sprinklers above the plants incase of fire, which directly effect profitability in terms of upfront costs (010, 013). Furthermore, the general perception is that insurance companies are sceptical of business models aimed at retrofitting old buildings by for example reducing the maximum floor load when installing piping (013). This factor can seriously hinder the potential for reusing vacant space.

4.5. Social-cultural context

Environmental Awareness and Values. In terms of awareness and values two main clusters should be outlined: 1.) general consumer attitudes towards VF and the surrounding dynamics, and 2.) broader societal developments in terms of food related environmental attitudes.

Most interviewees agreed that there is general perception that that VF is not natural (009, 010, 014, 015, 016). In response to this, an Amsterdam based VF entrepreneur suggested that,

> *"for me it's completely not natural that we have cities with more than 10 million inhabitants. […] I would really like humanity to be established in a way that it is spread equally around the globe; we would be okay with growing everything through organic methods and permaculture. That would be perfect, but is it natural to have cities with more than 10 million people? No."*

In the eyes of those working in the VF industry, these perceptions also stem from opinions based on half-information stemming from the early phase in the innovation cycle (008), and generally lacking awareness of how food is produced (009, 010) and how food systems function (001). As a Dutch interviewee outlined, "we are not aware that food is anything else than a given" (008). In a similar conversation a Germany based VF project manager outlined that their company's existence is legitimized by placing VF at the crossroads of fresh food production and reducing environmental impact. She suggested that this is necessary as "we're all very demanding global citizens that want everything all at once" (014).

Nevertheless, there is a general growth in media attention (010) in the topic on the one hand, while on the other hand it was mentioned that VF specifically carries the same educative potential as traditional soil-based UA when it comes to citizen engagement on the local/neighbourhood level, as was explained by a municipal actor (017). It was also suggested that the general gap in the knowledge about food systems can be potentially addressed by appealing to the tech-savy generation(s) through engaging them with agricultural food production in this manner (015). Next to this, on a more *landscape* level, consumer level pushes to buy more local produce (006), the adjoining (global) sustainability agendas, such as the SDGs (004) or growing discourses on circularity, as for example in The Netherlands (006) carries the potential to support VF in terms of shaping mind-sets and behaviour.

This being said, it is essential to point out that efforts to raise awareness about food systems should also conceive of VF in this context. As the same Germany based project manager suggested,

> *"vertical farming particularly in urban city centres shouldn't be seen as a replacement for a local agriculture system that already exists. It's more about really re-shifting our focus onto regional produce and urban food systems [...] the cities themselves can become self-sufficient in their fruit and vegetable needs." (014)*

In this sense, VF is an element of a larger systemic solution targeting regional and urban food systems as is also outlined by Forster and Escudero (2014). Finally, a key point raised by an

entrepreneur is that the scepticism towards VF in terms of it being natural or not can be a catalyzer to open conversations about food systems at the consumer level (016). By being exposed to food production that is perceived as unnatural, the above-mentioned scepticism and general questions about the origin of food that winds up on the consumers plate can also be asked. Hence the science-fiction-like look of plants growing under purple lights carries the potential to open up larger discussions about factory farming, food-miles, and year-round availability of fresh produce.

Consumption Culture. When discussing any topic related to the supply of produce, the surrounding consumption culture should also be examined. Hence also in the case of food, it is necessary to also explore the dynamics throughout the consumption chain, which is why food culture is a key point. One respondent outlined that when one looks at any type of transformation within a food system, the focus should be on targeting the predominant food culture (001). He went on to describe the problematic nature of fast-food dominant food culture (001, 003). This aspect highlights the persistence of structural and systemic problems, seeing that the continuous presence of cheap and unhealthy foods make it questionable if green values and marketing or communication strategies on sustainable and organic produce are sufficient to change end consumer behaviour, and if at all the presupposed agency is present. In this sense VF in and of itself will not bring society-wide changes in the context of food consumption, as structural barriers persist, and thus should be targeted from a more systemic perspective.

Product Qualities. Seeing that VF is ultimately focused on produce, the qualities of these products should also be explored, as this is one of the competitive advantages arising from VF. Different qualities that carry competitive advantages outlined are as follows: high-end produce, for example edible flowers, herbs, and micro greens can be produced through VF (003, 007, 012), non-edible produce, for example for cosmetics, pharmaceuticals, and pet foods (014) can be produced in these plants, and finally produce that is difficult to ship long distances also carries a competitive advantage (003).

Nevertheless, demand for food is more varied than VF can currently meet (005), which is a major barrier. As two interviewees outlined, “we cannot feed the future cities in this way at least not with the current technology” (006), which means that “vertical farming will definitely not feed the world” (016).

Social- and Power Relations. A key factor, which was preconceived of as missing from the theoretical framework is that of social- and power relations. For this reason, explicit attention was paid to assessing this element of VF as well. This is the key factor when considering the politicizing focus of the critiques of transition theories (Wachsmuth, 2012), and the metabolic conception of cities (Swyngedouw, 2016). In terms of societal problems, the following can be said. Firstly, socio-cultural divides between different groups within a city are apparent in food cultures as well (003). This means that health problems related to food are often grounded in economic standing (003). Secondly, food policy is often too focused on middle-class consumption patterns (004). For VF to be successful these points need to be actively considered by those working in the field, be those entrepreneurs, public officials, or the AVF, as societal acceptance of this type of innovation depends on its accessibility by the wider public.

In terms of problems explicitly mentioned in relation to VF the following can be said. Firstly, the industry has an extractive tendency. A respondent mentioned that certain companies even utilize the up-coming food crisis to market their products with only profit in mind (009). Secondly, VF does not directly and inherently carry an inclusive social dimension, which is common in soil based Urban Agriculture (004). Finally, closely linked to the societal points above, VF produces high-value products that tend to serve the wealthiest strata of society – the top 5% of the consuming public (006). These points are essential to consider when planning for the up-scaling of such a technology, as wide applicability and acceptance depend on considerations for wider societal needs.

4.6. Natural and Built Context

Technical Compatibility. The final point within the predefined theoretical framework developed by van Doren et al. (2018) is that of technical compatibility. The most general result under this factor is that VF solutions always have to take the specific urban context into consideration (003). This means that plug-and-play solutions are theoretically viable, and in terms of yield quantity and quality even more reliable; however, it does not directly guarantee market competitiveness or acceptance in societal terms directly. In this sense, contextual factors to consider are 1.) levels of development, 2.) sunlight hours and growing seasons, 3.) density and fresh produce availability from local/regional sources, 4.) the tension between universal applications and adaptability to already existing built environments, and 5.) the logic demanded by different urban settings when it comes to food systems. These points are discussed hereon.

Firstly, from a technical perspective, due to the unitary logic of CEA, VF is possible anywhere in the world (010). However technical compatibility and advancement is always dependent on the levels

of development where VF is to take place. This means that possibilities to automate for example are dependent on the relationship between capital and labor costs (009). Next to this, compatibility with locally available parts produced by local manufacturers should also be considered from a sustainability perspective, as was outlined by an Amsterdam based VF entrepreneur (009). Nevertheless, viability of a farm is also dependent on natural conditions, namely the general growing seasons and sunlight hours. Environments with ample sunlight do not directly necessitate VF as in these areas greenhouses can suffice (006). It is environments with low sunlight hours and short growing seasons, for example in Scandinavia, which necessitate VF (006, 014). Besides general soil quality should be considered (015), which is an essential point in the context of the global imbalance in the nitrogen and phosphorus cycles (Rockström et al. 2009).

Furthermore, factors specific to the given urban environment, which were mentioned and should be considered, are density (014), the extent to which mega-cities are dependent on long supply-chains, extensive food miles, and imports of fresh food (009, 014), and the land price in city centres (010, 015). This being said there is no perfect recipe for choosing fitting cities. These factors illustrate that multiple points need to be considered when choosing the viable sights for VF, and highlight that the theoretical universal applicability of the technology does not compare to universal viability. A LED lighting provider based in Finland illustrated this, who suggested that,

> *"you have different logic in different cities depending on the geography, the political system, and development." (011)*

He went on to categorize cities on the basis of the different kinds of enabling logics that allow for VF. Firstly, he mentioned Hong Kong and Singapore as cities with limited land availability. Secondly, he suggested that mega-cities such as the urban areas around Shanghai and Beijing have concerns for food safety, which can support VF. Finally, he mentioned North American cities, such as New York and Chicago as having a growing environmentally conscious consumer base, which can similarly be conducive to VF, but from a completely different perspective (011). This theoretical exercise once again highlights that different contextual factors can be conducive to up-scaling from different perspectives, and therefore prove the point that there is not a perfect recipe for the best-case urban environment, when it comes to VF.

5. Conclusion

What emerges from the above accounts is a reaffirmation that there is a need to transition urban food systems to a more sustainable state, and that VF under certain conditions can be an active component of such a transition. Nevertheless, understanding what practical steps need to be taken is a crucial first step in this process, and for this reason the accounts of the 17 interviewees scope 26 factors, which should be considered in this process. The case of VF illustrates that even technologically, and in terms of resource use potentially intense interventions also carry opportunities to transition cities on to more sustainable and green pathways. However, it is essential to reconsider these interventions from a more holistic perspective, which allows for assessing environmental impacts from multiple perspectives, and also allows for understanding the socio-economic structures underlying these interventions, and what this means for planning with this type of transition.

As can be seen from the emerging tensions from the above accounts, one-dimensional promises for any type of sustainability intervention should be treated with a grain of salt. This is due to the fact that without appropriate reflection, and the resulting multi-factor mapping of what has to be considered, introducing complex elements into already complex systems – such as VF into urban food systems - can accelerate the given systems level of complexity to unimaginable and unmanageable levels. Ultimately such interventions can result in unwanted side-affects, such as even higher GHG emissions per kilo of produce, hence, a careful assessment of multiple factors should be the bare minimum when conducting planning exercises. As can be seen, the amended framework of van Doren et al. (2018) can suffice in catering to these needs through the 26 factors outlined above, when considering LCUD in cities. As can be seen from the emergent factors, a predominant focus has been put on social and political factors, and their implications for assessing socio-technical interventions. The reason for this is that the initial framework did not sufficiently cater to these elements, and the accounts of the interviewees highlighted the necessity to amend the initial framework.

All-in-all, having applied an urban food systems lens to a potentially scalable socio-technical intervention – Vertical Farming – has proven that multiple and integrated perspectives need to be considered when assessing the true climate mitigation as well as up-scaling potential of such experiments. Next to this conducting such an exercise, encompassing the amended framework of van Doren et al. (2018), has proven that a handful of factors, previously not considered can also emerge in the process, adding analytical depth to the analysis.

6. Bibliography

Agrilution, (2018) “Smart Gardening,” accessed from: https://agrilution.com/.

Al-Kodmany, K. (2018), “The Vertical Farm: A Review of Developments and Implications for the Vertical City,” *Buildings*, (8.24).

Association for Vertical Farming, (2018), “Why Join,” accessed from: https://vertical-farming.net/why-join/.

Bloomberg, (2017), “SoftBank Vision Fund Leads $200 Million Bet on Indoor Farms,” accessed from: https://www.bloomberg.com/news/articles/2017-07-19/softbank-s-vision-fund-leads-200-million-bet-on-indoor-farming.

Brussels Environment, (2016), “Good Food Strategy,” accessed from: http://document.environnement.brussels/opac_css/elecfile/BRO_GoodFood_Strategy_ENGL.pdf.

Cohen, N. and R. Ilieva. (2015), “Transitioning the food system: A strategic practice management approach for cities,” *Environmental Innovation and Societal Transitions*, (17): 199-217.

CoolFarm, (2018), “About,” accessed from: https://cool-farm.com/.

Despommier, D., (2011), *The vertical farm: Feeding the World in the 21st Century*. Picador.

European Commission, (2017a), “Infarm: The Vertical Farming Revolution, Urban Farming as a Service,” accessed from: https://cordis.europa.eu/project/rcn/206087_en.html.

European Commission, (2017b), “Future of Food and Farming: Communication,” accessed from: https://ec.europa.eu/agriculture/sites/agriculture/files/future-of-cap/future_of_food_and_farming_communication_en.pdf.

FoodCouncil MRA, (2018), “About,” accessed from: http://www.foodcouncilmra.nl/.

FoodLogica, (2018), “About,” accesed from: http://foodlogica.com/.

Forster, T. and G. Escudero, A. (2014), *City Regions as Landscapes for People, Food and Nature*. Landscape for People, Food, and Nature.

van Doren, D., et al. (2018). “Scaling-up low-carbon urban initiatives: Towards a better understanding,” *Urban Studies*, (55.1): 175-194.

Geels, F. W., (2002), “Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study,” *Research Policy* (31): 1257-1274.

Geels, F. W., (2011), "The multi-level perspective on sustainability transitions: Responses to seven criticisms," *Environmental Innovation and Societal Transitions* (1): 24– 40.

Ilieva, R. T., (2016), *Urban Food Planning: Seeds of Transition in the Global North,* New York: Routledge.

InFarm, (2018), "About," accessed from: https://infarm.de/.

Municipality of Amsterdam, (2015), "Agenda Duurzaamheid," accessed from: https://www.amsterdam.nl/wonen-leefomgeving/duurzaam-amsterdam/publicaties-duurzaam/agenda-duurzaamheid/.

Natuur & Milieu, (2017), "Voedselvisie 2030," accessed from: https://www.natuurenmilieu.nl/wp-content/uploads/2017/09/NM-Voedselvisie-2030-rapport-v3-ia.pdf.

Steel, C., (2008), *Hungry City: How Food Shapes our Lives*. New York: Vintage Books.

Swyngedouw, E., (2016), "Circulations and Metabolisms: (Hybrid) Natures and (Cyborg) Cities," *Science as Culture*, (15.2): 105-121.

Petrovics & Giezen, (forthcoming), "Planning for Sustainable Urban Food Systems – An Analysis of the Up-scaling Potential of Vertical Farming," Manuscript Submitted for Publication.

Rockström, J., et al., (2009), "A safe operating space for humanity", *Nature*, (461): 472- 475.

Wachsmuth, D. (2012), "Three Ecologies: Urban Metabolism and the Society–Nature Opposition." *The Sociological Quarterly*. (53.4): 506-523.

Research Paper

DOES THE IMPLEMENTATION OF SPECIAL ZONES OF SOCIAL INTEREST (ZEIS) ENCOURAGES ADEQUATE HOUSING IN PRECARIOUS SETTLEMENTS?

The Case of Sapé, São Paulo

Mariana REIS SANTOS; Brazil/The Netherlands

Abstract

With the establishment of the Constitution of 1988, a new approach to urban governance emerged in Brazil. The document brought significant changes regarding the right to the city and adequate housing, in particular, for the urban poor. The recognition of these rights triggered the experimentation with inclusionary policies around the country (Rolnik and Santoro, 2013). As a result, informal settlements started to be acknowledged as part of the formal city and were included in zoning and planning laws.

One of the main outcomes of these experiments was the creation of Special Zones of Social Interest (ZEIS), a land and housing policy that linked investments on infrastructure in precarious settlements to land regularisation processes. In 2001, ZEIS was incorporated into the City Statute, a document that established a range of collective rights to guide land use and development. Since then, the instrument has gained popularity in the country as a land regularisation tool. Nevertheless, a considerable share of settlements remains poorly built and addressing informality is still a challenge.

Therefore, this paper evaluated the co-relation between the implementation of ZEIS, land regularisation processes and provision of basic infrastructure in precarious settlements. More specifically, it measured the quality of State interventions supported by the zoning. By focusing on quality, this article aimed to evaluate whether ZEIS has encouraged adequate housing conditions for the urban poor or reinforced precarious patterns of development.

To explore this relationship, a case study was conducted on the performance of ZEIS in Favela of Sapé, a settlement in the West of São Paulo. As a methodology, case studies have become a common option for performing evaluations and analyse what a program, practice or police has achieved (Yin, 2012). Moreover, this research strategy commonly relies on various sources of field-based information (Yin, 2012). Accordingly, this paper comprised mainly primary qualitative data. It also made broad use of content and secondary analysis, with the goal of ensuring validity and reliability.

The performance of ZEIS in Sapé demonstrated that since its implementation, in 2001, tenure security and physical characteristics have enhanced considerably in the area, particularly, when it comes to housing quality and provision of basic

infrastructure. Nevertheless, these accomplishments are being compromised by a strong process of reoccupation which is supported by illegal organisations. In addition, there is a delay of the Municipality in meeting the demands for housing in the area because of governance issues and mismanagement of financial resources.

This scenario, combined with a weak inspection body, has once again permitted the development of precarious housing and infrastructure in the area. It also has compromised the issuance of freehold land titles to the settlement's dwellers. In other words, the site is under a vicious circle where neither the provision of housing and infrastructure is enough to meet the demand nor the land regularisation is completed because of the reoccupations.

In sum, although the implementation of ZEIS seems to have a share of responsibility in Sapé's upgrading process, the local authorities do not have the capacity of reinforcement necessary to maintain these improvements. Furthermore, it is fair to assume that the current legal framework provided by ZEIS is not adequate for the context of São Paulo and requires further adjustments. Not only because of the complex character of the city, but also because in practice, urban norms may be interpreted differently according to political and cultural conditions (Rolnik, 1997).

Keywords

Spatial Justice, Governance, Adequate Housing

1. Introduction

This article was based on the Master Thesis entitled "Does ZEIS encourages adequate housing in precarious settlements? The Case of Sapé, São Paulo", presented at the Institute for Housing and Urban Development Studies (IHS), in October 2018. As the mentioned thesis, this paper evaluates to what extend the implementation of Special Zones of Social Interest (ZEIS) facilitated the development of adequate housing in the Favela of Sapé, a settlement located in the West area of São Paulo. "Adequate" is hereby define as access to basic infrastructure, services and facilities, good location, legal security of tenure, affordability, accessibility, habitability and cultural adequacy.

To conduct this evaluation it was necessary to understand how ZEIS operates. Therefore, legislation, official documents, annual reports, policy documents, and GIS information were extensively analysed. Moreover, previous research was reviewed, with the goal of understanding the trajectory of the instrument and the challenges of design and implementation. In addition, to draw an overview of the current situation of the built environment of Sapé, semi-structured interviews were conducted with professors, government officials, and professionals engaged in the settlement's upgrading process.

The urban interventions in the settlement started in 2012 and are currently on its final stages. Nevertheless, the initial intervention plan suffered many alterations and several aspects were not implemented. In fact, there is no prediction of when or whether or not these aspects will be carried out (Formicki, 2017). Therefore, this article discusses the outcomes of the implementation of ZEIS in Sapé and the performance of the public authorities. Through this discussion, this paper evaluates the effectiveness of ZEIS as an

upgrading tool and establishes whether the instrument has encouraged decent housing conditions or reinforced precarious patterns of development in the settlement.

1.1. Informal development in Brazil

Accommodate the abrupt population growth, caused by the current pace and scale of urbanisation, has been a major challenge for public administrations. On one hand, governance and public policies have a fundamental role on encouraging an equitable spatial development, particularly, when it comes to inclusionary measures and social assistance for vulnerable groups. On the other hand, overregulation and technocratic urban norms commonly difficult the access to the formal land market and, therefore, reinforce informality (Biderman and Smolka, 2009).

The issue of informal land development is acknowledged in Brazilian cities since the end of the XIX century. In fact, since then, informal settlements have been consolidated as the main alternative for low-income families to access the urban land market (Cardoso, 2007). This phenomenon was reinforced not only by historical inequalities and uneven distribution of land and wealth but also by the incapacity of the State of regulating the Real Estate Market. Not to mention the absence or ineffectiveness of housing policies for low-income families in the country.

As a consequence of this scenario, the development of the majority of Brazilian cities happened without planning and with the basic infrastructure following (instead of preceding) the occupation of the land (Cardoso, 2007). Because these occupations often happened in environmentally fragile areas, this pattern of development brought high financial and environmental costs for the public authorities. Furthermore, it shaped the access to basic infrastructure, services and facilities as a luxury, encouraging the speculation with land. In other words, the urban development in Brazil is marked by

"restricted conditions of access to land and housing; high costs of housing production and or urban services, aggravated even further by inflation and unequal (and unfair) patters of income distribution; real property treated as exchange value; extensive hoarding of idle land; and an intense speculation process" (Fernandes, 1993, pp. 213)

It is in this scenario of scarce public resources and high speculation with land that the favelas are formed.

1.2. A shift on the approach to informal development

The approach of the public administration to informal settlements was often inconsistent, varying from efforts of eradication to palliative improvements. Moreover, because there was no legal arrangement to support investments on infrastructure and services these areas, the public interventions were often ineffective. This started to change in the 1980s, with the new Constitution and subsequent implementation of the City Statute[1]. The City Statute brought significant changes to the approach to urban governance in Brazil; particularly, regarding the management of precarious settlements. Through the articulation of several

[1] The Federal law nº. 10.257 of 2001, commonly called the City Statute, was created to regulate the Articles 182 and 183 of the Federal Constitution of Brazil which coordinates urban development policies.

urban instruments, the document created the legal arrangement necessary to regulate and integrate these areas to the formal city.

One of the major instruments instituted were the Special Zones of Social Interest (ZEIS). In the process of building a new urban order based on the principle of the social function of property, ZEIS were consolidated as a unique type of zoning. The main objective of the instrument was to guarantee to low income families the access to urban land served with basic infrastructure, services and facilities. Therefore, ZEIS represented a shift on the approach to informal settlements. Because of the instrument, these areas were for the first time recognised as part of the formal city and included in planning and zoning laws.

2. The case of Sapé

Sapé is a precarious settlement located in the West of São Paulo, under the administration of the Butantã Borough, in the Rio Pequeno District (see Figure 1). The Butantã Borough is one of the wealthiest regions of the city and has significant points of interest such as the Hospital Israelita Albert Einstein, one of the most important private hospitals of the city, the Palácio dos Bandeirantes, seat of the São Paulo state government and the University of São Paulo (USP), one of the biggest universities of the country.

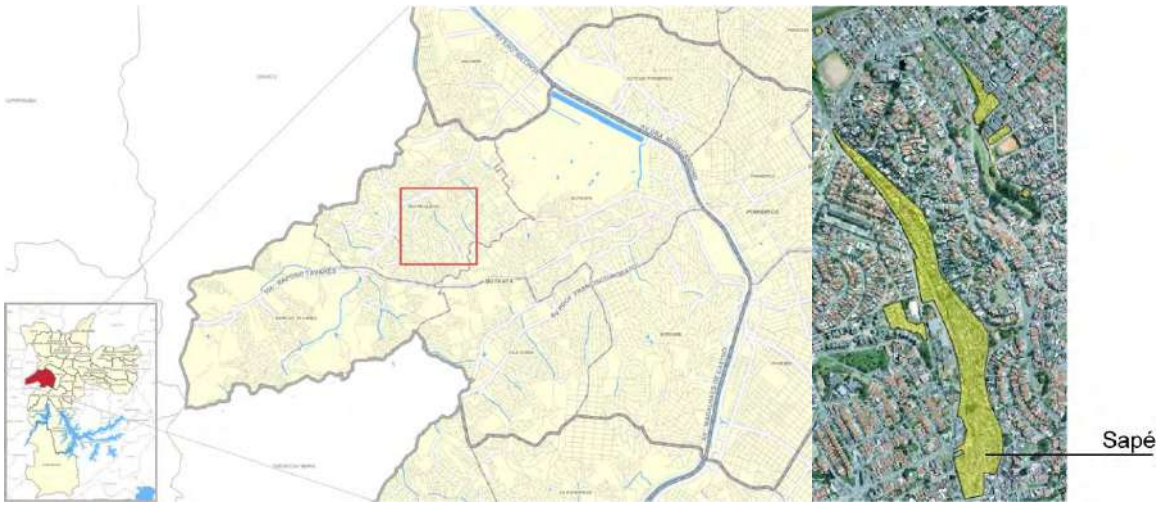


Figure 1 Location of Sapé in São Paulo

Rio Pequeno was mainly formed by pottery, quarry and construction workers, hired to build the university during the 1960's and 1970's, a moment of strong urbanisation in the city. Constructed in public land, the settlement, which started with a few houses along the Stream of Sapé, became a dense and precariously built slum. Because of this densification, the occupation overcame the stream, which led to precarious housing and sanitation conditions (Brandão and Leitão, 2016). Moreover, because of the proximity to the stream, the area went through several episodes of floods over the years, which regularly resulted in great material and human losses.

The public interventions in Sapé occurred in a fragmented way and because of the environmental fragility of the area, the actions towards the depollution of the stream and relocation of dwellers situated in flood-prone areas were fundamental. Therefore, the actions of the public authorities in the area were marked by the tension between environmental demands and housing and urban infrastructure demands.

In 2002, Sapé was regulated as ZEIS by the PDE and incorporated into the Land Regularization Program, resulting in the provision of land titles even before any urban infrastructure arrangement (Grosbaum, 2010). In parallel, the Sapé Stream went through multiple interventions conducted by the Córrego Limpo and 100 Parques Programmes, which were concluded in 2009. The implementation of ZEIS brought about the urbanisation plan of the area. Nevertheless, because of the delay of the public authorities in articulating the necessary arrangements to initiate the construction works, the population in the area had increased and the urbanisation plan had to be readjusted. Finally, in 2010, a public bidding was made and the construction works, which are still running, began.

3. The outcomes of ZEIS

3.1. The effectiveness of ZEIS as an instrument

The demarcation of Sapé as ZEIS ensured the population of the settlement the right to usufruct from the city, in a good location. Therefore, the zoning overcame the “highest and best use” of land, by establishing areas of social interest in prime locations (Borelli and Santoro, 2015). Moreover, the institutional and legal arrangements required to implement the zoning permitted an active and democratic engagement of the community in the urbanisation process.

The intervention plan of Sapé has achieved significant improvements regarding the availability of basic services such as electricity, water, sewage and refusal disposal and, social services and facilities. The removal of dwellings from hazardous areas enabled significant improvements on the quality of the water of the stream. Additionally, it made room for the construction of public spaces, causeways, roads and, cycle paths. Another significant contribution to enlarge the availability of space was the verticalisation of the new housing units. This allowed the allocation of a higher number of people in a smaller area, what is beneficial if you consider the environmental gain to the region and the elevated number of removals conducted along the stream. Nevertheless, the positive outcomes of the urbanisation plan in the area may be at risk because of the strong process of reoccupation of common spaces and hazardous areas.

It is important to highlight that the approach of the Municipality was either to provide infrastructure and do not interfere in the dwelling`s physical characteristics or provide infrastructure and reconstruct the dwellings completely. This indicates an unequal distribution of public resources in the area and favours part of the population instead of benefiting the population as a whole, in an equal manner. The performance of the Municipality demonstrates that the actions of the State often encourage injustice by promoting “private appropriation and accumulation of the commons, the resources, and the collective-created world” (Zárate, 2015, pp.27).

Another approach that disfavoured part of the population was the criteria to select the families that were entitled to these apartments. Because the intervention was made through

a public-private partnership, the financial resources were held by the private sector. Therefore, among their criteria of selection, there was the ability of the family to pay for the new apartments. This is controversial because, through the selection of families with higher financial capability, the opportunity of accessing adequate housing is taken away from the dwellers that need it the most. This illustrates the positioning of Harvey (2015) that profit is commonly prioritised over people's rights, necessities, and well-being. Additionally, this criterion goes against the principle of ZEIS itself, which is to ensure the right to the city and housing to low-income groups.

Nonetheless, in a conflicted manner, the implementation of ZEIS has succeeded in providing legal security of the tenure to the inhabitants of Sapé. The zoning guaranteed to Sapé's dwellers the right to be relocated to the adjacent neighbourhoods and receive financial aid from the government to cover rental expenses. Moreover, the zoning also entitled the inhabitant out of the hazardous areas to remain on-site and, therefore, granted these dwellers the right to the city and subsequent accomplishment of the social function of property, cited by Borelli and Santoro (2015) as one of the positive outcomes of the zoning.

Nonetheless, the issuance of titles did not occur in the area yet because of the reoccupations supported by criminal organisations in the settlement. This demonstrates that perceived tenure security is not only provided to informal dwellers by public investments, as defended by Durand-Lasserve et all (2009), but also by the compliance with the demands of criminal organisations, that often overcome the power of the State in these areas. This confirms the affirmation that cities have become an expression of inequalities and violence (Zárate, 2015).

In Sum, the implementation of ZEIS in Sapé has formed a vicious circle where neither the provision of social housing and infrastructure is enough to attend the demand nor the land regularisation is completed due to the reoccupations that have been contributing to the increase on the population in the settlement. This vicious circle is illustrated below.

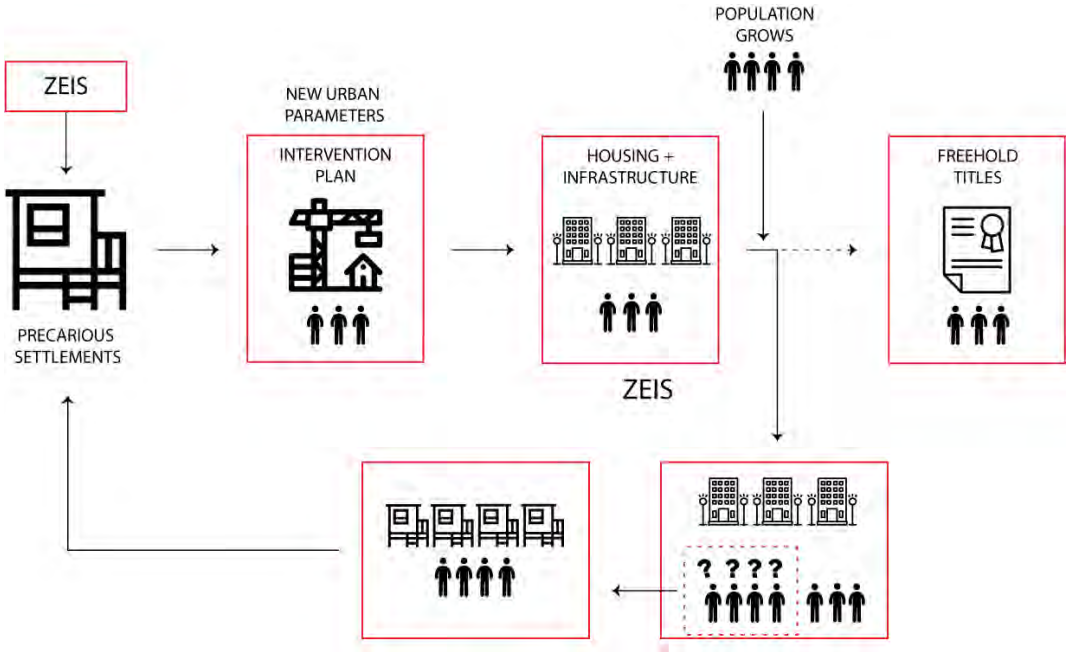


Figure 2 Vicious circle, an outcome of ZEIS in Sapé

3.2. The impact of ZEIS on housing conditions

Housing conditions have changed significantly in Sapé since the institution of ZEIS, particularly since 2011 when the most radical phase of the intervention started to be implemented. Before the zoning, a considerable share of the residential development in the settlement was in hazardous areas, subject to floods and landslides, which was a threat to the life of the dwellers living in these conditions. In addition, the inhabitants that were not in hazardous areas were provided with basic infrastructure and sanitation facilities, which by itself is already a significant advancement considering the precariousness of the settlement before the Public authority intervene. In addition, the area was provided with public spaces, sports facilities, cycle paths, and adequate roads. The construction of these soft services assisted the creation of a socially just space.

The relocation of people from hazardous areas was not only beneficial from a safety and health point of view, considering that most of these dwellers were poorly built and nearby the stream that was an open-air sewage, but also from an environmental perspective. These relocations allowed the depollution of the stream and the provision of sanitation systems to the area, as well as the mitigation of floods. In addition, the inhabitants that were living in precarious conditions around the stream were relocated to newly built apartments, constructed with durable materials an out of hazardous areas. However, a considerable share of dwellers that were relocated did not return to Sapé yet due to the lack of social housing, demonstrating that the demand for housing in the area is still higher than the supply. Furthermore, the actions of criminal organisations in the area have been encouraging the reoccupation of public spaces. This reoccupation process may trigger the precarious development of land in the area once again, considering that the supply of housing is, as mentioned, already insufficient.

3.3. ZEIS and Adequate Housing

When considering the dimensions of adequate housing posed by this paper, the most significant contribution of ZEIS was the provision of legal security of tenure. Although the issuance of titles has not occurred yet, alternative forms of tenure have been granted to the inhabitants of the settlement. Further, legal security of tenure has been ensured also to the inhabitants that were temporarily relocated to the neighbourhoods around Sapé. Nonetheless, the delay of the Municipality on concluding the construction works has been precluding the return of these families to the settlement, which constitutes a violation of their rights. Moreover, the elevated rental costs of the surroundings compromise another dimension of adequate housing that is affordability. This contributes to the criticism of Harvey (2012) and Lefebvre (1996) regarding the neoliberal approach that our cities are managed.

The financial burden of the urbanisation plan is also extended to the families that have remained on-site during the construction works. Although ZEIS is supposed to encourage housing affordability, the provision of public infrastructure and services to Sapé have had the opposite effect in the informal property transactions in the area. This is a common outcome of slum upgrading. Nonetheless, the zoning succeeds in containing the pressures of

the formal Real Estate Market and, indeed, ensures the right to the city to slum dwellers (Borelli and Santoro, 2015). However, in Sapé, it has failed in meeting the demands of the lower income population for housing. This failure resulted mainly from the mechanisms used by the Municipality to finance these interventions, as well as the lack of a unified system to prioritize the demand for housing in the city. Furthermore, the engagement of the private sector in the urbanisation process of Sapé and the incapacity of the local authorities of overcoming the interests of the latest resulted on the selection of families that had a better financial condition over families in hazardous areas. This situation compromises the accessibility of housing in the area. Nonetheless, this scenario is not triggered by the zoning, but for financial and public administration issues.

Regarding the cultural adequacy of the environment constructed in the area, ideally, the new housing should follow features similar to the existing dwellings, what does not occur. By choosing to verticalise the new units, the Municipality contradicts the character of the area. On the other hand, in a megacity like São Paulo where the land is scarce, particularly to produce social housing, this may be a suitable approach. Furthermore, it has ensured to most of the population the right to remain on-site and enjoy a physically safe location, what according to Caldas (2009) is the most adequate approach to intervene in informal areas.

The verticalisation of the housing also promoted significant environmental improvements. A considerable share of these enhancements is a result of the depollution of the Sapé stream and the construction of adequate sanitation systems, which was only possible because of the removal of dwellers from the stream floodplain due to the verticalisation approach. Accordingly, it has also contributed significantly to the habitability of the settlement. Nevertheless, the efforts to clean the stream were a result of the combined actions of the Córrego Limpo and 100 Parques programmes and not of the implementation of the zoning,

Additionally, to ensure such habitability, a high number of removals had to be conducted in the settlement, which violates the right of these dwellers of remain on-site. At the same time, it was necessary because of the precarious and dangerous conditions on which these inhabitants were living. Although these removals are temporary, it may have a negative impact on the livelihood and social connections of Sapé's inhabitants, even with the concern of the Municipality in relocating these dwellers to adjacent neighbourhoods. However, the socioeconomic impact of urban interventions instigated by the implementation of ZEIS, as well as the impact of relocation on the livelihood of dwellers subject to these interventions shall become the object of further research.

Summarizing, the implementation of ZEIS in precarious settlements seems to have a share of responsibility on the adequacy of housing produced in these areas. Particularly, when it comes to ensuring a good location in the city and providing the legal security of tenure necessary to remain in such good location, which guarantees to the inhabitants of these settlements the right to usufruct from serviced land. Nevertheless, the urban parameters permitted by the zoning seems to be distorted to fulfil the private sector requirements, as can be perceived by how the affordability and accessibility of housing were managed in Sapé. In addition, the major advancements on habitability result from the depollution of the stream, which is an outcome of a public-private initiative that is not connected to the zoning, revealing that the implementation of ZEIS was not significant to this process. At the same time, the special urban parameters established by ZEIS permitted a higher use of land, which made room for the construction of public spaces and infrastructure. These were major

improvements to the settlement. And finally, as already mentioned, although verticalisation is not culturally adequate to the profile of Sapé, it enabled important advancements to the area. Accordingly, the overall contribution of the implementation of ZEIS in precarious settlements to the encouragement of adequate housing is summarized in the following scheme.

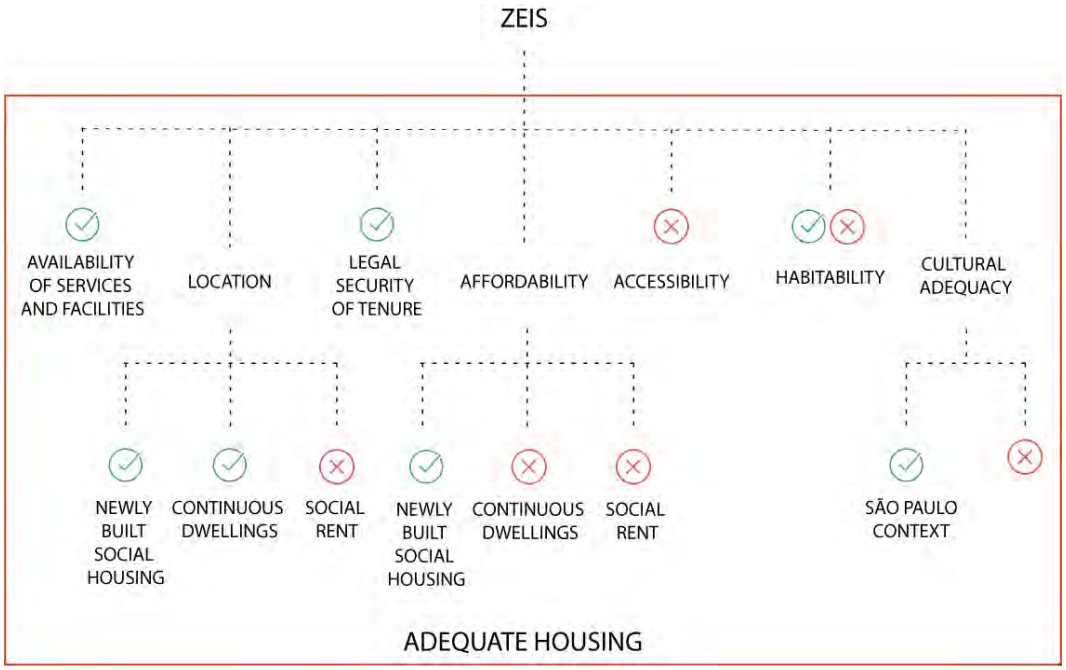


Figure 3 How ZEIS influenced adequate housing in the case of Sapé

4. Conclusion

A considerable share of the negative outcomes of the implementation of ZEIS is related to the lack of financial resources and governance issues. This is illustrated by the case of Sapé, which despite being a ZEIS since 2001, did not suffer significant interventions until 2011, when the financial resources of the central government were made available by the Growth Acceleration Programme (PAC). Besides that, there is a clear delay on the actions of the Land Regularisation Sector (CRF) in reinforcing the interventions made by the Physical-Territorial Sector – CFT (the sector responsible for the coordination and execution of projects). In addition, precarious settlements also face issues caused by changes on administration. For instance, the issuance of CDRU's to Sapé's dwellers even before the implementation of ZEIS and, thereafter, removal of the families that received the concession. Moreover, the instrument seems to be often distorted to attend the demand of the Real Estate Market for profit. In addition, although ZEIS receives financial resources from other urban policies, it seems that in the context of São Paulo, the production of housing has been prioritized over improvements in precarious settlements, again, to satisfy the demand for profit of the private sector.

5. References

Biderman, Ciro; Smolka, Martim (2009). “Measuring Informality in Housing Settlements: Why bother?”

Borelli, Julia; Santoro, Paula (2015). “Os desafios de se produzir Habitação de Interesse Social em São Paulo: da reserva de terra no zoneamento às contrapartidas obtidas a partir do desenvolvimento imobiliário ou das ZEIS à cota de solidariedade”.

Brandão, A; Leitão, Karina (2016). “Os Programas de Urbanização de Favelas em São Paulo: As Transformações Físico-urbanísticas da Favela do Sapé”.

Caldas, Nisimar (2009) “Os Novos Instrumentos da Política Urbana: Alcances e limitações das ZEIS”, PHD, São Paulo: Universidade de São Paulo

Cardoso, Adauto (2007) “Avanços e desafios na experiência brasileira de urbanização de favelas”.

Fernandes, Edesio (1993), The Regularisation of Favelas in Brazil - The case of Belo Horizonte. 2 (SAGE), pp. 211-236.

Formicki, Guilherme (2017), “As Falhas do poder público na condução da política de urbanização de favelas no município de São Paulo”.

Grosbaum, Marcia (2012), "O espa o p b lico no processo de urbaniza ão de favelas".

Harvey, David (2012) Rebel Cities - From the right to the city to the urban revolution. London: Verso.

Intervenções Contemporâneas em Cidades da América do Sul: Estudo das transformações territoriais em assentamentos precários. São Paulo/Brasil - Medellín/Colômbia. 2018. Available at: http://www.favelasaopaulomedellin.fau.usp.br/publicacoes/ [Accessed 2018].

Lefebvre, Henri (1996) The Right to the City. 1996. Writing on Cities. Blackwell. pp. 147.

Rolnik, Raquel (1997), “São Paulo, um século de regularização urbanística: para quem, para quê?”.

Rolnik, Raquel; Santoro, Paula. (2013) “Zonas Especiais de Interesse Social (ZEIS) em cidades brasileiras: Trajetória Recente de Implementação de um Instrumento de Política Fundiária”

Yin, Robert (2012) Case Study Research: Design and Methods, 5th edition, Thousand Oaks, United States: SAGE Publications Inc.

Zárate, L., 2015. Right to the City for All: A Manifesto for Social Justice in an Urban Century

Research Paper

EVALUATING THE URBAN FORM OF A MOUNTAINOUS CITY FROM THE PERSPECTIVE OF COMPACTNESS CHARACTERISTICS: KIGALI CITY, RWANDA

Ivan RWAMPUNGU, Department of Civil Engineering and Architecture, Saga University; Japan

Prof. Dr. Nobuo MISHIMA, Department of Civil Engineering and architecture, Saga University; Japan

Abstract

A better understanding of the composition and form of cities, and how land use changes throughout a city, can provide helpful insights for city sustainable planning. Many sustainable city models have been studied and the compact city concept has been adopted as one the sustainable model in city planning policies of many countries. However, due to dynamic nature of the city structures around the world, there exists a limited consensus on parameters and dimensions to measure urban compactness especially in the cities developed in unplanned manners. This study aims at analyzing and understanding the urban form in Kigali, the capital city of Rwanda. Two dimensions of spatial organization and spatial distribution of population were measured using GIS functions to objectively evaluate physical compactness. Findings reflected trend of decrease in compact form with absence of sustainable concepts due to lack of regularity authority control and haphazard development. Suggestive measures were provided for future consideration in sustainable urban development of the city.

Keywords

Urban form, compactness, mountainous city

1. Introduction

1.1. Background

The spatial growth of cities is an avoidable fact around the world. In the last 200 years, while the world population has increased six times, the urban population has multiplied 100 times. Today, approximately 50% of the world's population lives in urban areas (Stalker 2000). It has been very significant during last decades mainly in cities of developing counties like Asia and Africa. The expansion is caused by many factors and has been resulting in creation of different city patterns. The first and foremost reason is increase in urban population. The urban population in Africa is expected to triple by 2050 and reach 1.3 billion (UNDESA, 2014). The increase in urban population automatically lead to the increase in density and need for both living space and other activities created by the new population. The resulting spatial pattern will describe its compactness or sprawling. Some cities have been able to

control at some extent this increase by promoting relatively high residential density, thus keeping the population inside its boundaries. On the other hand, cities have expanded its boundaries permitting the new population to live away from the city centre on green spaces leading to an unforeseen urban sprawl. A problem which is currently affecting many cities and being condemned for its negative environmental, economic and social impacts.

With these new urban forms evolving trough urban planning, many studies have tried to find out new urban forms practices and design that are sustainable. However, the debate on most suitable urban form to achieve sustainability is still unresolved. The term "Urban form" can be defined as the physical structure and pattern of urban elements meaning buildings, lots, blocks, streets, intersections, spaces and the way in which these elements are configured and used. In order to achieve urban sustainability, this combination of urban elements and the form need to be understood (Jenks 2000). Jenks, Williams and Burton included the notions of compactness, urban intensification, traditional neighbourhood design, density, mix of uses, housing type and decentralization to define a sustainable urban form. Jenks (2000).

Many sustainable city models have been studied and the compact city concept has been adopted as one the sustainable model in city planning policies of many countries. However, the compact city concept dates back to the early 1970s with the book: "Compact city: Plan for a liveable urban environment" by Dantzing and Saaty (1973). This concept resurged in the United States and later on found more attention in Europe. The rationale being to protect the city for the old compact city, the contemporary concept ensures more efficient use of the land and natural resources as well as achieving better quality of life. Moreover, the compact city concept is based on the process of intensification within city boundaries to increase residential density, centralization and mixed uses while limiting the development beyond the city boundaries (Churchman 1999). The three main components of compact city are high density, mixed land use and intensification. (Burton 2002). Many researches cleared the three components into dense and proximate development pattern, urban areas linked by public transport, and accessibility to local services and jobs. Also, UN-Habitat has recommended five principles of compactness including high density (at least 15,000 inhabitants per square kilometre), mixed land-use, social mix, limited land-use specialization, and efficient street network (UN-Habitat 2014). The benefits of compact city are such as efficient use of land while curtailing sprawl, reduction in transport network and reliance on mass transport, etc. High densities impel less space observed per capita with more land for agriculture and open spaces; public transport serve better in dense settlements with low dependence on private cars; higher densities reduce society's environmental footprint and slow the consumption of non-renewable resources (Ewing 2008).

More than half of the world's population live in urban areas and it is expected that the majority of all future urban growth will occur in Asia, Africa and Latin America. Urban populations in these three parts are expected to double by 2030, while the built-up areas of cities are expected to triple from 200.000 square kilometres to 600.000 square kilometres. (Angel et al., 2005). International policy discourses led by UN-Habitat and the world bank are thus actively exchanging new ideas and best practices on how urban planning can become effective. Within the debate on urban form, the compact city is widely promoted as a sustainable solution to the social, environmental and economic of urban sprawl and other unsustainable patterns of urbanization (UN-Habitat, 2009). However, some cities of three mentioned parts of the world may showcase difficulties to implement the concept as

designed due to different existing composition and form of their cities (Donald B., 2017). Therefore, a better understanding of physical, social and economic characteristics, and how land use changes throughout a city can provide helpful insights for city sustainable planning.

2. Methods

2.1. Case study

Kigali is the capital, commercial and largest city of the Republic of Rwanda. It is located in the centre of the country with a status of a province, one of the five provinces in the country. Kigali is one of the fastest growing cities in Africa (Civco et al., 2005). From its inception since 1907, the city has witnessed a remarkable spatial expansion, population growth and developmental activities such as building, road construction, deforestation and many other anthropogenic activities (REMA, 2013). In 1991, Kigali city only covered an area of 112 km2 with 140,000 inhabitants. In 2012, the city expanded to a total population of 1,135,428 living in an area of 730 km2 (NISR, 2012). This has resulted in increased land consumption and a modification and alterations in the status of land cover/use (REMA, 2013).

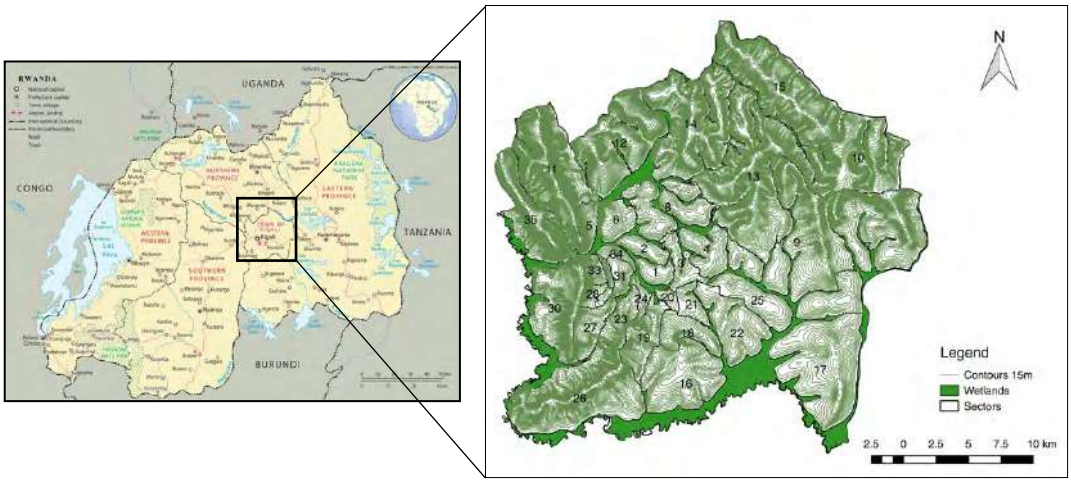


Figure 1 Location of Kigali City and its topographic features. Source:

Kigali is built in hilly landscapes sprawling across ridges and wet valleys in between. Big structures like universities, banks, hotels, international organizations, embassies, government offices, commercial buildings and residential areas of affluent people tend to be built on top of the ridges while the poorer people live down towards the valley. Other poor neighbourhoods are located on the hills which can be seen in the fringes of the city. Wetlands, water bodies, forests, hills with slopes greater than 20 % and other natural constraints to development cover about 50 % of Kigali's area. The city is administratively divided into 3 districts and 35 sub-districts or sectors.

2.2. Aim and objectives

The aim of this study is to measure the urban form of Kigali city, Rwanda through various characteristics of compact form as a sustainable form. The objectives are: (1) to explore trends of urban form expansion; (2) to analyse and evaluate the existing urban form through spatial organization and population distribution measurements and find out whether Kigali city expansion trend generate a compact form, favourable to achieve sustainable urban development.

2.3. Urban form, Compact form and measuring approaches

Urban form is a spatial composition of elements that repeat, and if based on certain sustainable concepts, can lead to the sustainability of cities. The urban form can be monitored on different levels from individual building, street, urban block, neighbourhood to city level (Bertaud, 2013). It is characterized by physical and non-physical characteristics. The physical characteristics are usually stable and easily measurable while non-physical such as density are dynamic. The compact form is conceptually and arguably takin as a sustainable form. Its concept is based on various principles such as intensification, density and mix of uses. This study mainly relates the urban form to the spatial organization and distribution of the population, and land use change trends from natural areas to urban built-up areas. Density and its spatial distribution are basic component of urban form and is used widely for sprawl assessments. Reduction in density over time is considered an indication of urban sprawl and density distribution defines the compactness of urban form.

2.4. Data collection

Data was collected from various government institutions. Various literatures were also reviewed in order to understand spatial organization of urban form and distributions of population. GIS maps representing land use in various year were directly corrected from the urban planning department of the City of Kigali and other data such wetlands data and population census were retrieved from official websites of respective governments institutions. This study is limited to year 2013 due to the availability of data.

2.5. Proposed methodology

Various measures of urban form and compact form are developed by researchers and mainly focus of different aspects such impact of urban form on social, economic, environmental or transport behaviour. In this study, several literatures were reviewed to identify common parameters (Fig.2) that can allow to measure the urban form. In this study, the analysis focused on the spatial organization and spatial distribution of the population. Moreover, some parameters were discussed through literature review and the Kigali Master Plan 2050 which was put in place in 2010.

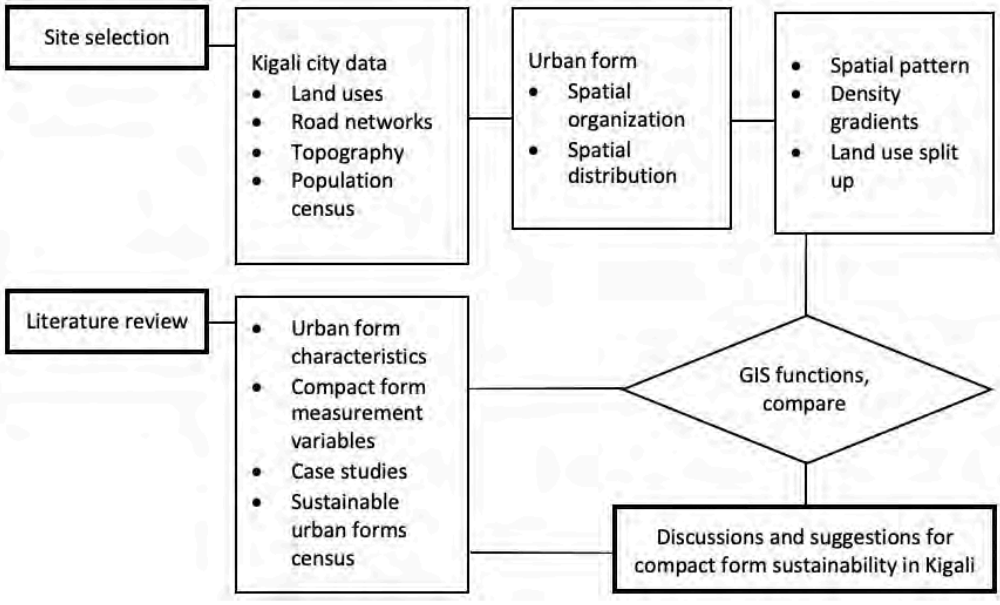


Figure 2 Analysis method. Diagram developed by author

3. Data interpretation

3.1. Spatial organization

The city of Kigali was founded in 1907 but its urban growth started in 1962 after it was declared the capital city. In order to understand the spatial organization of the city we used the method of Bertaud (Bertaud A., 2013). The method uses the concept of superimposing two patterns of the city (1) the spatial pattern of population distribution within the city's built up area when people are at home and (2) the pattern of movement people make around the city during the day. The city of Kigali was found to be predominantly a monocentric model with a dominant CBD and sub-centres. This is mainly a consequence of topography constraints. The CBD, which is taken as the starting point of the city, is located on the top of a hill with gentle slopes and surrounded by wetlands in the northern, eastern and southern sides. On the other hand, the western side is obstructed by mountains with steep slopes. In the process of urbanization, new large to small scale sub-centres were developed creating a multi-centre development with simultaneous radial and random movements of people across the city.

The Central Business District (CBD) is located 6km (Fig. 3) in the western direction from the centre of gravity (CG). The city spatial expansion was always directed to the east. While the eastern part of the city showcases gentler slope, the western part of the CBD is obstructed by Mount Kigali. As par the organic law of the Kigali Master Plan, the developable land should have a slope of less than 20 per cent (KMP, 2013). However, as the master was put in place in 2010, many settlements are located on steep slopes, thus in risky zones to be relocated. Therefore, the spatial distribution and expansion of the city has been mainly influenced by topographical challenges.

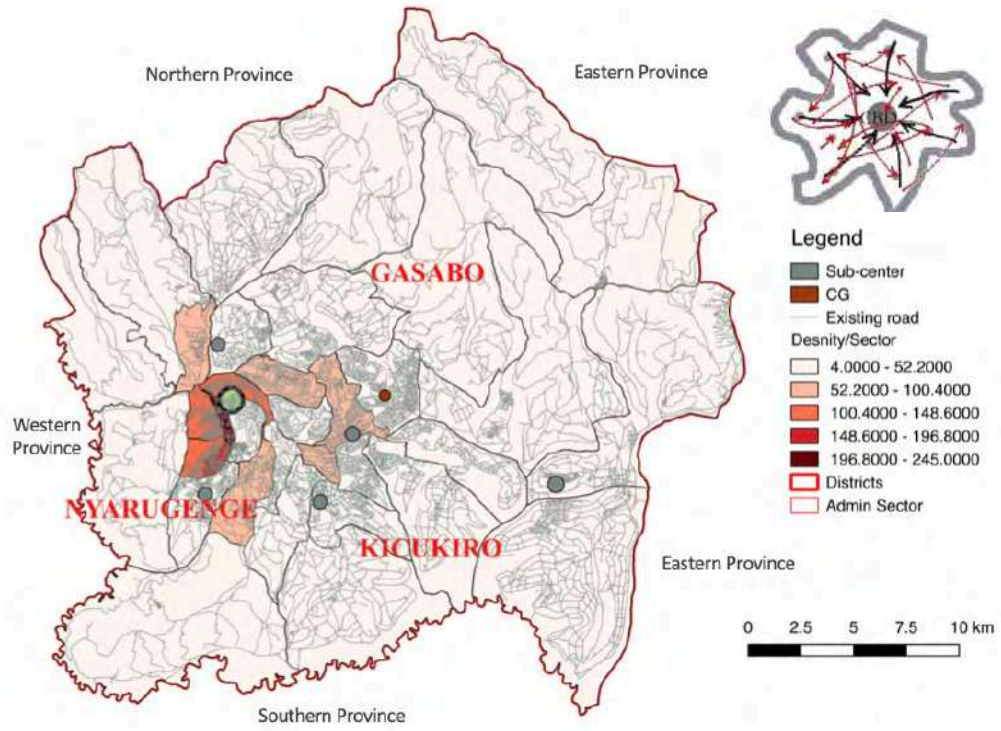


Figure 3 CBD eccentricity and topographical challenges. (Data source: Kigali city urban planning department)

3.2. Spatial distribution

The spatial distribution of the city was analysed through density indicators. The calculations should be based on the built-up area. Four indicators are measured: (1) Average built up area density, (2) Land use split up, (3) Density profile and (4) Population by distance to CBD.

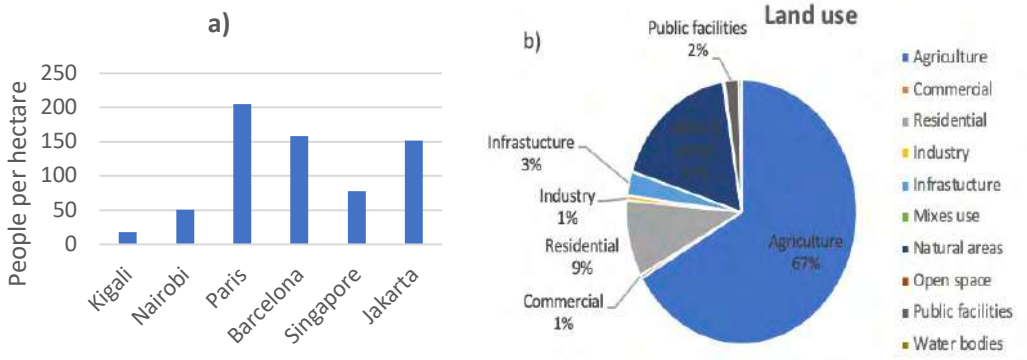


Figure 4 a) Density based on administrative boundaries, b) Land use of Kigali City (2013). (Source: a) Population and area numbers from http://citypopulation.de/, calculations done by author. b) RNRA, 2012)

Figure 4.a illustrates densities of various cities based on their administrative boundaries. As it is visible the density of Kigali is very low compared to other cities. Cities like Barcelona and Paris are classified as compact city due to various reasons including their densification. Figure 4.b showcases the land use occupation in Kigali city in year 2013.

3.2.1. Built up area density

The urban built-up area of Kigali has been growing rapidly since 1962, when it was declared the capital city of Rwanda. In 1990, the administrative area of Kigali was 112 Km2 with 21 Km2 of built up area. Later in 2000, the total area was increased to 349 Km2 with an increase to 47 Km2 of built-up area. It is after 2006 administrative reforms, that the boundaries were expanded to 730 Km2.

In general, the city experienced a relative expansion of built-up areas. Between 1990 and 2010, the city showcases more compactness in the CBD and surrounding built-up areas. The built-up area density has been increasing constantly to reach 147 people per hectare (Figure 5). From 1990 to 2000, the density was primary supported by the densification around the CBD while between 2000 and 2010, however the city area was expanding, the city continued to showcase some more compactness due to a high rate of urban migration compared to settlements. In 2010, the city become more sprawled as the urban density started decreasing. There was a remarkable extension trend in all sides of the city except the western part as depicted in Figure 6. However, the tendency is higher in the eastern and northern sides. The western side was spared to its topography critical for built-up and forests cover.

Furthermore, some new built-up areas appeared in the hinterland of the Southern part. These are smaller and dispersed built-up patches compared to the Northern and Eastern development. Rural lands have been converted into built-up areas due to the increase in urban activities (REMA, 2013). There is a big demand for land by the high number of offices, schools, industries built during last 27years. Moreover, citizens constructed bungalows instead of high-rise apartments.

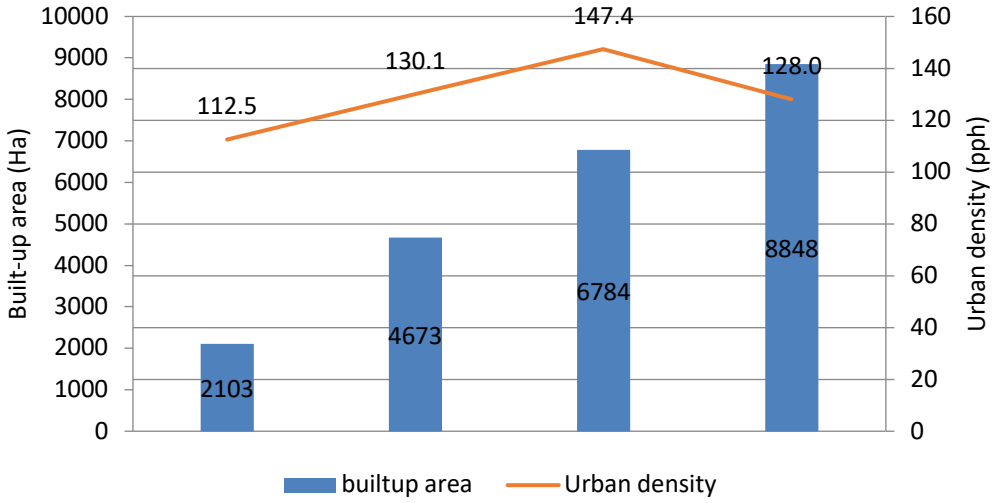


Figure 5 Built up expansion trends from 1990-2013. (Source: Based on KCMP, 2013)

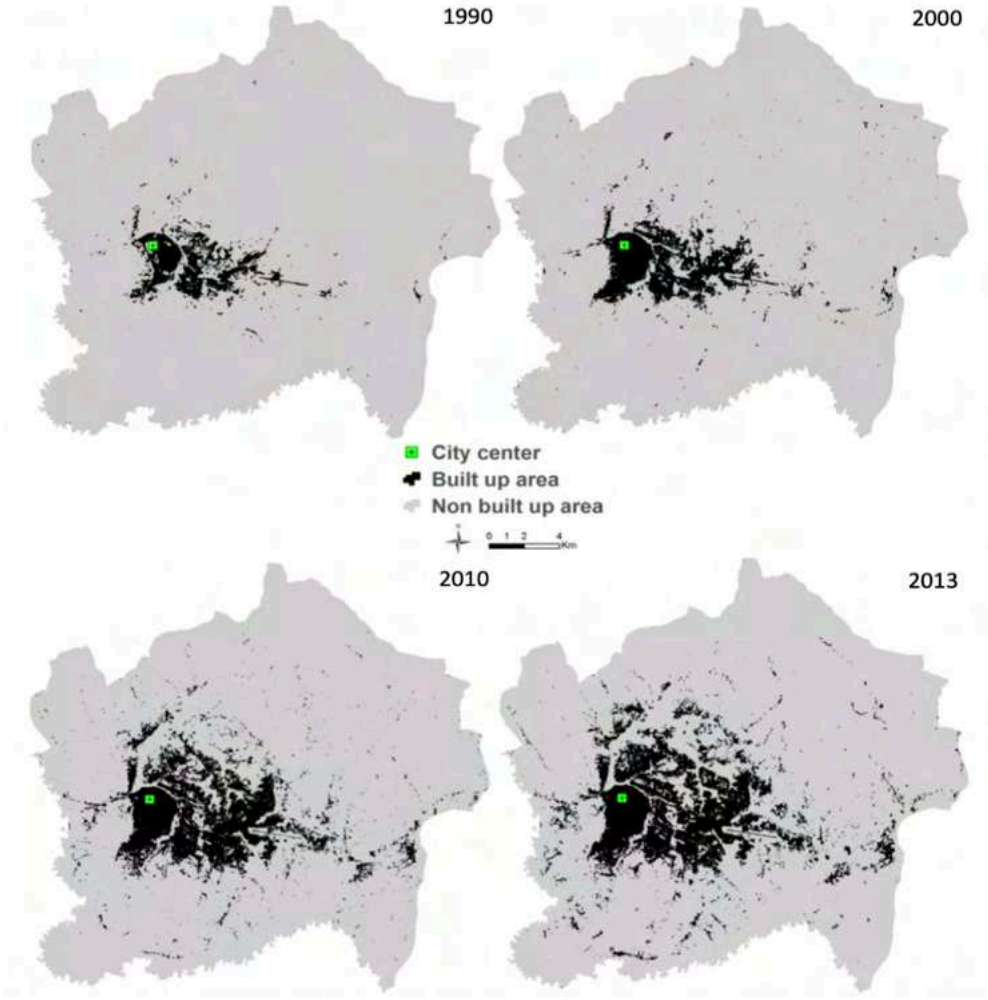


Figure 6 Built up expansion trends from 1990-2013. (Data source: Kigali City Urban planning department)

3.2.2. Land Use split up

The urban land composition has undergone series of land use changes since 1990. As shown Table 1, in 1990, only 2.9% of the total current area of the city was built-up. The agriculture land which includes all green space natural forests excluded, as they are counted in the category of natural areas together with wetlands, has been decreasing with a high decrease during 2001 and 2010. However, the 5.5% decrease in agriculture land was expanded during the 10 years while between 2010 and 2013, only 3 years, a 4.5% decrease is recorded. Although, this category experienced changes and decrease, by 2013, it represented 67% of the total land use. The land used for agriculture is sometimes on steep slopes where any development is typically impossible, thus making it the major land use category within the city.

The built-up area recorded a 341.7% increase over 23 years since 1990. Within the first decade only, the built-up area doubled. The causes are many including the social events such as the end to the genocide in 1994 with many people coming back to settle in the capital as a safer place compared to the surroundings provinces. Although the change rate reduced since 2000, the built-up area is still increasing from changes of other land use categories mainly the agriculture land. A remarkable increase in land used for infrastructure is also noticed during the first and second decades. This is particularly the effect of development and settlement whereby infrastructures such as roads are built to connect different zones of the city.

Land Use name	Land use (in Ha)				Net change (in %)			
	1990	2000	2010	2013	1990-2000	2001-2010	2011-2013	1990-2013
Agriculture	53789	52905	49986	47755	-1.6	-5.5	-4.5	-11.2
Built-up	2103	4673	6784	9288	122.2	45.2	36.9	341.7
Water Bodies	132	132	285	283	0.0	115.9	-0.7	114.4
Infrastructure	465	1238	2434	2915	166.2	96.6	19.8	526.9
Natural areas	13995	11526	10975	12658	-17.4	-4.8	15.4	-9.5

Figure 7 Land use changes in 1990, 2000, 2010 and 2013. (Data source: RNRA, 2012)

In 2013, the built-up area composed 13% of the total area and 18% of the total developable area (not steep slopes or wetlands). As shown in Figure 8 within the built-up area, 67 hectares (76%) are occupied by residential houses mainly scattered and unplanned followed by 14 hectares (16%) occupied by public facilities, 4 hectares (5%) by industries, 3 hectares (3%) by commercial buildings and a relatively small percentage of mixed-use development. On the other hand, public urban open spaces such as squares or parks are almost non-existent in the city. Few roundabouts are sometimes used as public open space. There is need to avail more land for recreational purposes. The Kigali Master Plan 2050 proposed developing and converting wetlands into recreational parks and gardens, thus proving more open spaces while also protecting the environment. Some of the wetlands are currently being occupied by unplanned settlements such as residential buildings or often commercial activities such as car washes.

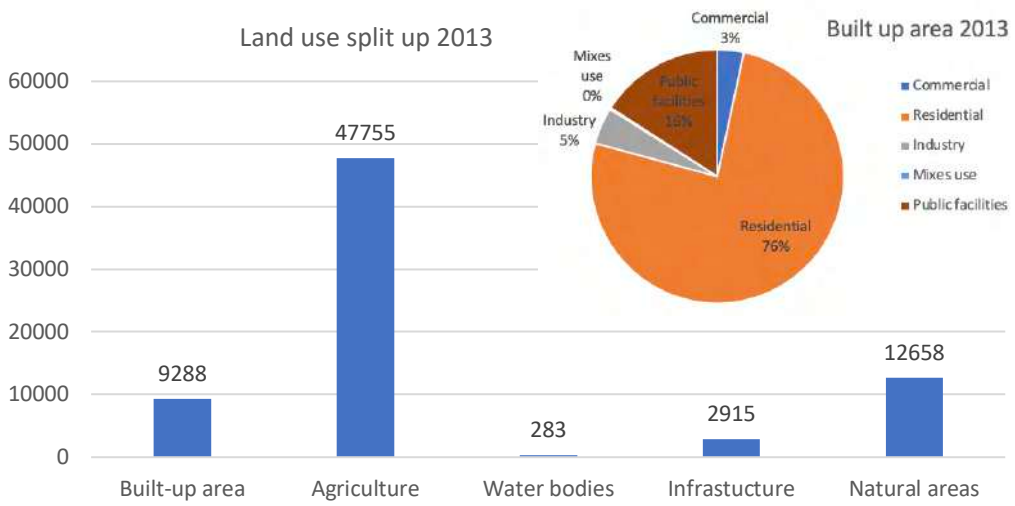


Figure 8 Land use-split up in 2013. (Data source: RNRA, 2012)

3.2.3. Population by distance to CBD/CG

Figure 9 illustrates the population densities residing within a certain distance to the CBD for the year 1990, 2000, 2010 and 2013. IN 2013, the high densities can be noticed near the CBD as they tumble down when going far of the CBD. Within 2km radius of the CBD, the densities are nearly 100 people by hectare. After 5km, the densities are less than 20 people by hectare and remain almost constant. The CBD is located 6km from the western boundary of the city, thus the only the population in the eastern direction is counted.

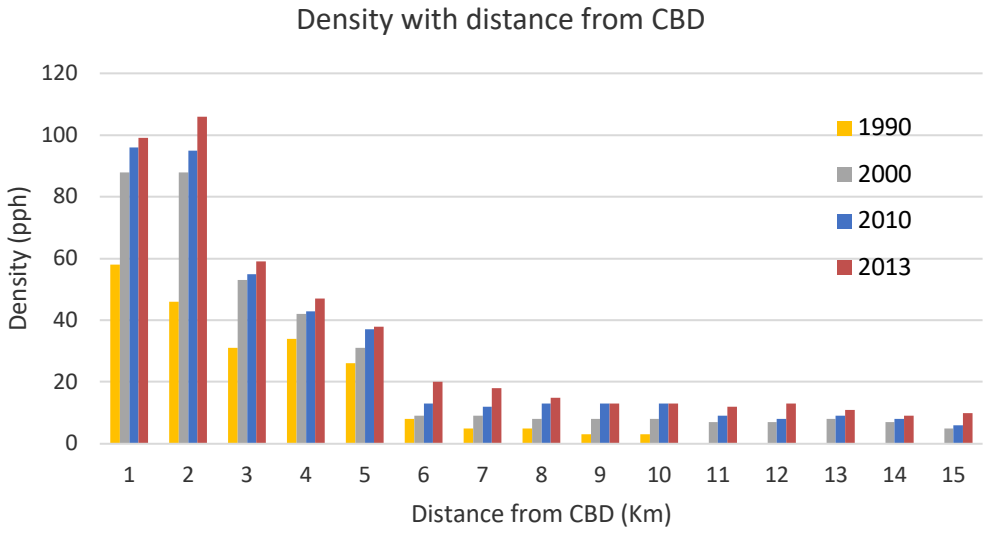


Figure 9 Density variations with distance from CBD. (Data source: RNRA, 2012)

Figure 9 is showing how residential area is spread with distance from the CBD. Despite high densities presents around the CBD, Regular residential land is consistently spread throughout the city. Likewise, as one leaves the city center and moves towards the periphery commercial/industrial land tapers off but does not disappear. This is probably due to the fact that Kigali has no large industrial zone.

4. Discussions

Kigali city is dominantly a monocentric city with various sub-centres spread over the city. The CBD eccentricity is located 6 km from the supposedly centre of Gravity of the city. The spatial growth of the city has been observed directed in the eastern part while in the western part, the expansion is obstructed by steep slopes typically impossible for development. As cited by the law, no development is allowed on slope exceeding 20 per cent. The eccentricity of the city is due to the first modern settlements after the colonization on the top of the hill to ensure security. As the city developed, other commercial services also joined creating the CBD near settlements.

Kigali city showcased an increase in urban built-up area corresponding to its growth of population. From 1990 to 2010, the city has been increasing its urban density creating a more compact city. This was mainly due to intensification of areas surrounding the CBD, whereby in some places, densities exceed 200 people per hectare. With a large percentage of these densities coming from unplanned settlements and eventually located in high risk zones with steep slopes or wetlands. In 2010, the urban density was 147 people per hectare, a value that can be related to that one recommended by UN-Habitat as 150 people per hectare. After 2010, the urban density started decreasing and this is explained by the increase of land consumption, a sign of city sprawl. Kigali population is growing on a rate 4% per annum (2000-2013) and the population is expected to double in 2025 (KCMP, 2013). This increase in urban population has placed considerable pressure on Kigali's housing stock, and resulted in the construction of informal settlements. To meet projected housing demands, Kigali would need to construct roughly 344,000 formal housing units by 2022, but currently less than 1,000 are constructed annually (City of Kigali, 20123).

Kigali city has limited mixed land. Only 19 hectares, representing almost zero percent of built up land, were classified as mixed land use. The biggest percentage with 67% of the total land use is the Agriculture lands. They are followed by natural areas, consisted of natural forests and wetlands, with 17% and built up areas with 13%. Infrastructures are apart with 4% of the total city area. Within the built-up area, 76% is consumed by residential areas, 16% by public facilities, 5% by commercial areas and 3% of the total built-up areas by industries or industrial zones. Although the city is considered green, due to green areas across streets and other areas, only 12 hectares are dedicated to urban open spaces such as parks and gardens. Presently, much of the agriculture land and forest cover is encroached upon and developed as built-up residential sprawl. Since 2010, the built-up densities started decreasing, thus leading to a sprawl tendency. One of the reasons being that since the implementation of the Kigali Master Plan, illegal developments were stopped and policies were adopted making difficult for unplanned settlements. Therefore, land prices in the urban areas started increasing and people objected for settling in the close suburbs whereby land is available on low prices.

The decrease in density as the distance from the CBD increases is a characteristic of the monocentric form of the city. While within 2 kilometres from the CBD, densities are relatively high, there is a detectable drop of density after. On one hand, it can be explained that, the urban built-up area on the western part of the CBD is discontinuous due to topography challenges. Very few developments were made on the steep slopes of mountains located at 2 km western side of the CBD. It is noticeable, that after 5km from the CBD, the density is slightly decreasing. These are new settlements which mainly happened

after the adoption and implementation of the Kigali Master Plan in 2010. They are planned low residential settlements located along main national roads, and they contribute meaningfully in sprawl of the city. Additionally, sub-centres have been created by these settlements.

5. Conclusion and future research

The study illustrated the trends of urban form in different years while understanding whether the city is developing a compact form. To understand it we used two dimensions of urban form which are spatial organization and spatial distribution of the population. Three variables of the spatial distribution were discussed. Furthermore, discussions were related to other compact cities to understand future urban form of Kigali City. Following this study, analysis of spatial organization and density distribution shows that Kigali is dominated by a monocentric compact form which grow in a polycentric dispersing form. In other words, the city compact form is dispersing creating new low densities. The compact form present early was facilitating shorter travels and higher densities within the CBD and its surroundings. Thus, it is necessary to increase density in new sub centres to sustain a more compact form. However, increasing density alone without infrastructure improvement may lead to an adverse impact on sustainability. To achieve a more compact city form, infrastructure upgrade and provision of more amenities and other facilities such as recreational parks, together with transport network is very necessary. An intensification through high density development in existing urban areas and sub centres may lead the city to a compact city.

Though, there is a high consideration of Kigali Master plan, its implementation should consider the trends of city expansion and better urban management, administration and strict regulations are necessary to achieve a more compact form with its benefits. Inclusive planning with more involvement and participation of people in the panning and implementation processes is extremely important and should be adopted to cater for economic and social needs. The existing high percentage of informal development should also be considered as it affects the success of compact city. There is also need to avail more land for recreational purposes and mixed land uses development promotion through various zoning of the city. While the compact city model has been adopted and applied as sustainable model mainly in cities of developed countries, this study suggest that such analysis can be useful for understanding the spatial structure and evolution of the city and thus in future planning and adoption of the compact city policies implementation.

Future research will be focusing on modelling and simulation of future compact urban form basing on trends and characteristics of the existing spatial organization and population distribution. Models may contribute in future urban planning and Kigali Master Plan implementation assessment.

6. Acknowledgements

This work was supported by the Japanese International Cooperation Agency (JICA) through ABE Initiative Scholarship. The authors would like to acknowledge the support and facilitation by the Urban planning department of the city of Kigali to provide part of the data used in this study.

7. References

Angel, Shlomo; Sheppard, Stephen; Civco, Daniel (2005) The Dynamics of global urban expansion. Washington, DC.; Transport and urban development department, the World Bank.

Bertaud, Alain (2013) Metropolis: A measure of the spatial organization of 7 large cities.

Burton, Elizabeth (2002) Measuring urban compactness in UK towns and cities. Environment and Planning B: Planning and Design 29(2): 219:250.

City of Kigali (2012) The Kigali Housing market brochure,

Civco, Daniel; Sheppard, Stephen. The urban growth management initiative: Confronting the expected doubling of the size of cities in the developing countries in the next thirty years-methods and preliminary results. ASPRS 2005 Annual conference

Churchman, Arza (1999) Disentangling the concept of density. Journal of Planning Literature 13(4): 389-411.

Donald Brown (2017) Challenging the conceptual boundaries of the compact city paradigm in sub-Saharan Africa: Towards southern Alternatives. DPU The Bartlett: London UK.

Ewing, Reid (2008) Characteristics, causes and effects of Sprawl. A literature review.

Jenks, Mike; Williams, Katie; Burton; Elizabeth (1996). The compact city: A sustainable urban form? Chapman and Hall: London, UK.

Jenks, Mike; Williams, Katie; Burton, Elizabeth (2000). Achieving sustainable urban form; E&FN Spon: London, UK.

Kigali City Master Plan. (2013). Analysis, benchmarking and vision report. City of Kigali.

National Institute of Statistics of Rwanda. (2012). Population and Housing Census, Kigali.

Rwanda Environment Management Authority. (2013). Kigali State of environment and outlook report.

Rwanda Natural Resources Authority. (2012). Rwanda National Land Use development master plan 2010-2020.

Stalker, Peter (2000) Handbook of World. Oxford University Press, New York.

UNDESA (2014) World urbanization prospects: The 2014, CD-ROM edition.

UN-Habitat (2014) A new strategy of sustainable neighborhood planning: five principles. Urban discussions Note 3. Retrieved from https:/unhabitat.org/wp-content/uploads/2014/05/5-Principles_web.pdf.

UN-Habitat (2009) Global report on human settlement: Planning sustainable cities. London: Earthscan.

World bank (2010) Eco2 cities: ecological cities as economic cities. The World Bank.

Case Study / Project

Finding Housing Affordability

in MRT Jakarta TOD Areas

Putrikinasih SANTOSO

Abstract

Housing provision and housing affordability are among the most challenging issues to address in most of the urbanized areas in the world, where the lack of provision leads to a massive backlog. The redevelopment of areas within a 700-meter radius from the newly established MRT Jakarta stations is also facing a similar struggle. The implementation of TOD concepts within the 700-meter radius from MRT Jakarta is expected to also encourage urban redevelopment to support its ridership: mixed-use buildings, compact development, high-density buildings. However, the land price, land taxation, and building taxation are following through the transportation and urban mobility infrastructure improvement within the TOD areas. When the redevelopment happens, how to ensure the provision and the affordability of housing in the TOD areas? A study is done in three MRT Jakarta TOD areas: Dukuh Atas, Blok M - Sisingamangaraja, and Cipete Raya. Each of the TOD areas has a distinct context, including a CBD area, an urban center within a heritage district, and a neighborhood center.

The outcome of this study is to determine the implementation strategies for affordable housing provision within MRT Jakarta TOD areas. The main methodology used is research-by-design, with an iteration process between the design outcome and desk-study research, including a review on existing regulation and policies on municipal, provincial, and ministerial level, an overview of the target market for housing provision, as well as a form-based design exercise and iterations to achieve TOD areas design objectives. Among several strategies is the utilization and optimation of existing regulation on the inclusionary zoning regulation.

Research Paper

The Role of Urban Slums in the Evolution of Megacities: A case of Nima and Old Fadama, Accra, Ghana

Eunice YORGRI[1], Department of Urban and Rural Planning, School of Architecture, Harbin Institute of Technology, 92 West Dazhi Street, Harbin, China, 150001

Prof. Leng HONG[2], Department of Urban and Rural Planning, School of Architecture, Harbin Institute of Technology, 92 West Dazhi Street, Harbin, China, 150001

Abstract

Urban areas are contributing unprecedentedly in modelling the social, cultural, economic, environmental and physical development of the globe as they are perceived as basket of opportunities to the poor. This phenomenon has undoubtedly resulted in the influx of poor migrants particularly in the global south and consequently causing the proliferation of slums. This is indirectly influencing the growth of megacities due to increasing population amidst limited infrastructure. So far, limited research has been conducted into the role of poor rural migrants in contributing to the growth of megacities. The study also attempted to propose sustainable planning strategies in guiding future urban planning. The case study used both primary and secondary data collection methods. In all, 304 questionnaires were administered in April 2017 (Nima=146 and Old Fadama=158). From the study, 46% of the respondents in Nima hail from the Northern part of Ghana and 14% from the Volta Region. On the other hand, 49% of the respondents in Old Fadama come from the Northern part of Ghana and 22% from the Volta Region. Both Nima and Old Fadama have high figures on migrant population which means a fair contribution to the growth of Accra as a megacity. Therefore, spatial equality through a comprehensive, integrated and universal national development(UND) covering all sectors should be employed. Also, economic opportunities upgrading which is essential for slum and rural communities in Ghana should be considered. Further research on how cities in Ghana are planning towards becoming megacities is prudent.

Keywords

Megacities, Rural-Urban Migration, Urban Slums, Nima, Old Fadama

1. Introduction

"Across the globe and in a short amount of time, we've given up the tractor for the city bus, the open landscape for one of brick and mortar."

In recent years, world population has grown exponentially including urban population which is said to be first in the history of mankind. Urbanization trends closely mirror the universal patterns of economic development and progress in industrialization. At the beginning of the

20th century, only 13% of the global population lived in cities and only sixteen cities had a population of least one million. Currently, approximately, four hundred cities have populations of more than one million, majority of which are located in the global south(Cohen, 2006). Cities can be places of opportunity, creativity, innovation and of peaceful co-existence across cultural and ethnic divides, thereby generating a high quality of life for residents(Lucci et al., 2015). This basically serves as incentives for rural migrants who try to escape poverty, low levels of development and the impact of climate change. As these poor migrants unprecedentedly influx cities, they also contribute to the rapid growth of cities, albeit sometimes they reside in poor neighbourhoods such as slums. Little attention is given to the impact of poor migrants in the growth of megacities. Therefore, this study considers the role slum plays in the rapid growth of cities by focusing on rural urban migration using two popular slum communities in Accra as case study. The case study is home to majority of migrants in Ghana's capital city. Per the definition by the Ghana Statistical service, a place with a population of more than 5000 residents is termed urban(GSS, 2012). Considering this definition, it means that both Nima and Old Fadama (OF) are urban within the broader urban fabric (city within a city). Assuming, slum populations (majority being migrants) did not exist in cities, then although there maybe megacities, the rate of growth may be significantly low.

1.1 Urbanization and Megacities

Urbanization is commonly associated with economics such as improved job opportunities, a centralized market, better pay and higher individual affluence, attracting people into cities(Cohen, 2006). For the first time in history, more people globally live in cities than in rural areas and this has been attributed to people migrating from rural regions into cities and the reclassification of areas(Habitat, 2016).

Fig.1 Global Mega Cities in 2015, Source:(Institute, 2013, Learner, 2017)

Globally, 55% of the world's population reside in cities and this figure is expected to increase to 68% by 2050(DESA, 2018). In some few years to come, the rural population will almost be approaching its zenith (see figure 2). The black and red arrows as shown in figure 2, visually presents an estimated gap developing between rural and urban population. As the years go by, the rural population is declining whilst the urban population is increasing, gradually resulting in the growth of megacities.

Megacities are considered as cites with a population of ten million and above. In the 1950s, only Tokyo in Japan and New York in the United States of America, were the first known megacities of the world(Munich, 2005, Taubenböck et al., 2012). In 2015, approximately 21 megacities existed globally (see figure 1).

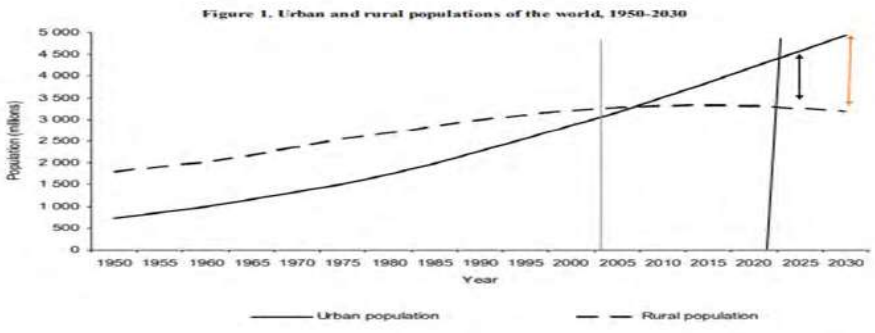


Fig.2 Rural and Urban Growth from 1950-2030, Source; (Nations, 2002)

Currently Africa and Asia host approximately 90% of the world's rural population. Almost half of the global urban population live in areas of less than 500, 000 dwellers. However, one in eight people live in megacities with more than 10milli0n inhabitants. By 2030, it is forecast that there will be approximately 43 megacities in the world, majority of which will be located in the global south(DESA, 2018). Megacities albeit maybe be motivated by urbanization, slum settlements are also the bi-products of unplanned urbanization, which indirectly contribute to the creation of megacities.

1.2 Megacities and Slums

Slum creation has been a dominant characteristic of rapid urbanization in the global South and is expected to continue well into the future(Lucci et al., 2015). UN-Habitat estimated that over 60% of urbanites in Sub-Saharan Africa live in slums as compared with an average of 37% across the global south(UN-Habitat, 2015). Although, no country has achieved middle-income status without urbanizing, the creation of megacities and slums is one of the greatest transformation of the 21st century(Lucci et al., 2015). Slums are massive as megacities and as cities keep experiencing exponential growth, so are urban slums. Slums despite the lack of urban infrastructure, are morphing into mega slums. About 1 billion people currently live in slum settlements, that is, almost a third of the world's urban population (UN DESA, 2013). In the 1970s the United Nations (UN) coined the term "megacity" to designate urban areas with eight million inhabitants and over. In the 1990s, they raised this threshold to ten million. Today, 22 cities and urban regions have reached this population figure, four of them in industrialised countries(Munich, 2005). Around 9% of the world's urban population – about 280 million people – currently live in megacities, and this figure is likely to rise to 350 million over the next ten years(Munich, 2005)

Slums, mostly develop as a result of a combination of factors such as rapid urban population growth, lack of affordable housing and poor governance. In some cases, the pace of urbanization outstrips government's capacity to provide the framework for affordable housing (e.g. land, infrastructure, access to utilities) for an increasing population. Also, governments are unwilling to act as they believe that providing services and better conditions to the poor will attract more people and cause slums to grow further. This means slums actually grow as they remain limitedly serviced for long periods of time (Lucci et al., 2015).

Sub-Saharan Africa is the region with the largest percentage of the urban population residing in slums, that is, over 50%. Implying that, Sub-Saharan Africa is the region where the rate of slum growth has been closer to that of general urban population growth(Lucci et al., 2015).

Ghana amongst the most urbanized and rapidly urbanizing economics in Africa. In the past three decades, the number of city dwellers has risen from 4 to 14 million and about six million people live in slums. Urban growth exerts intense pressure on government and municipal authorities to provide affordable housing, public services and jobs. Statistics from the World Bank shows that, 53% of the population lived in towns and cities in 2014. The urban population increased from 4million to 14million since 1984, with an estimated 6 million (39%) living in slums(Habitat, 2014). Recently, there are approximately 256 slum pockets spread across the country majority of which are located in Accra. This phenomenon has contributed significantly to the growth in population of the Greater Accra Region, although the contribution of natural increase cannot be overlooked.

2. Study Sites and Methodology

2. 1 Study Sites

Ghana had a population of 24.2 million during the last census of which over half of the population lived in urban areas(UN-Habitat, 2011, GSS, 2012). Both Nima and Old Fadama (OF) are slum settlements located in the Greater Accra Region of Ghana. They are amongst the numerous slum pockets (256 slum pockets) spread throughout the country. Nima and OF are peculiar as a result of their long standing history, population of migrants and the continuous influx of migrants into these areas. In details, Nima is located directly north of the ring road and within the Ayawaso East Metropolitan Area of the Accra Metropolitan Assembly (AMA)-figure 3. The low-income residential neighbourhood has a total population of approximately 70,000 and it is settled on 1.59 square kilometers of land(GSS, 2012, Owusu et al., 2008). The population of Nima has increased exponentially considering that in 1960, the average population density in the area was 25, 846 residents per square kilometer and 43, 478 people by the year 2000 respectively(Kang et al., 2010). On the other hand, Old Fadama is located within the Ashiedu Keteke Metropolitan Area of the AMA-figure 3). The slum area occupies a 31.3 hectares of land along the Odaw River and the Korle Lagoon. From the 2009 community enumeration, the community had a population of 79,684 giving a population density of 2424.18 persons per hectare(Settlements, 2010). However, the current population of the area is estimated at 100,000 people, making it densely populated. The now “matured slum” emerged in the 1980s and has become one of the most populous in Accra.

Fig. 3 Location of Nima and Old Fadama on the Map of the AMA

During the colonial period and independence era, urban planning in Accra did not take native and migrant communities into account. They were largely overlooked by the state and left unregulated(Obeng-Odoom, 2010), hence more people settle in the areas but remain unrecognized, particularly migrant communities, thereby leading to population increase and slum formations.

2.2 Methodology

Research is the pursuance of truth through study, observation, comparison and experiment(Kothari, 2004). In order to get an in-depth knowledge on the problem, this study used the case study method and non-probability sampling (purposive and snowball). The main reason for opting for this method of data collection is that, slum residents are difficult to get and their willingness to participate in surveys is minimal (sometimes they feel surveys are a form of mockery to them-more surveys less actions). Therefore, the researcher used non-probability sampling design instead of probability sampling design. The slum areas were selected based on the population of migrants. The researcher is impartial and the data analysis was done without prejudice, without no element of bias. In all, 304 questionnaires were administered to both Nima and OF respondents. Respondents in Nima were administered 146 out of the 150 questionnaires sent to the community, whilst respondents in OF were administered 158 questionnaires out of 160 questionnaires. The reason for the disparity is based on the respective population of the slum community and the willingness of respondents to participate in the survey. Some residents were not willing to participate and also respondents who agreed to participate did not answer the questions satisfactorily, hence were not added in the analysis.

Also, the researcher used secondary data from earlier researches relevant to this study such as journal articles, reports, reviews and unpublished documents from online portals and news, which were duly cited and referenced.

One major limitation of this study is the availability of residents and their willing to participate in the survey.

3. Results and Discussions

Urbanisation is associated with rural–urban migration, as workers move from less productive activities in agriculture to more productive activities in urban areas. But rural–urban migration can also happen as a result of searching for better amenities, to escape rural

poverty (even in the absence of prospects of a formal job in urban areas) or from conflict, natural disasters and social tensions. However, rural–urban migration is actually not the dominant factor behind urban population growth in developing countries, particularly in Sub-Saharan Africa(Lucci et al., 2015). Although the agents of urbanization may be specific to countries, the significant characteristics such as rural urban migration cannot be overemphasized. Therefore, the focus of this study is to examine the role of slums in the growth of megacities through the influx of poor rural migrants.

3.1 Causes of Slums in Accra

The creation of megacities and slum formation can be attributed to multifaceted factors. Slum developments especially in Accra relates to rural-urban migration (lack of jobs at the places of origin) and the lack of affordable housing. Financial and lack of job availability are the internal factors contributing to slum development(Srinivas, 2005). Rapid rural-urban migration, infrastructure inadequacy and economic retrogression are also some of the factors causing slum formation according to the UN-Habitat report in 2007(Habitat, 2006).

3.1.1 Migration

According to the former UN-Secretary General, Ban Ki-moon, migration is an expression of the human aspiration for safety, better future and dignity, forms part of the social fabric and also the very make-up as a human family (2013 High-level Dialogue on International Migration and Development). Migrants constitute more than a billion of the global population and one-seventh of the universal population, with international migrants making up an estimated population of 244million and internal migrants constituting 763million(Tacoli et al., 2015). Migration may occur within a country from urban to rural, urban to urban, rural to rural, or rural to urban. Also, migrants may move willingly to live in a better place and to improve their financial status and this is predominant among rural-urban migrants in Ghana(Awumbila et al., 2014). Table 1 gives an overview of the differences given by respondents of both Nima and Old Fadama between their places of origin and current destination.

Table 1 Differences between Place of Origin and Destination

ORIGIN	DESTINATION
Peaceful	Poor Living Condition
No Tertiary Institutions	High Cost of Living
Cheap Accommodation	Good for Business
Low Level of Development	Great Opportunities
Enough Space	Low Cost of Rent
Lack of Jobs	Good Schools
Good Sanitation	Too Crowded
Different Level of Civilization	

These factors are very important to consider for they significantly form the basis for the movement of rural dwellers to reside in cities. From the survey, 57% of respondents in Nima migrated to Accra in search of jobs whilst 7% moved because of education. Also, 5% of respondents migrated as a result of the low level of development in the area, whilst 6% moved because of marriage. One percent of respondents migrated due to proximity to work, 1% due to the lack of electricity and 1% migrated because of trade. Again, 11% of respondents migrated because of the population of the area, whilst 10% of respondents did not mention the reason for migrating. For OF on the other hand, 64% of respondents migrated to find jobs whilst 7% migrated because of education and 3% because of trade. Furthermore, 1% went for on a visit, whilst 1% migrated due to the death of mother. Added,

eleven percent of respondents migrated due to marriage, whilst 2% as a result of cost of rent. Three percent of the respondents migrated due to the population of the area whilst 8% did not give a specific reason. From the above findings, it's crystal clear that, migrants have diverse and personal reasons for moving and settling at a place (figure 4). To some respondents, the low level of development in the area is no issue, whilst to others it caused them to leave. However, some factors such as good schools (Education), marriage and finding a job are significant reasons for majority as it constitutes a major part of their socio-economic development. Therefore, integrated spatial development should form the pivotal part of government policies, particularly in the global south.

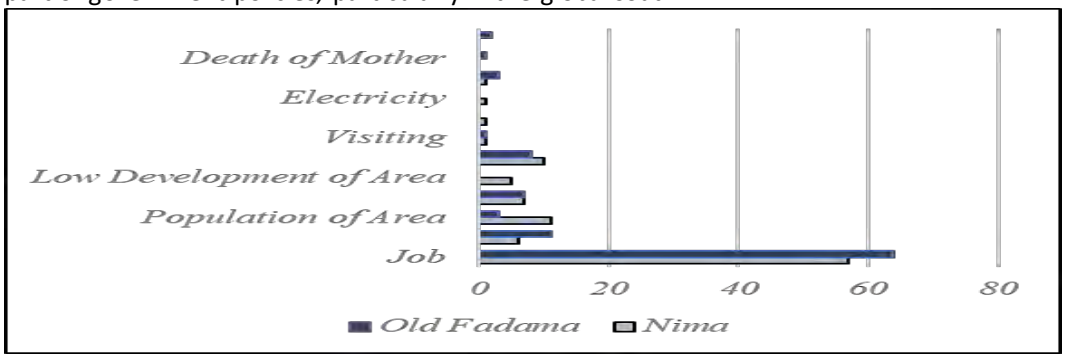


Fig. 4 Respondents' Reasons for Migration

According to the World Economic Forum Report (2017), the push factors of migration include lack of employment opportunities, unsustainable livelihood and rural poverty whist the pull factors include employment opportunities, pursuit of specialized education, better income and prospects for wealth creation, among others(Baffoe and Matsuda, 2017). All the factors are very evident in reasons posit by slum dwellers for migrating from their respective places of origin.

Respondents hailed from different parts of the country including neighbouring countries to settle in Nima or OF. The findings show that, 3% of the respondents in Nima come from the Central region of Ghana, 1% from Western Region, 6% from the Ashanti Region, 21% from the Northern Region, 12% from the Upper East Regions, whilst 6% are indigenes (figure 5). The results for OF also show that, 4% of the respondents, hail from the Central Region, 1% from Western Region, 3% from the Ashanti Region and 35% from the Northern Region (figure 5).

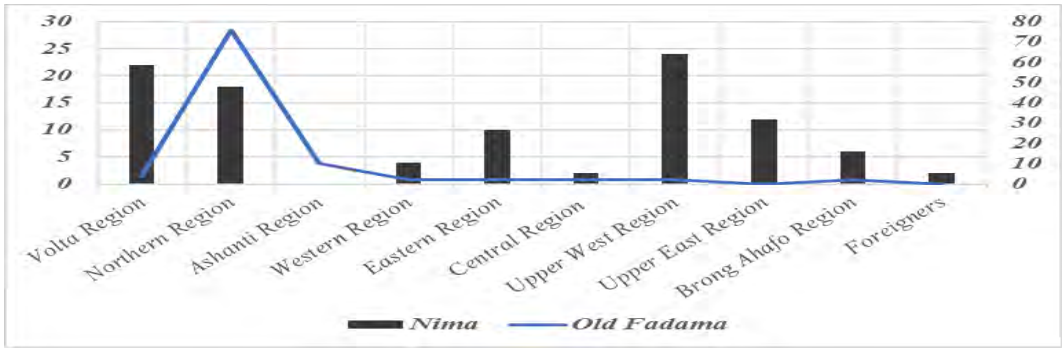


Fig. 5 Respondents' Places of Origin

Despite the fact that respondents migrated from different places, they all hope for good and better living including job acquisition, good schools, hospitals and incredible opportunities. One of the major differences between the place of origin and destination for both

respondents of Nima (78%) and Old Fadama (54%) is the unavailability of jobs and opportunities (push factors). Before deciding to leave the rural area, they feel the abstract beckoning of life in the cities which keeps burgeoning the interest to live in cities which comes as a result of spatial equality. This phenomenon re-iterate that economic improvement for slum dwellers both at the place of origin and destiny can significantly reduce migration, hence decelerating the pace of the growth of megacities, self- sufficient and resilient to forces of poverty. Also, when rural areas are economically empowered, the possibility of abled bodies from the rural areas drifting to cities may be curtailed. Slum dwellers who are young and detest consistent monitory of parents see being away from home and fending for themselves as freedom. Parents must take responsibility of their children and not to push them into child labour and a law restricting child labour should be enacted and stringently and effectively enforced. This has become vital as some respondents in OF are so young to be out on their own. For the girls amongst them, they end up being impregnated, hence contributing to the natural increase in the slum. Most often, they stay in the slums for ages and to some extend start their families in the slums (figure 8). All these account for the creation of mega slums, invariably leading to the creation of megacities. Since the destination provides jobs through the proximity of markets, where they indulge in manual and menial jobs (needing no skill or certificate) such as kayayi, truck pushing, assisting food vendors among others and coupled with the affordable cost of living, they will continue to live there and new entrance will join, gradually leading to the creation of mega slums (mega slums are descendants of megacities, figure 9).

In a nutshell, the responses outlined by respondents were categorised into high impact factors and low impact factors. The high impact factors are the ones relating to government policies and the low impact factors are personal factors (Table 2).

Table 2 Classification of Factors Given by Respondents

PUSH FACTORS	PULL FACTORS	HIGH IMPACT FACTORS	LOW IMPACT FACTORS
Low Level of Development	Job Opportunities	Job Search	Visit
Population of the Area	Education	Education	Marriage
Visits	Trading	Trading	Death of Mother
Death of Mother	Proximity to Work	Low Cost of Rent	Population of the Area
Lack of Social Infrastructure	Low Cost of Rent	Low Level of Development	
		Nearness to Work	

The high impact factors according to this study, are the factors that are relevant and difficult to solve by governments in a short term and are major contributory factors to causing people leave their places of origin whiles the low impact factors according to this study are the factors that also contribute to slum development in infinitesimal cases. The reason for this categorization is to aid in development plans and also present a roadmap in resolving slum challenges from their root causes (For example, 57% and 64% of respondents in both Nima and Old Fadama migrated due to lack of jobs and in search of jobs respectively).

The findings show that 75% of respondents in OF relocated to the area whilst 25% did not relocate to the area. Also, 82% in Nima relocated to the area whilst 18% did not relocate to

the area (figure 6).

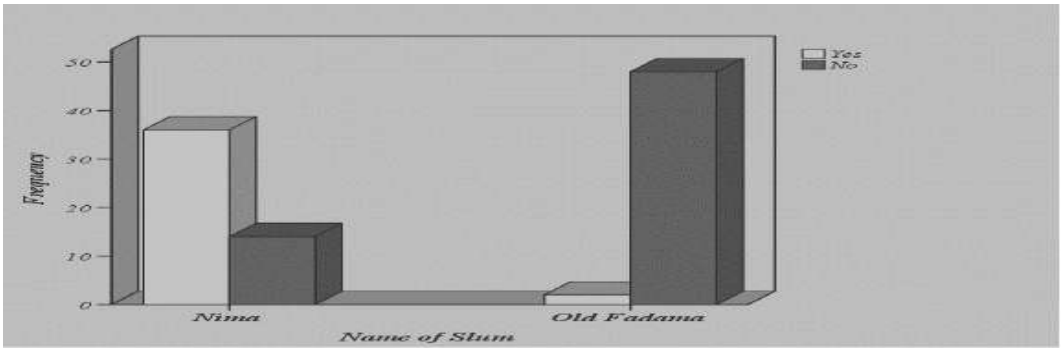


Fig. 6 Respondents Born in the Slum

The place of abode of every individual is paramount, despite the myriad of challenges or no matter how scintillating the place may look. However, even within the city, there are push and push factors that forces slum dwellers move from one slum to another. As already elucidated above, there are other reasons compelling slum dwellers to leave their previous location. Poor rural migrants move to the city for better life but after reaching the city, what they perceive it to be is not what they encounter hence, will continue to move within the city slums until they are capable of finding a decent place (figure 7). The funnel represents the city always welcoming new entrance.

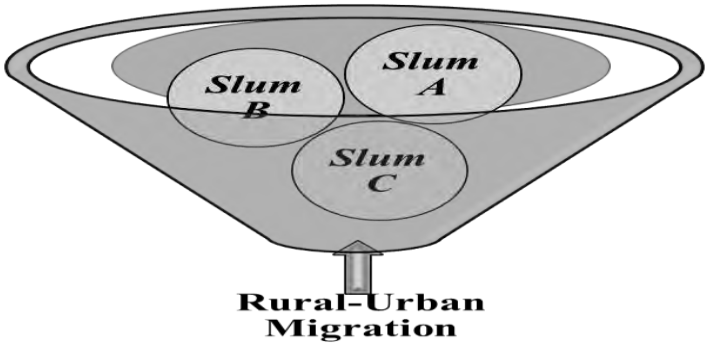


Fig. 7 The Inter-Slums Migration Funnel

The funnel represents the city (figure 7), therefore, slum dwellers will prefer to stay and move within slums until they get what they want within the city, just a few might consider the option of returning to their places of origin. For instance, from the findings of the study, 10% of respondents in Nima mentioned that they left the previous location due to the cost of rent. This means that their first point of call was not directly settling in the slums but due to the high cost of rent they relocated into the slum of Nima. Also, 5% of respondents in Nima mentioned that they had free accommodation, whilst 37% of respondent stated that they preferred this location because of low cost of rent One percent of respondents in Nima also left their previous location due to divorce and eviction respectively. This class of people needed an immediate shelter hence found solace in the slum. Evictions and demolition are mechanisms to eliminate slums in cities but they end up causing more slums, which even grow rather more rapidly since new entrance may take advantage of the condition, leading to urban population growth. The findings of the study in Old Fadama show that 5% of respondents left their previous settlement due to the cost of rent, whilst 1% moved after the divorce with their spouse (table 3). The social implication of this is that dwellers will cease any opportunity that come their way provided they will achieve the reason for which they are in the city and when they achieve it, it may serve as an incentive for new city entrance.

Table 3 Reasons for Respondents Leaving Previous Settlement

	PERCENTAGES	
Reason for Leaving Previous Location	***Nima***	***Old Fadama***
Cost of Rent	10	5
Divorce	1	1
Evicted	1	1
Family Relocation	1	0
Poor Sanitation	1	1
Education	7	7
Marriage	10	18
Work	28	38
Change of Environment	1	1
Demolition	22	2
Proximity to Work	5	2
Trading	1	1
Did Not Relocate	11	20
Not Stated	1	3
Total	100	100

Economically, job availability plays a vital role in elevating not only slum dwellers but the entire citizenry from poverty and conversely boost the economy of the country, of which Ghana is a typically example. Spatial and economic inequality has forced most citizens to move into cities where they end up settling in the slums.

Both Nima and OF have vibrant markets such as the popular Nima market, Agbogboloshie and Konkomba yam markets which often receives people from all parts of the city on daily basis. For instance, most of the young migrants who leave the northern part of Ghana and settle in OF, engage in truck pushing, kayayei (head porters) due to the proximity of the area to these markets and also, both Nima and OF have close proximity to the CBD. From the above analysis, it can vehemently be put forward that the selection of settlement by slum dwellers are based on different informed decisions and choices, some major and others minor but all constituting to the reason for settlement invariable contributing to the creation of megacities. Assumedly, the factors considered by slum dwellers for settling in a neighbourhood varies as compared to high and middle income earners, who not only consider the environment and neighbourhood but also the availability of social amenities and security. Slum formation accelerated as a result of rapid urbanization within the past 20 years particularly in the global south.

3.1.2 The Role of Slums in the Development of Megacities

Slums in cities are seen as the life line of the city depending on the angle from which it is viewed. Predominantly, urban slums come about as a result of rapid urbanization and unfavourable policies. Slums have become inevitable in cities, particularly among prosperous cities of developing countries who lack the strategies of meeting the pressures of urbanization. Most slum dwellers move out of rural areas to escape from the chronic hardships and poverty of the area. Although the rural landscape may well be conducive for living, the lack of economic opportunities and spatial inequality motivates the movement of rural dwellers to cities, where they abstractly perceive or predict the type of life in the city. Sometimes from the evidence gathered by those who are returning from cities and looking "all flashy".

Slum dwellers contribute to the creation of megacities from two main perspectives as concluded by the findings of this research. First is the continuous influx of migrants into cities who find solace in slums (the place they can readily afford). They move in as a result of spatial inequality and lack of jobs. For example, in Old Fadama, more girls avail themselves in the markets as head porters (Kayayei), which needs no degree, certificate or training. The second perspective is the length of state of some migrants (lifetime migrants). They stay in the slums and start their families, who also start their own families (figure 8). Figure 8 assumes each new entrance starting a family and producing about three children, then they eventually become grandparents, creating a slum generational. Adding the new generation to the already existing population coupled with new entrance, will definitely transform the city into a mega city

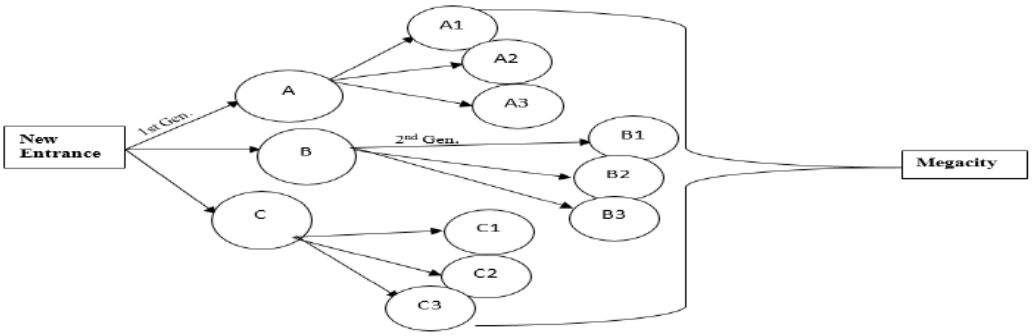


Fig. 8 A model of Generational Increase in Sums

From the statistics, the population of GAR increased from 491,1817, 851,614, 1,431,099, 2,905,726 from 1960, 1970, 1984, and 2000 respectively, to 4,010,054 in 2010(Bentsi-Enchill et al., 2013), with 40% migrating from other regions in the country. No matter how hash and hard the conditions are in the city, slum dwellers still prefer living in the city than to return to the rural area. From the study, both Nima and Old Fadama are migrant communities, therefore any action that will deny them of their source of livelihood will face strong resistance.

Megacities do not just form overnight but have been attributed to numerous factors such as the neglect of infant squatter settlements in cities amongst others as concluded in this study. For instance, slums such as Dharavi (Mumbai, India), Rocinha (Brazil), Lagos (Nigeria) are mega slums in mega cities but did not just form overnight. This means that the existence of slums contributes significantly into the rapid growth of cities (figure 9).

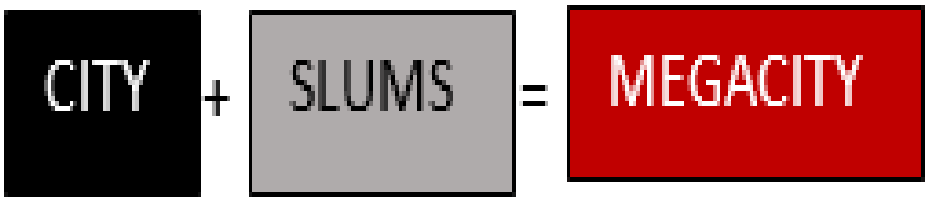


Fig. 9 Basic Urban Mathematical Equation for the growth of Megacities

As presented by some scholars, urbanisation is the increase in the proportion of the national population living in towns and results from a mixture of in-migration from rural areas and natural increase of the urban population. They stated that, the classification of a locality as urban or rural is based on population size in Ghana, that is, localities with five thousand or more people are regarded as urban(Bentsi-Enchill et al., 2013). The proportion of urban population in Greater Accra was 90.5 percent in 2010. Comparatively, GAR has the highest proportion of the population living in urban areas than other regions(Bentsi-Enchill et al., 2013). Also, the population dynamics of the cities in Ghana based on the census data from 1970-2010 show that, the country may possibly create a bipolar urban society, based on lack of proper planning and investment(Owusu and Oteng-Ababio, 2015).

Slums will continue to exist in cities unless the right strategies are put in place. Rural migrants drift into cities for greener pastures and other opportunities in the city. Mega-cities are conceptually different from world cities or global cities because they are defined by population size rather than global functions(Yeung, 2009). Megacities as already defined earlier refers to cities over 10 million. Rural to urban migrants have an enormous number moving to megacities and settling in slums(Crank and Jacoby, 2015). A megacity is a prime example of such a critical stage of development and this is principally true where growth is too rapid(Munich, 2005). Large cities always pull people to it particularly people who are captivated by densely populated areas(Munich, 2005). Urbanization attributed to rural urban migration results in the rise in numbers of poor people living in hazardous conditions(Bolay et al., 2016).

3.1.3 Recommendations

Most cities of the world particularly in developing countries are rapidly urbanizing and morphing into megacities. The euphoria of rural to urban transformation amongst people is considered the global trend. However, uncontrolled movement of people coupled with natural increase is putting pressure on some cities than others. For instance, in Ghana, much pressure is centred on Accra as a result of the heavy concentration of industries, government departments and offices, and the availability of basic services. Basically, a strong political will in addressing the challenges of slums in cities, is pivotal in the planning and implementation of strategies. Granting that, the political will to deal with existing slums through adaptive measures is weak, then the political will to prepare for the future urban expansion through proactive measures will even be weaker(Mehta and Dastur, 2008). It is realistic and prudent for government, policy makers and practitioners from all angles and at all level sought out for affordable and implementable approaches and strategies in resolving challenges of global mega cities and slums. In recent years, urbanization is a global process that makes up the fast development of majority of developing countries therefore also needing prompt attention and important spatial, social and economic sustainable changes.

A comprehensive and integrated planning is clearly needed in Ghana to minimize spatial inequality. Rural areas should not only be seen as agrarian landscape, but areas needing utilities and services. Also, the one size fits all strategy must be eliminated from government policies. The development of respective regions and areas can be made peculiar with the challenges that they are facing. As the law states already, a place with 5000 or people is termed urban in Ghana hence a place ceiling maybe introduced in Ghana controlling the number of people that are permitted to live a particular urban area. Urbanization is inevitable particular within developing countries, therefore strategies for healthy urbanization is prudent especially in cities such as Accra, Kumasi, Tamale and so on.

The quest for education pushed some of the respondents to Accra, therefore, it is imperative for governments and city officials including urban planners to include the construction of schools in rural and deprived areas of the country. Slums are not a novel problem and their challenges have become a global concern, resulting in constant debates both locally and at the international level. Urban planners should provide feasible plans for government to balance efficiency and civil rights. As a matter of civil rights, citizens are to enjoy as their rights basic amenities including proper housing and water. Therefore, a gradual approach in the provision of such amenities can be rolled out. As far as the social needs and poor economic conditions of slum dwellers are not tackled, slums will continue to exist. Therefore, full consideration of civil rights in the entire country is vital. Also, Government should empower youth in the rural areas by building their capacities through skills development and livelihood support such as creating micro-credit avenues. Slum dwellers can also be empowered and sensitized on the need to return to the rural area. This can be possible through a bottom up approach such as community mobilization and sensitization.

A hybrid intervention method is needed particularly in cities to control rural-urban migration, strategies which will not end up creating more challenges in cities such as slum formations. Urban lands, both precarious and habitable lands must be guarded or utilized to prevent encroaching by particular poor rural migrants. Policy regulating rural-urban migration is paramount in reducing and avoiding the growth of megacities. Prioritizing spatial equality as the number one focus of any development agenda is eminent.

Furthermore, the study recommends healthy urban planning, that is, planning for people and putting the needs of people and communities at the heart of the urban planning

process. Finally, the best solution to remedy slums and to prevent the growth of megacities is to prevent them.

3.1.4 Conclusion

Slums are often perceived as a means to an end particularly when a country is urbanizing. However, the influx of rural migrants adds to the already existing high populations of urban areas, who often reside in slums after encountering the hardships of cities and their inability to matchup with the complex conditions of the city. Therefore, this study concludes that provided the systems give room to welcome new entrance into the city, then cities will continue to grow despite the lack of infrastructure and other urban services.

Megacities are mostly categorized by extreme concentrations of people and infrastructure, however, megacities are heterogeneous and complex, just like slums. Seven of the ten most populous cities are located in developing countries(Ali and Sulaiman, 2006). Therefore, in order not to be confronted by the problems of existing in megacities, cities in developing countries must find adaptive and sustainable strategies to prevent the continuous influx of rural migrants. We conclude that, government must recognize that rapid urbanization will continue to hit developing economies and that the impact of Climate change, natural disasters, conflicts and so on, may move people from agrarian into industrialized areas, hence cities must be prepared and work towards it evolution.

5. References

ALI, M. H. & SULAIMAN, M. S. The causes and consequences of the informal settlements in Zanzibar. XXIII Congress of the International Federation of Surveyors, Munich, Germany, Retrieved from https://www. fig. net/resources/proceedings/fig_proceedings/fig2006/papers/ts35/ts35_01_ali_sulaiman_0320. pdf, 2006.

AWUMBILA, M., OWUSU, G. & TEYE, J. K. (2014), Can rural-urban migration into slums reduce poverty? Evidence from Ghana, Migrating Out of Poverty Working Paper, 13, 1-41.

BAFFOE, G. & MATSUDA, H. (2017), "Why do rural communities do what they do in the context of livelihood activities? Exploring the livelihood priority and viability nexus", Community Development, 48, 715-734.

BENTSI-ENCHILL, N., CUDJOE, S., SEPAH, E., ANARFI, J. & GAISIE, S. (2013), Population & Housing Census: Regional Analytical Report Greater Accra Region, Population and Housing Census: Accra, Ghana.

BOLAY, J.-C., CHENAL, J. & PEDRAZZINI, Y. (2016), "Slums and Precarity in Developing Countries. Learning from the Slums for the Development of Emerging Cities", Springer.

COHEN, B. (2006), "Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability", Technology in society, 28, 63-80.

CRANK, J. P. & JACOBY, L. S. (2015), "Crime, violence, and global warming", Routledge.

DESA, U. (2018), Revision of world urbanization prospects, UN Department of Economic and Social Affairs.

GSS (2012), 2010 population and housing census: summary report of final results, Ghana Statistical Service Accra.

HABITAT, U. (2006), The state of the world's cities report 2006/2007, The millenium development goals and urban sustainability, 30.

HABITAT, U. (2014), The state of African cities 2010, Governance, Inequalities and Urban Land Markets.,(UNEP, Nairobi, 2010).

HABITAT, U. (2016), Urbanization and development: emerging futures, World cities report, 3, 4-51.

INSTITUTE, W. (2013), State of the World 2007: Our urban future, Routledge.
KANG, S., PESCINA, J. U. C., QUASHIGAH, P. J. & KUMASHIE, I. (2010), Nima Land Use Mapping Project, Report and Map set, Millennium Cities Initiative.
KOTHARI, C. R. (2004), Research methodology: Methods and techniques, New Age International.
LEARNER, A. (2017), The habitable planet: A systems approach to environmental science.
LUCCI, P., BHATKAL, T., KHAN, A. & BERLINER, T. (2015), What works in improving the living conditions of slum dwellers, ODI Dimenstion Paper, 4.
MEHTA, B. E. & DASTUR, A. (2008), Approaches to urban slums: a multimedia sourcebook on adaptive and proactive strategies, The World Bank.
MUNICH, R. (2005), Megacities-Megarisks: Trends and challenges for insurance and risk management, Munich Re.
NATIONS, U. (2002), World Urbanization Prospects, The 2001 Revision: Data Tables and Highlights, World Urban Prospect 2003 Revis, 1-195.
OBENG-ODOOM, F. (2010), "An urban twist to politics in Ghana", Habitat International, 34, 392-399.
OWUSU, G., AGYEI-MENSAH, S. & LUND, R. (2008), "Slums of hope and slums of despair: Mobility and livelihoods in Nima, Accra", Norsk Geografisk Tidsskrift-Norwegian Journal of Geography, 62, 180-190.
OWUSU, G. & OTENG-ABABIO, M. (2015), "Moving unruly contemporary urbanism toward sustainable urban development in Ghana by 2030", American Behavioral Scientist, 59, 311-327.
SETTLEMENTS, P. S. D. O. H. (2010), Final draft report on community-led enumeration of Old Fadama community, Accra–Ghana, Author Accra.
SRINIVAS, H. (2005), Defining squatter settlements. Global Development Research Center Web site, www. gdrc. org/uem/define-squatter. html, viewed, 9.
TACOLI, C., MCGRANAHAN, G. & SATTERTHWAITE, D. (2015), Urbanisation, rural-urban migration and urban poverty, Human Settlements Group, International Institute for Environment and Development.
TAUBENBÖCK, H., ESCH, T., FELBIER, A., WIESNER, M., ROTH, A. & DECH, S. (2012), "Monitoring urbanization in mega cities from space", Remote sensing of Environment, 117, 162-176.
UN-HABITAT (2011), Ghana housing profile, Author Nairobi.
UN-HABITAT (2015), Slum almanac 2015–2016: Tracking improvement in the lives of slum dwellers, United Nations Human Settlements Programme (UN-Habitat) Nairobi, Kenya.
YEUNG, Y.-M. (2009), Mega-cities.

Research Paper

Multi-scale Spatial Layout Structure System

Experiences of Shanghai Mega City Spatial Planning

William Zuo, Shanghai Tongji Urban Planning & Design Institute Co.,LTD. China

Abstract

As one of the leading factors of China's economic growth, Shanghai has ranked atop of global metropolitan. Recently, Shanghai has just completed the compilation of a new version of Shanghai 2035 Master plan. Under the guidance of 'outstanding global city' of Shanghai, one of the most remarkable changes is the redefinition of cities and regions. This master plan introduces a five-level spatial layout structure system of 'Central Activity Zone-Main City Zone-Suburban Town Circle-Near Shanghai Collaborative Zone-Yangtze River Delta Regional Urban Agglomerations'. The Central Activity Zone is the core area of the main city, the Main City Zone is the key upgrading area around the main city, the Suburban Town Circle is the suburban development complex composed of the suburban New city-new town-ordinary town and village. the Near Shanghai Collaborative Zone emphasizes the strategic coordination and interactive promotion between Shanghai and its surrounding areas, and the Yangtze River Delta Regional Urban Agglomerations refers to Shanghai driving more than ten cities in the Yangtze River Delta to form a world-class metropolis area. In different spatial scales, this pattern has given a coordinated and unified spatial planning arrangement for urban and rural areas and different regions, which provides a guideline for the world's mega-cities' spatial planning. The disadvantage is that the multi-scale spatial governance system matched with the multi-scale spatial layout structure system has not yet matured in Shanghai and its surrounding areas, resulting in difficulties in planning and implementation. Now, China is commencing a large-scale reform of its spatial planning system, which offers a great opportunity for the implementation of new planning concepts.

Keywords

Spatial Planning, Yangtze River Delta Regional Urban Agglomerations, Planning Integration

1. Introduction

Ever since the definition of mega city was proposed by contemporary urban planners, these regions are steadily growing alongside with influences and challenges. Presumably, many of these challenges such as urban slums, food and energy shortages will bring adversely impact on the long-term development of mega cities. This paper focuses on the regional spatial system invented by the Shanghai Municipal Government. The system has been expected to reshape spatial layout of the emerging Shanghai mega city region and form a compact municipality spatial structure. By introducing this system, the state council of China intends to solve regional development gaps as well as emerging challenges of Shanghai mega city region. This paper also interprets the implementation processes of this spatial system in the field of planning practice.

2. Literature Review

The expansion of metropolitan areas generates influential reciprocal impacts on both the metropolitan and its surrounding districts (Mayer, H. M. 1987). Major treatments for the negative impacts come along with urbanization are categorized into one of the three categories: suburbanization, satellite town development or sub-center development. Each of them has individual advantages and disadvantages. Post-World War II suburbanization in the United States caused a population boost in non-central city sections in 1950s (Tobin, K. A. 2002). Surging population eventually lead to an expansion of suburban and huge amount of expenditure on highway construction. Seoul decided to build the Songdo City to the south of Seoul when facing mega city problems of its own. It is planned to be a modernized and environmentally-friendly satellite city of Seoul with high quality of green open space and affordable housing. The city is qualified with 18.5million square meter LEED certified projects with high standard of sustainability (Poon, L.2018). However, it is common for mega cities and their neighboring cities to form mega city regions which are interconnected to each other in terms of social, economic and environmental impacts. 19 mega city regions have been planned as part of the Belt and Road Initiative proposed by the state council of China. According to the initiative (Preen, M.2018), Yangtze River Delta is considered as hub of the belt and one of the most important regions. Shanghai as the economic center of Yangtze River Delta is adopting a series of planning regulations for sustainable development of Yangtze River Delta as a whole.

2.1. Research Method

The Municipal Government of Shanghai has released the Shanghai Master Plan 2017-2035 (2018) in replace of the existing Shanghai Master Plan 1999-2020. Shanghai has been redefined as a global city of innovation, humanity and sustainability which provides opportunities for the whole community. It introduced a five-level spatial planning hierarchy comprise four urban hierarchies and one regional hierarchy.

By studying major differences between Shanghai Master Plan 2017-2035, Shanghai Master Plan 1999-2020 and other contemporary Master Plans in China, a recognizable pattern change in terms of spatial structure system can be identified. It is the result of a revolutionary reform known as the 'Integration of Various Plans into One Master Plan'. This reform integrates some of the major planning systems in China such as the urban planning system and land use planning system into one ("Shanghai Master Plan 2017-2035",2018). Construction of industrial parks, factories and shipping facilities were addressed by Shanghai Master Plan 1997 as the key factors to regional development. Detailed construction plans were released as guidelines for regional industrial parks. However, none of these factors were scheduled in the Master Plan 2035.The city has adjusted its priorities from economic growth to the creation of a sustainable, ecological and human centered society. It is required by the master plan that all regulatory plans and detail plans in sub-center zones must not neglecting the protection of local environments and heritage sites ("Shanghai Master Plan 2017-2035", 2018).

	Shanghai Master Plan 1999-2020	**Shanghai Master Plan 2017-2035**
National Strategies	Centers of Economy, Finance, Trade and Shipping	Centers of Innovation, Humanity and Sustainability
Residential Population	160million	250million
Total Development Land	1500 km^2	3200km^2
Spatial Planning Layout	Not included	A Five Level hierarchy ranges from center activities zone to the

		Yangtze River Delta Regional Urban Agglomeration Zone
Planning Implementation	Not included	Specific Implementation processes and regulations are included.
Transportation Network	City-wide transportation network	Regional wide transportation network

2.2. Shanghai Mega City Spatial System and Supporting Methods

The hierarchy and functions of networked spatial system introduced by Shanghai Master Plan 2017-2035 are list as following:

- Center Activities Zone： Core bearer of global urban functions such as highly integrated finance, commerce, business, culture, leisure, tourism services and linkages between global network and the entire municipality
- Sub-center of the main city Zone: Also known as the Center of New City, it includes public activity center and public open spaces around the Centre Activities Zone. It partially undertakes specific functions as global activities center. There are five new cities located next to the boundary of Shanghai's urban footprint known as Jiading District, Qingpu District, Songjiang District, Fengxian District and Nanhui District.
- Suburban-Town Zone/Local Centre: It represents public activities centers or new towns which provide public services to the local community.
- Near Shanghai Collaborative Zone or villages: Facilitating integrated urban-rural developments among the five districts create interconnections between Shanghai and its town clusters.
- Yangtze River Delta Regional Urban Agglomeration Zone (YRDUA): The YRDUA is defined as a polycentric mega-city region (PMR) located along the Yangtze River Delta. Shanghai and twenty-five well developed cities are included in this zone. They were chosen by the national government as part of the national stimulus policies to boost Chinese economy (Zhang, M., Xiao, H., Sun, D., & Li, Y.,2018). Shanghai has been identified as the gateway of this agglomeration zone by the master plan. It is expected to promote the economic growth of the entire YRDUA.

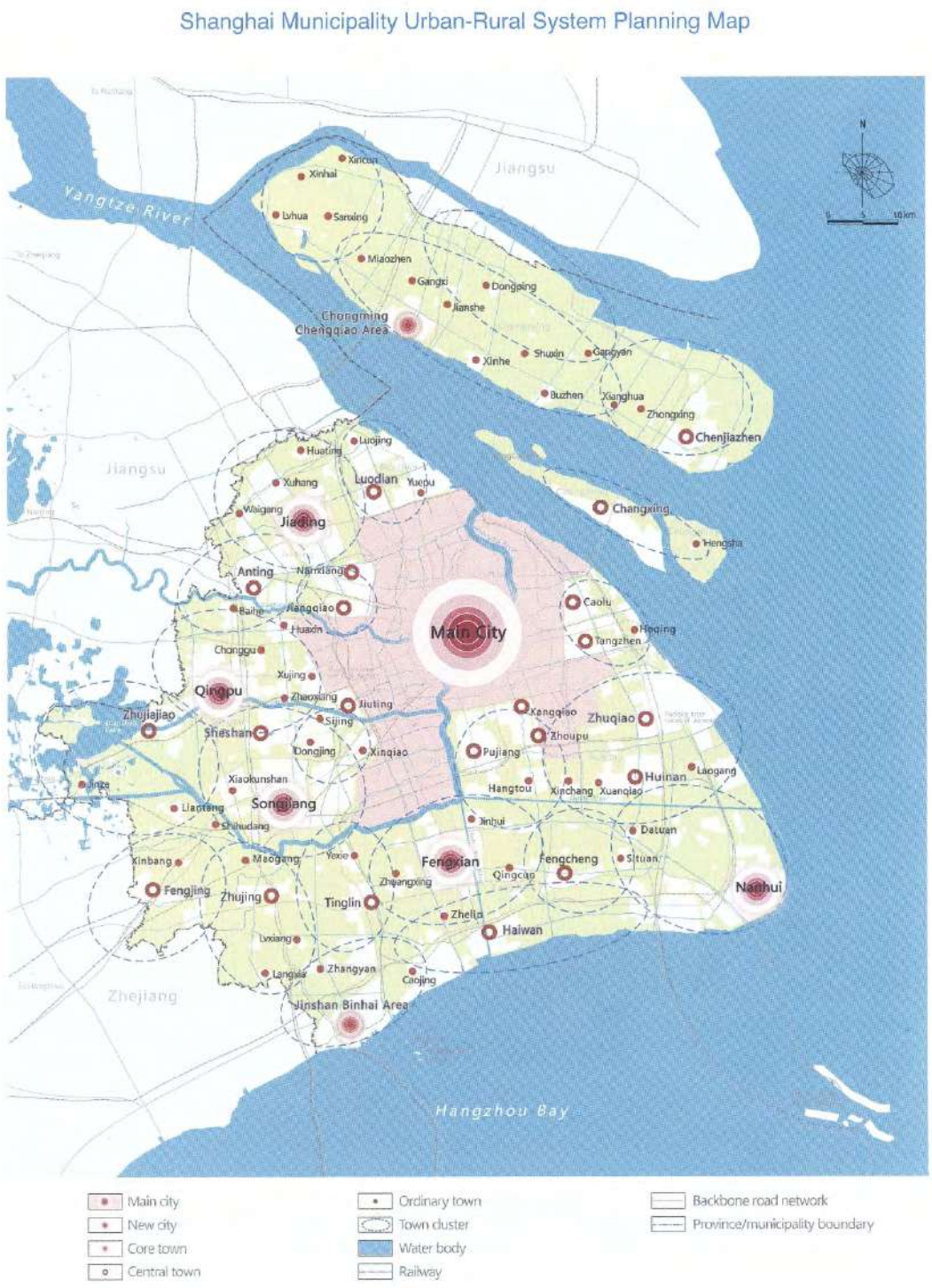


Figure 1: Shanghai Municipality Urban-Rural System Planning Map

Besides the hierarchy, specific land use proposals are introduced by coordinated development plan. Several proposals have been adopted by the Municipal Government of Shanghai to ensure the long-term growth of Shanghai Mega City Region.

- Population Distribution Method: The master plan requires no more than 25 million populations by the end of 2035, which equals to only 0.002% annual growth from 24.15million in 2015. Even as result of increasingly aging population, low-birth-rate and internationalization, this proposed population growth rate is considered extremely low in compare with other mega cities ("Shanghai Master Plan 2017-2035".2018). A concurrent registered residence policy has been frequently used in developing countries to slow down the progression of urban sprawl. As required by this registered residence policy, individuals' social welfare is closely related to their registered residences identified through birthplace. Because of the huge social welfare gap between urban regions and non-urban regions, municipal government like Shanghai and Beijing have strengthened registered residence policies which prevent people from effectively residence changes. As the result of proposed population de-concentration method, Shanghai Government has modified its registered residence policy.

- Urban Footprint Control Method: Before the publish of Shanghai Master Plan 2017-2035, it was common for local governments to adjust urban footprint boundaries in exchange of available land resources. In order to avoid similar uncertainties, 3200 km^2 urban footprint area are chosen as Shanghai's new urban footprint boundary for the next two decades. The five districts identified by Near Shanghai Collaborative Zone are included within development boundary. Regional plan encourages immigration from countryside to regional town centers by compensation (Land compensation standard in Shanghai, 2019). Therefore, local government can transfer inefficient residential land into valuable ecological or agricultural land.

Shanghai Master Plan 2017-2035	
Spatial Structure System	Other Supporting Methods and Plans
Centre Activities Zone	Population Control Method
Sub-Center Zone/New City	Urban Footprint Control Method
Suburban-Town Zone/Local Centre	Ecological Land Management Method
Community Centre	
Yangtze River Delta Regional Urban Agglomeration Zone	City Cluster Development Plans for Yangtze River Delta

- Ecological Land Management Method: Based on the land use structure introduced by the master plan, land resources are divided into three categories: ecological,

agricultural and urban spaces. land uses for the three types of land are clearly separate from each other. In order to prevent inefficient industrial or residential land use, proportions of ecological land and green spaces are strictly limited to no less than 60 percent of the overall land area. It is required by the Master Plan that 23% forest coverage among all the ecological land to ensure environment quality of the emerging mega city region. The figures below demonstrate the proposed location of green corridors across Center Activities Zone and reserved natural inhabits along the Yangtze River. By comparing the distribution of Ecological and Agricultural overlapping areas, we can identify a perfect combination of both form and function in terms of mixed land uses and environmental sustainability. The specific land use purpose is determined by the land use priority identified by local government. For example, if a block of land is suitable for multiple land uses, but surrounded by ecological forest, it is most likely will be classified as ecological land as well.

Figure 2: Shanghai Municipality-wide Eco-Space Planning Map

- Regional Transportation Improvement: In order to improve overall service level as national railway center, Shanghai will strengthen its municipality-wide transit

system by optimizing its quality of existing three level rail transit network. The three level transit network comprises intercity lines, local lines and metro lines. Intercity lines provide express service from Shanghai to other core cities in the city cluster of the Yangtze River Delta such as Nanjing and Suzhou. Local lines shorten the traveling times between Shanghai and its sub centers to no more than 40 minutes ("Shanghai Master Plan 2017-2035", 2018). Metro lines provide direct light railway and subway services within Shanghai

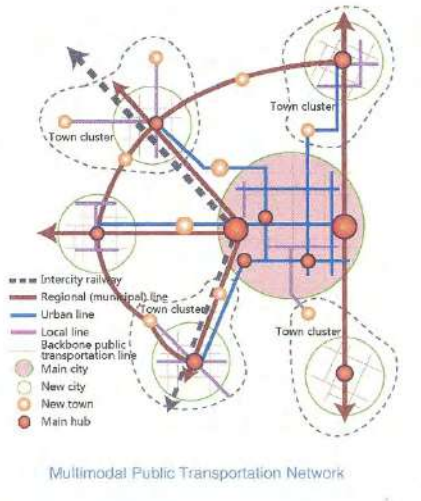


Figure 3: Multimodal Public Transportation Network

2.3. Yangtze River Delta Regional Spatial Structure Reform

The Yangtze River delta urban agglomeration is one of the earliest urban agglomerations formed in China (Chaolin. 2007 as cited in Zheng, Z., & Bohong, Z. 2012). According to Zheng (2012), the YRDUA spatial structure was established based on a single-nucleus and multiply centers model. Shanghai has played an important role as single-nucleus which accelerates the development of the agglomeration through different stages. In early stages, population density of Shanghai and other regional centers such as Hangzhou, Suzhou, Nanjing and Ningbo were growing rapidly based on accumulative effects on urbanization. Local governments have learned the importance of sustainable development and introduced industrial parks around towns and cities (Liuetal.2010).

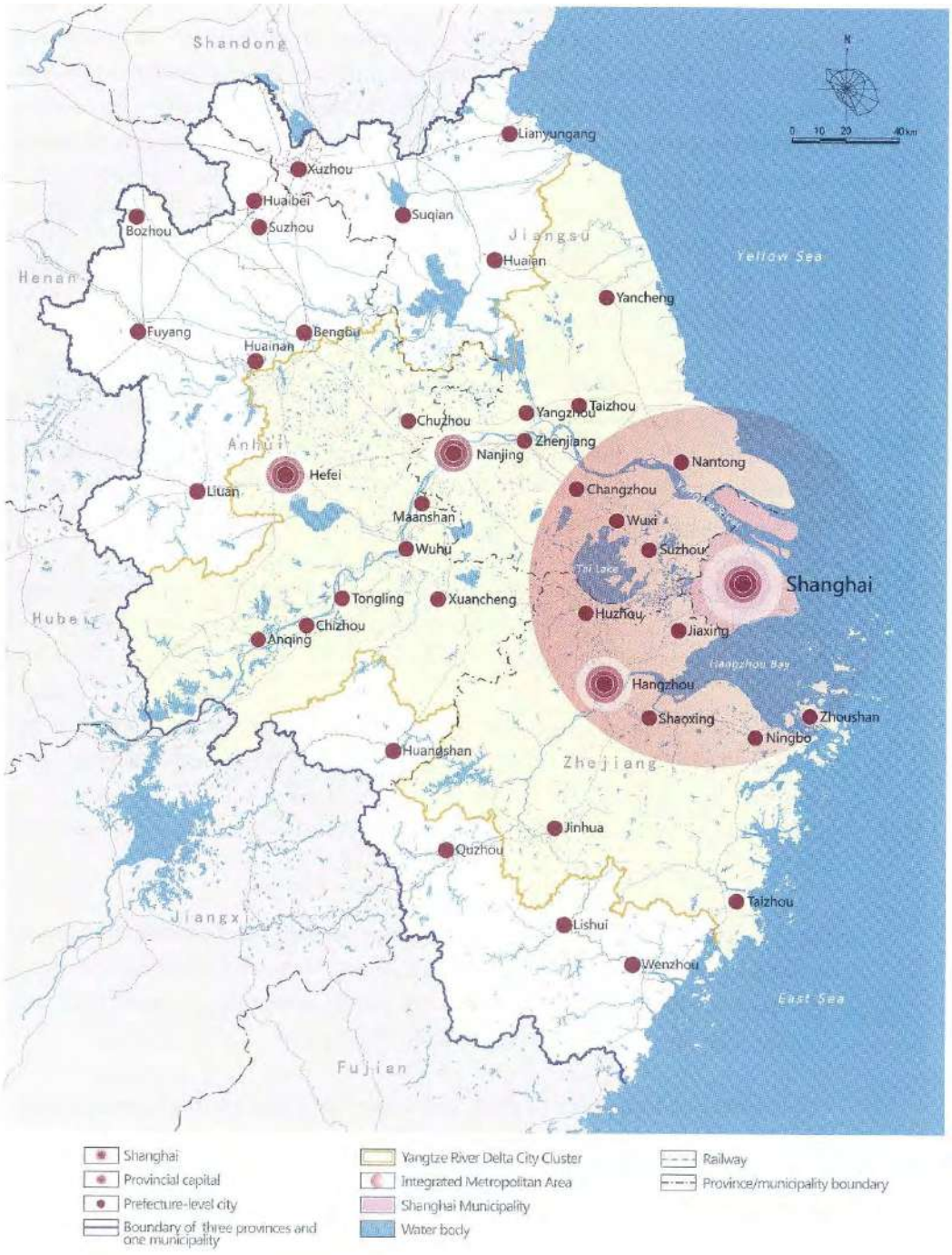


Figure 4: Shanghai Municipality Location Map

The State Council has approved a City Cluster Plan for the long-term development of Yangtze River Delta and other two main city clusters in China (China's City Cluster Plan,

2018). The Yangtze River city cluster includes five development belts stretches from Shanghai as Coastal Development Belt, Hangzhou-Ningbo Development Belt, Shanghai-Nanjing-Hefei-Hangzhou-Ningbo Development Belt, Riverside Development Belt and Shanghai-Hangzhou-Jinhua Development Belt. These five belts connect Hefei, Nanjing, Suzhou, Hangzhou, Ningbo five metropolitan areas to Shanghai. The function of Shanghai as financial and tourism center has been redefined by the 'The Belt and Road Initiative'("The Belt and Road Initiative", 2019) and the Shanghai Master Plan 2035. The original spatial structure has now been shifted from single-nucleus to multiply-nucleus agglomeration. Shanghai is transforming into an innovative, livable and environmental-friendly city rather than an overcrowded economic center. This transformation will most likely bring great opportunities for other cities within the YRDUA by the establishment of Free Trade Zone (FTZ) ("The Belt and Road Initiative",2019.). The free trade zone allows these cities to stockpile imported products first, and collect tariff only by the transaction of these products.

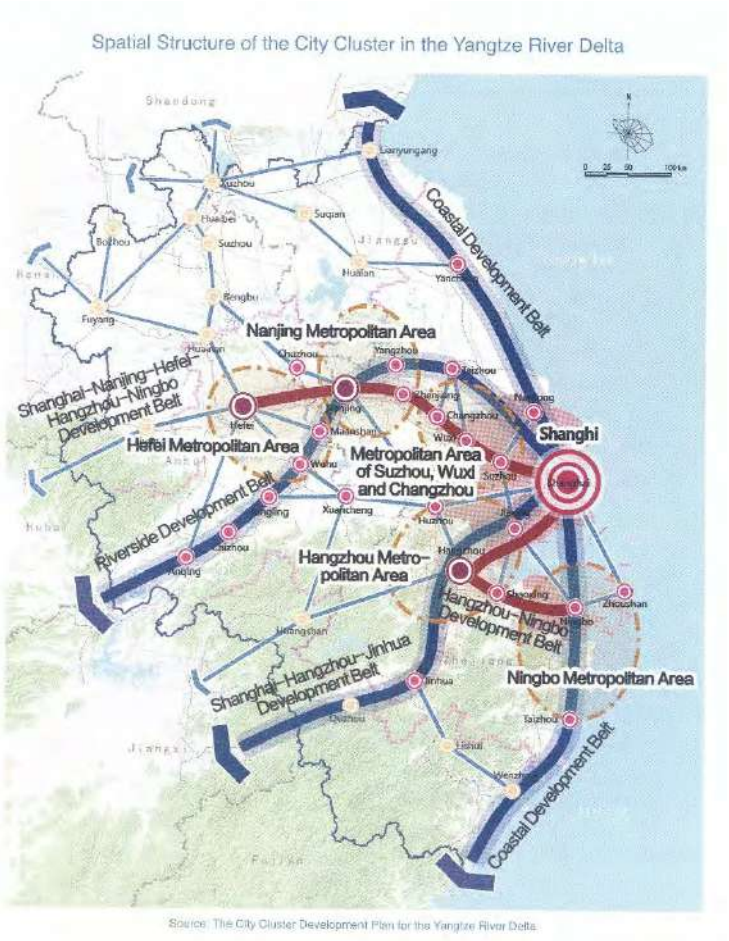


Figure 5 Spatial Structure of the City Cluster in the Yangtze River Delta

3. Planning Implementation Process

An implementation-oriented action planning system has been established based on relevant Unit Plans and Detail Plans. The system requires coordinated development objectives and timetables for population distribution. A variety of planning guidance and outlines will be published in line with the spatial framework of Shanghai Master Plan 2017-2035(“Shanghai Master Plan 2017-2035”.2018).

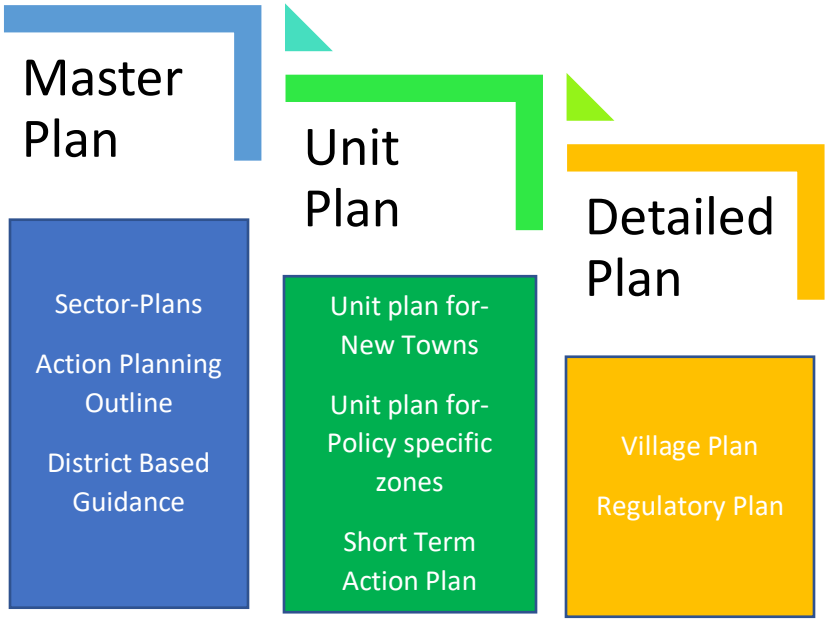


Figure 6: Multi-level plans in planning Implementation process

The overall framework can be classified into three levels

1) Master Plan has defined overall land uses guidance and urban development objectives for all districts. It includes district plans and Sector plans at master plan level.
2) Unit Plan will be prepared by regional government to enhance the support for New towns and Policy specific zones. It guides the construction of short-term projects and local infrastructures with short term action plan.
3) Detailed plan includes regulatory plans, sector plans and village plans. These plans are specific implementation-oriented plans which direct the implementation of urban construction projects. According to the technical standards and specifications proposed by the Shanghai Master Plan 2035 (“Shanghai Master Plan 2017-2035”,2018), Shanghai will refine policies and regulations for better operation management and planning design in key sectors.

4.Conclusion

Mega city problems are caused by many factors. Unfortunately, conflicts between limited land resources and steady growing population is unavoidably one of them. By establishing a spatial structure system, a coordinated development plan and a series of detailed planning implementation processes, the Shanghai Municipal Government has proposed an integrated master plan to strengthen regional interconnections for a sustainable future of Shanghai Mega City Region. As a result of that, the fast-growing city cluster of Yangtze River Delta will be able to offer residential, commercial, industrial and recreational services to Shanghai's cross-city commuters and residents. It will eventually lead to regional population redistribution across the entire city cluster of Yangtze River Delta. Effectiveness of the newly implemented Shanghai Master Plan 2017-2035 may not be revealed in a short term, but shanghai vision and experiences might be considered as a valuable solution to other overcrowded mega city regions.

References

Abercrombie, Patrick (1944). “The Greater London Plan.” Standing Conference on London Regional Planning, Ministry of Housing and Local Government, London: Great Britain.

China’s City Cluster Plan(2018). Dezan shira & Associates, Available July 9th 2019 from https://www.dezshira.com/multimedia/view/china-s-city-cluster-plan-7849.html

ConHualv.com, Available July 9th 2019 from https://www.66law.cn/laws/324070.aspx

Kim, Kabsung; Park, Juyoung (2005) Segmentation of the Housing Market and its Determinants: Seoul and its neighboring new towns in Korea. Australian Geographer, 36(2), 221–232. https://doi.org/10.1080/00049180500150019

Liu,LC;Dong,XF;Chi, SQ (2010) “Quantitative delimitation of metropolitan areas based on a synthetic method: Case study in the Lanzhou metropolitan area.” J. Urban Plann. Dev., 136(4), 357–364.

Mayer HM. Crabgrass Frontier: The Suburbanization of the United States. Professional Geographer [Internet]. 1987 May [cited 2019 Jul 10];39(2):256–7. Available from: http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=15553427&lang=zh-cn&site=ehost-live

Poon, Linda (2018) Sleepy in Songdo, Korea’s Smartest City, City Lab. [cited 2019 Jul 10]; Available from https://www.citylab.com/life/2018/06/sleepy-in-songdo-koreas-smartest-city/561374/

Preen, Mark (2018) China’s City Clusters: The Plan to Develop 19 Super-regions, China Briefing. [cited 2019 Jul 4]; Available from https://www.china-briefing.com/news/chinas-city-clusters-plan-to-transform-into-19-super-regions/

Shanghai Master Plan 2017-2035 (2018) Shanghai: Shanghai Scientific & Technical Pulishers.

The Belt and Road Initiative, (2019) Available June 19th from http://belt.china.org.cn/

Tobin, K. A. (2002) ‘The Reduction of Urban Vulnerability: Revisiting 1950’s American Suburbanization as Civil Defence’, Cold War History, 2(2), p. 1. doi: 10.1080/713999949.

Zhang, Mingdou; Xiao, Hang; Sun, Dongqi; Li, Yu (2018) Spatial Differences in and Influences upon the Sustainable Development Level of the Yangtze River Delta Urban Agglomeration in China. Sustainability, 10(2), 411. MDPI AG. Available from http://dx.doi.org/10.3390/su10020411

Zheng, Zhu; Bohong, Zheng (2012) Study on Spatial Structure of Yangtze River Delta Urban Agglomeration and Its Effects on Urban and Rural Regions. Journal of Urban Planning & Development, 138(1), 78–89. https://doi.org/10.1061/(ASCE)UP.1943-5444.0000095

Track 2

Besides the megacity and other cities

Planning for balance

photo: Atik Sulianami, Unsplash

Research Paper

Building moratorium as a future instrument for tackling unsustainable urban growth

Ivana ANGELOVA, Researcher, Meiji University; Japan

Abstract

We live in times when our planet is overloaded with issues coming from human activities where additional mechanisms to preserve the quality of life are essential. Modern societies experience constant internal dynamics. The uncontrolled urban growth leading to dense and unmanageable environment is a main urban issue cities face today. This is a prevailing problem in the developing countries where the construction industry is booming. Overall, while there is a rush to development there are also some conflicting interests and policies that are leading to unsustainable urban growth.

To regulate a property development a local government can try to impose a moratorium on the issuance of building permits and this can be agreed upon all the interest parties or it may be imposed by operation of law (Lehman and Phelps, 2005). Oftentimes local authorities will impose a building moratorium to tackle development in order to have time to make a satisfactory urban plan or to make some changes and update the regulations. The land use control objective is to promote good planning values supported by the whole community. This is done by regulating the urban growth and it is best implemented on a carefully contemplated comprehensive plan. During a time a new plan is being drafted and growth balance is achieved some construction demand may arise based on an existing outdated, inadequate urban plan. If this demands are met "the ultimate worth of the eventual plan could be undermined" and this where the moratorium comes in place (Coon, 2010).

The resources of academic literature on the case are somewhat in short supply and mainly based on describing specific case scenarios without a critical thought on the tool itself. Based on the resources the paper will look at a few different cases in developed countries using the growth management systems and one southeast european case - the city of Skopje, Macedonia that adopted the building moratorium system in January 2018. The author of this paper was personally involved in the decision making process in that time and will try to elaborate on how the tool was being used.

The validity should be determined by weighing its impact on the affected parties and more comprehensive research in the economic repercussions of the mechanism is needed.

A building moratorium is oftentimes a political decision and it's downside is that political parties would use it merely for their own purposes.

Keywords

Building moratorium, local government, Skopje, sustainable growth, legislation.

1. Introduction

The clustering of human interactions in big urban agglomerations poses a great sustainability challenge on the urban settlements regarding basic services, decent jobs, safety, housing, infrastructure and natural resources. Some of the biggest global implications of the unsustainable urban development are the growing environmental degradation, poverty and inequalities (Caprotti et al., 2017).

To tackle the problems deriving from over-construction in urban environments governments use different growth control mechanisms and other related regulations. Most of the growth controls do not limit development notably but rather they help in generating higher public benefits (Molotch, 1976). In the 80's there was a trend in the USA where the local authorities would use different mechanisms that allow for a systematic growth of their cities in order to balance the need and the supply especially in the housing market. The municipalities used a variety of growth management tools like building permit embargo to fully developed growth management ordinances as to have a control over the private development decisions. From all the growth control tools the outright and vital one is the building moratorium (Rosen and Katz, 1981).

Building moratorium used by the local governments worldwide is the one urban growth management tool that this paper focuses on. The objective of this research paper is to explain the mechanism itself, how and under which circumstances governments can legitimately use it and ultimately this paper will question its repercussions.

In addition, this research presents how and why this tool was used in the case of the city of Skopje, North Macedonia as a representative from the southeastern non EU countries while illustrating cases from other countries namely from the USA and the UK. This is due to the fact that literature provided is limited to examples coming from those regions only. In the case of Skopje the issue of unmanageable environments arises due to poor urban planning, due to corruption in the local and central governments, low public participation, urban plans that do not correspond with the master plan and in return leading to unconstitutional implementation of the urban and construction policies. It is relevant to stress that the urban context and conditions are very similar among many Balkan cities. On the other hand, in the developed countries, the unbalanced building stock growth is mainly due to mismanagement between the supply and demand in the real estate market.

The information provided in academic research papers is focused on describing and analyzing specific case scenarios mainly from the second half of the last century and without a critical thought on the tool itself. There is no holistic overview on the occurrence, meaning the repercussions of using this tool are not yet fully investigated even though academics argue more exploration on the case is needed.

2. Theoretical review

2.1. Definition of the term "Moratorium"

In order to understand how building moratorium is functioning it is crucial to look into its meaning first. Figure 1 shows the synonyms to the term.

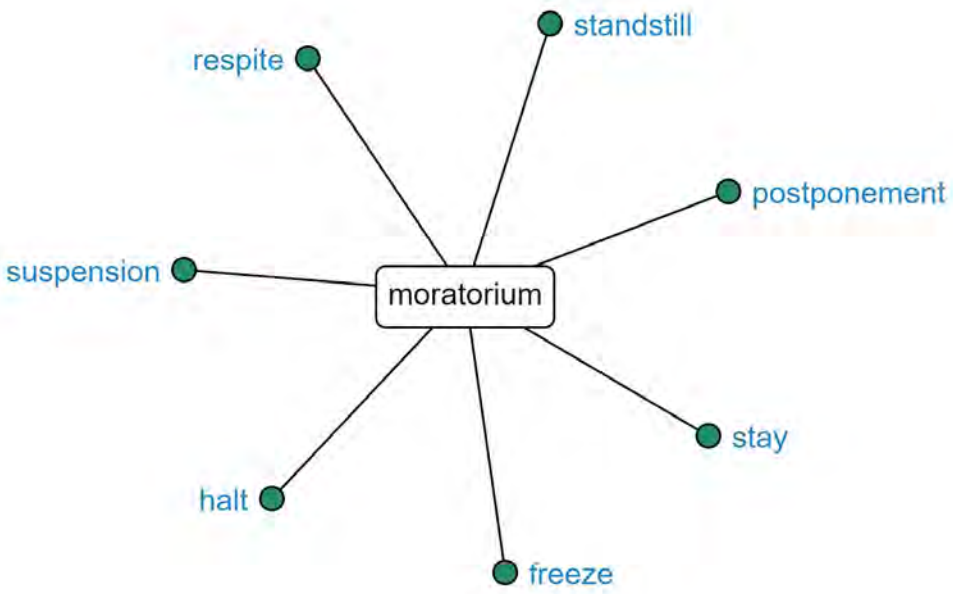


Figure 1. Synonyms for moratorium.

Source: https://www.freethesaurus.com/moratorium

"MO'RATO'RIUM (Neo-Lat., neu. sg. of Lat. *moratorius*, relating to delay, from *mora*, delay). A moratorium is a delay or suspension of an activity or a law. In a legal context, it may refer to the temporary suspension of a law to allow a legal challenge to be carried out "(Gilman et al.,1905).

"A building moratorium halts the construction of a project or projects. Building moratoriums are imposed by cities, towns and the courts, and for a variety of reasons" (Bankrate, 2018).

According to Rosen and Katz (1981) a building moratorium is used to stop the building permits by the local authorities in response to supply deficiency of the most essential public services, particularly the clean water supply, sewage infrastructure and public amenities. In addition, the authors conclude that the building moratorium has become the most common tool for temporary controlling the city growth. Coon (2010) argues that a moratorium on the development should halt the construction temporarily, preserving the status quo while giving time to the government to update the comprehensive plan. In the period when development is pending an adoption and completion of a new more comprehensive and permanent regulations is expected.

The moratorium will last until future events authorise its ending and issues regarding the suspension have been resolved. It is expected that in the time of a suspension of an activity or a low some legal challenges will be resolved (Investopedia, 2018). Only after an evidence of an externality arises governments can regulate development timing under a strict no-takings rule (Turnbull, 2004).

2.2. Circumstances under which a building moratorium is declared and its types

There are varieties of reasons why the governmental bodies may declare moratoria. According to Lehman and Phelps (2005) more often than not when there are concerns within communities connected to environmental degradation and safety an immediate termination of construction activities is seen as the best interest of the jurisdiction and local authorities in urban settlements impose a building moratorium (Bankrate,2018). Coon (2010) explains that governmental bodies will adopt moratoria first and foremost to halt and balance the big demand to development, than to prevent unsuitable and not carefully considered growth and/or to take time in order to raise awareness to a new issue in planning. According to him other reason may be connected to preventing the disadvantaged outcomes that the public and landowners could face in accordance to a construction that might be conflicting with the future plan strategies. In practice those motives are interrelated.

According to time spam a building moratorium can be *short-term*, lasting for several months, typically three months to a year, and *long-term* that last for several years up to a decade depending on the framework set by the local government (Bankrate, 2018). The moratorium can also be *general* referring to all kinds of building permits in one zone or it can be *specific* and pose a ban on a certain land use like a housing moratorium or a commercial moratorium. According to Coon (2010) the most common type is the general land use moratorium that halts the acceptance of new development applications until planning or zoning changes are being made. Passing this law prohibits the landowners right to build by obtaining construction permit until the new comprehensive plan is adopted addressing some new urban issues that has not been previously being dealt with in the planning policies.

2.3. Moratorium in San Francisco Bay Area and in United Kingdom

In the San Francisco Bay Area the issues that led to building moratorium and in this case many other North american cities are coming from speculation in land price and this type of moratorium is specially aiming at the housing construction. “The dynamic economic growth and accompanying rapid housing development of the 1950s and 1960s has evolved into a desire to preserve the status quo and protect the natural and ''economic'' environment from the more damaging aspects of unconstrained suburban development” (Rosen and Katz, 1981). In the late 1970s San Francisco Bay Area housing prices went from being average to the highest in the whole country. In this scenario the residents of the affected area opted for different land use control mechanism like the building moratorium, down zoning, more rigorous environmental regulations and other advanced growth management tools. Among all the most relevant type of growth control was the building moratorium because it showed fastest results in stabilizing the housing prices.

In the case of the local governments in the UK, they use a very typical form of development moratoria- the *moratorium on assets of community value*. Authorities work in cohesion with the residents in order to decide on the list of assets that are of great importance to them and would like to preserve as they are. A form of a public–private partnership is used as a mean to preserve the places listed as public interest. There are however consequences to the asset owners that the government is compliant to make sure they understand. After the official listing of an asset there is a moratorium period in which the interested community members can use their right to bid for the private real estate listed as an asset and buy it. The negotiation period in which the owner is blocked from developing or selling the property to another party rather than interested community group is six months (Localism Act 2011 and the Assets of Community Regulations 2012).

3. Building moratorium in Skopje

3.1. Problems in the urban sphere

The city of Skopje, the capital of North Macedonia is situated in the heart of the Balkan peninsula. In the second half of XX century Skopje faced a rapid urbanisation and has increased its territory immensely. After the fall of Yugoslavia in the beginning of the 1990s the new socio-political system led to some inevitable changes in the way urban planning was practised. Ever since the city is going through changing planning paradigms. Skopje now is experiencing uncontrolled expansion that generates a mixture of various types of urban space with variety of urban issues to deal with, a minimum public space and big environmental problems. “What we face now is urban planning at the most primitive level” (Pencic, 2018). Pencic (2018), an academic and urban planner and also the head of the municipal working group for plans evaluation argues that Skopje was the greenest city in former Yugoslavia after a major earthquake that hit the city in the summer of 1969 opened a chance to literally start planning the city from scratch. Foreign and local experts like Kenzo Tange had the opportunity to create a new city. Skopje was a small town before the catastrophe, but was given the chance to develop in accordance to the latest world-known information at the time. Urbanism in that period was also booming, as experts were to build many cities that were destroyed after World War II. Planners envisioned the physical structures into resilient spatial and organisational patterns adaptable to change. Skopje was and had the chance to be a beautiful city. Land ownership was national, it belonged to the country and was considered a public good while dwellings belonged to the citizens. Today capitalist countries do so, it is not merely a feature of the socialist times. According to her after the country has privatised the national land the city is facing major urban challenges. She addresses the biggest problem in the priority given to the private good while the public is being overturned. Siljanovska and Angelova (2017) would stress that: “The city of Skopje is not in the most desirable condition, it needs a better development and growth strategy. The biggest challenge lies in the lack of transparency in the urban policy making and its inflexibility which makes long-term sustainable solutions almost impossible.”

3.2. First moratorium in the history of the country declared

On the 6th of January 2018, the Council of Centar Municipality in Skopje voted in favour of the decision to halt construction within its legal borders and declared that the urban plans are invalid until their legitimacy is being confirmed.

The DUPs:detailed urban plans for a city quarters (equivalent to the term: comprehensive plans in some countries) are not compatible with the GUP: general urban plan (equivalent to the term: zoning plan or master plan in some countries) of the city. As the renowned architecture and planning magazine Porta 3(2018) puts it, the moratorium is a bold governmental decision. Putting order in the urban chaos and improving the quality of life for the citizens of Municipality of Centar was the pre-election promise in December 2017. Initially a ‘construction blockade’ was demanded by the citizens themselves as they become aware of the continuously endangering conditions and quality of life in their municipality. They have joined to get acquainted with what is planned, what kind of problems can they present to the policy makers and to increase the awareness that as citizens everyone has the right to engage in monitoring the creation of city policies and future spatial development. They asked for more participation and transparency before new plans are being put into power. The moratorium that was implemented in the municipality was as an instrument that helped the new mayor and its bureaucrats providing time to perceive the situation on the ground, to review the planning documents that enable the construction in the previous governmental structure and finally to develop new DUPs that are in line with the GUP. The objective was to review thoroughly the valid plans, as well as the ones in the process of adopting. “The instinctive thinking that something is wrong with urban planning and decision

making for future spatial development is basically derived from the uncomfortable feeling of daily life hardship and the constant increase of pollution problems, traffic collapse, endangered health, lack of place in kindergartens and schools, lack of health facilities in easily accessible locations, loss of greenery, usurped and enclosed spaces and many others" (Pencic, 2018).

On 20th of March 2019 the Constitutional Court ruled in favour of the Chamber of Construction that filed charges on the Municipality of Centar based on the argument that the category of moratorium is not recognised in the legal/constitutional system.

3.2.1. Qualitative analysis of the urban plans

Throughout the first three months of the implementation of moratorium the municipality established a working group of 3 outside members with urban development backgrounds to evaluate the detailed urban plans. The group was intended to establish a methodology for optimal qualitative analysis of the plans based on the building standard law and the masterplan regulations, as shown in Figure 2. The group crucial role was to show its results to the planners and the municipal administration. The group came as a mediator between those two actors and was also involved in the decision making process by giving recommendations for future legislation on planning regulation.

The methodology adopted for analysing the detailed urban plans that the working group provided was:

Analysis of the existing situation: by mapping

- mapping of inventory- of the building stock and streets, due to nonexistent GIS database - outdated database
- Implementation of a previous plan in low (buildings or infrastructure constructed)
- Ownership of empty plots

Comparison of existing conditions with planned conditions:

- 3D visualization comparison
- Shadow analysis: 1.apartment hours under shadow; 2. shadow scope
- Comparable numerical indicators

Analysis of the planned condition

- Comparison of numerical indicators between the GUP and DUP in the procedure
- The area of land aimed for construction and intensity

on the construction

- The need for facilities for public use - education, health and

social protection (schools and kindergartens)

- Green area, public (parks and playgrounds) and private (private gardens, yards)
- Mapping of parcels/plots that do not allow underground parking on -2 levels (4

different ways ways to analysing)

- Number of public parking lots and analysis of street profiles

• mapping objects that do not meet the parameters for the mutual height,

depth and disposition

• Number of population, density and demography (no official population census since 2000)

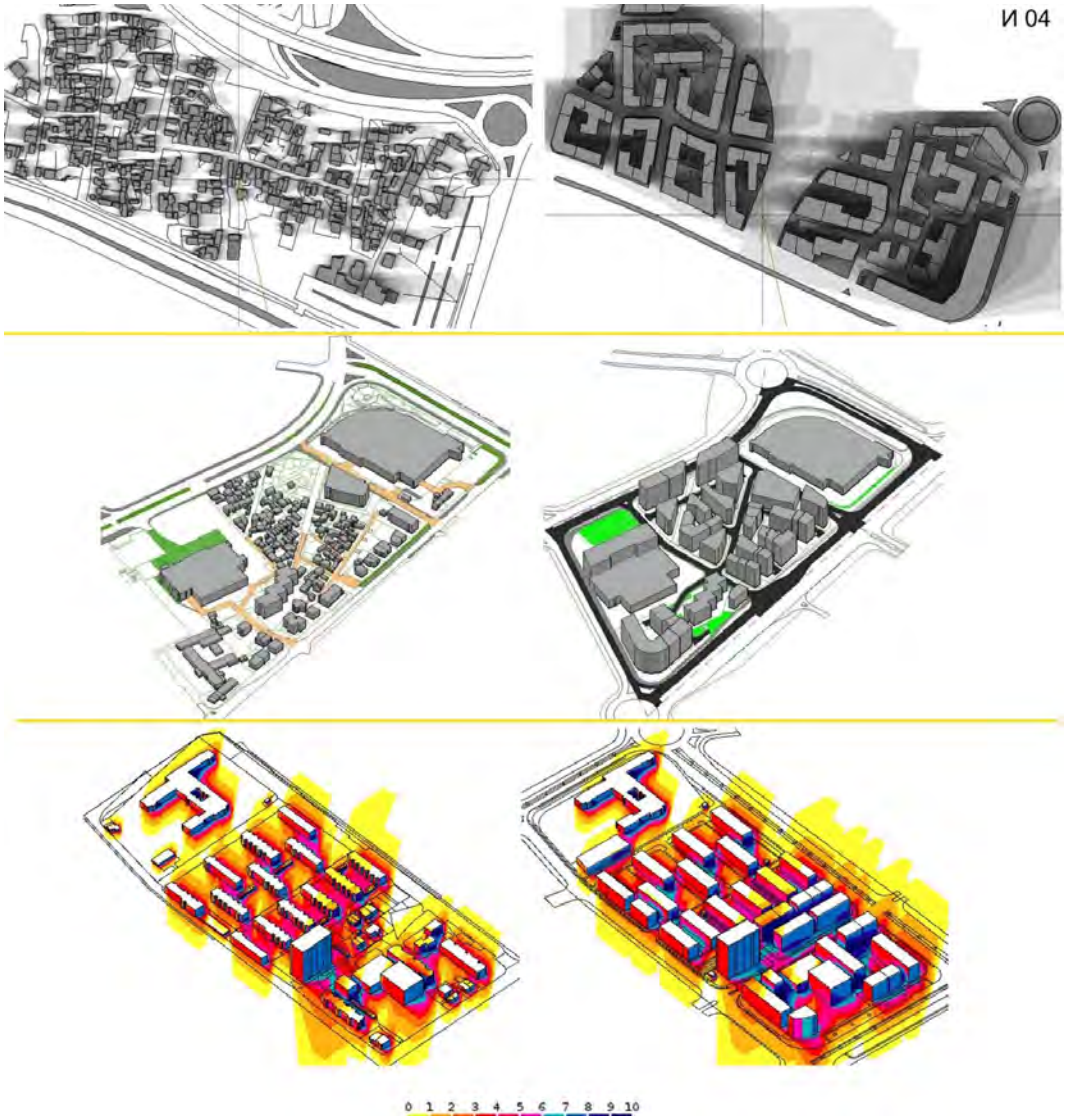


Figure 2. Examples of Qualitative analysis of the urban plans for Municipality of Centar. From top: shadow scope, 3D visualization comparison, apartment hours under shadow.

source: Courtesy of Municipality of Centar

4. The legitimacy of a moratorium

Lehman and Phelps (2005) argued that a validity of a moratorium is determined by weighing its impact on the affected parties. Not in all countries a moratorium is recognized in the constitutional law and in turn local authorities may face big challenges in facing the

troublesome and hardly manageable development. In such case however, there are ways to practice this mechanism. Coon (2010) took the example of The New York zoning enabling laws that did not mention any "moratorium" or "moratoria" but in past cases the New York Court of Appeals indicated that limitation to development and zoning regulations are possible to enforce by law. Landowners could not use a land profitably as long as the community long-term goals in planning are met. On the contrary some other moratoria cases like the Town of Oyster Bay, Texas turned out to be ruled by the supreme court as illegitimate as the town board had no jurisdiction to take such decisions because The Town did not properly refer to the county planning commission, as required by General Municipal Law.

In the case of the city of Skopje, there has been a big media coverage on the local government decision. Affected parties like potential developers and landowners protested against the legitimacy of the decision since the term is not mentioned in the zoning enabling law. However following that the DUPs are outdated and not in compliance with the GUP - a document with a higher legal basis, the municipality of the central zone of the city decided to use this occurrence as a legal basis for the decision to freeze construction (until new synchronised plans are issued). "I know that the decision to halt building construction is something that is being used for the first time in the country but it is stated clearly in the decision the legal grounds on which the moratorium is introduced" (Bogdanovic, 2018). The mayor also backed up the decision relying on the fact that the air quality in the city is among the lowest in the European continent and rapid urban growth would be to blame. "The urban planning documentation for these DUPs is not in accordance with the General Urban Plan (GUP). The detailed urban plans are old and their planning period is over. The stopping of the implementation of the plans will affect the pollution that according to the research based on the UNDP sustainable parameters will decrease by 22 to 25 percent" (Bogdanovic, 2018).

5. The repercussions

The repercussions of stopping the development would affect different actors involved in the process differently. There are many subjects affected by the moratoria in the Municipality of Centar-Skopje: each resident of the municipality, but also every user in that space; anyone who wants to build as the owner of a plot, but also everyone in whose surroundings it will be built; any interested investor, but also anyone who wants to see the benefit of that investment; everyone involved in the preparation of project documentation for future constructions, but also those who need to perform control and give approval; everyone involved in space planning, but also those who need to exercise control and give an opinion. (Pencic,2018). The negative consequence for the local government was the reduced municipal budget due to pending communal service tax form the real estate owners. One of the repercussions of a long-term moratorium is that the municipality with low budget is unable to provide basic necessities for its citizens. When asked about this consequence the mayor answered: "In the past year, we also provided funds from other places ...Today, the Municipality of Centar is a municipality that has no debts.. we managed to provide additional funds in the municipal treasury." (Bogdanovic, 2018). On the other hand there are consequences which should significantly change the development of the city by making it more sustainable and will affect everyone. New urban policies were adopted and the Law on Construction is in its final phase. Bogdanovic (2018) stated that in the coming period the municipality plans to take more decisions that will improve the lives of citizens. In October 2018 in Skopje there was a drop of 31% in the number of building permits

being issued compared to the same month of the previous year (State Statistical Office of the Republic of Macedonia, 2018).

Once a development moratorium is expected anticipatory impacts begin. Large construction companies will rapidly issue building permits so that they can minimize the economic disruptions afterwards. The occurrence is explained by Janczyk and Constance (1980) as: "In the moratorium district , supply should increase as builders rush to get their permits in hand and thus beat the moratorium. Demand should also increase as speculative buyers try to cash in on an expected price increase". Warner and Molotoch (1995) wrote in an article in favour of strict development regulations arguing that the pro-growth regulation group overweights the one against it using the argument of an overburdened planet in need of regional self-sufficiency. However, drawing form four case scenarios where partial or full moratorium was used, the authors noticed some factors that inhibited growth limits from exerting strong influence. Those factors are: *symbolic politics* where policy makers create rules just for the sake of it but without physical output; *episodic intervention* where temporary victories become long-term failures; *countervailing policies* where there are contradictory internal tendencies like restricting development with some policies and encouraging it with others and finally the *initiatives of the regulated* where they may take unexpected advantage form the lax and loopholes.

As to potential hardships to landowners Coon (2010) concludes that the advantages to the municipality must outweigh the negative consequences of a moratoria to potential developers. He concludes that: "The municipality should be prepared to show that the burden imposed by a moratorium is being shared substantially by the public at large, as opposed to being visited upon a minority of landowners". S. Schwartz, et al. in 1979 (cited in Rosen and Katz, 1981) concluded that proponents of the moratorium claimed enablement of a better suburban sprawl control, preservation of neighbourhood character and improved environmental quality. On the other hand Babcock and Bossehnan in 1973 (cited in Rosen and Katz, 1981) argued that growth controls should exclude low and moderate income households and that in the case of housing moratorium the rental prices go substantially higher than usual.

6. Summary

The motive of a building moratorium is to respond to new needs coming from communities by developing new strategies like a comprehensive plan, zoning regulations, site plan regulations, building regulations and improvements to road, water and sewer infrastructure. As a summary a moratorium on construction would be justifiable if: it has a higher purpose like improvement of people's livelihood; there is a rational time frame based on the optimal accomplishment of the goals of the moratorium; have an expiration date; there are protecting measures aimed at the public interest until new policies are put in place; follow jurisdictional procedures by obeying the enabling law.

A topic that needs to be further researched is the economic repercussion of the mechanism. Janczyk and Constance (1980) concludes in their research that governments together with policymakers need to make plans for the long run and foresee growth patterns so that a significant cost on government revenue, jobs in construction sector and consumer surplus can be avoided. Even though the general public supports such decision oftentimes business and welfare elites are not satisfied. Thus a moratorium law should try to accommodate a mechanism to protect to some extent the potential developers and landowners (Coon,2010).

The building moratorium in Skopje can be seen as a trigger to change in the way the city has been growing, saidly unsustainably for the past two decades. Citizens awareness and

participation is growing bigger and a general public interest in understanding and participating in the development of the urban policies that should be aimed not just to serve the market needs but regulate the basic living conditions of the people. On a final note, the tool as a political decision and can be misused to fulfill a hidden political party agenda.

7. References

Bankrate. (2019). *Building moratorium Definition | Bankrate.com*. [online] Available at: https://www.bankrate.com/glossary/b/building-moratorium/ [Accessed 1 Jul. 2019].

Bogdanovic, S., (2018). Interviewed for Порта з-градежништво, архитектура и екологија. *По „мораториумот“ очекувам да се воведе пред во градењето*.

Caprotti, F., Cowley, R., Datta, A., Broto, V., Gao, E., Georgeson, L., Herrick, C., Odendaal, N. and Joss, S. (2017). The New Urban Agenda: key opportunities and challenges for policy and practice. *Urban Research & Practice*, 10(3), pp.367-378.

Community Right to Bid: Non-statutory advice note for local authorities. *Localism Act 2011 and the Assets of Community Regulations 2012.* Part 5 Ch, 3. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/14880/Community_Right_to_Bid_-_Non-statutory_advice_note_for_local_authorities.pdf [Accessed 10-12-2018]

Gilman,D. C., Peck, H. T. and Colby, F. M., (1905). 'moratorium', *New International Encyclopedia*, 1st ed.,New York: Dodd, Mead and Co.

Investopedia. (2018). *Understanding Moratoriums*. [online] Available at: https://www.investopedia.com/terms/m/moratorium.asp [Accessed 27 Jan. 2018].

Janczyk, J. T. and Constance, W. C. (1980). Impacts of building moratoria on housing markets within a region. *Growth and Change,* 11 (1), pp. 11-19.

Lehman, J. and Phelps, S., (2005). 'moratorium', *West's Encyclopedia of American Law*, 2nd ed.,Detroit, Thomson/Gale.

Pencic, D., (2018). Interviewed by Atanasoska, M. M. for Fakulteti.mk. Available at: https://www.fakulteti.mk/news/18-01-03/prof_d-r_divna_penchikj_se_naogjame_na_najprimitivnoto_nivo_na_planiranje_na_gradot_vozduhot_od_vodno_ne_stignuva_do_skopje?fbclid=IwAR2rOQM0s8fc-gz1qB2sJirJ45f45XZpNa7IZ83dwOY_U-qvplFZ_p8Lp74 [Accessed 08-12-2018].

Pencic, D., (2018). Interviewed for Порта з-градежништво, архитектура и екологија. *Moratorium as an instrument for construction control.*

Rosen, K. T. and Katz, L. F. (1981). Growth management and land use controls: The San Francisco bay area experience. *Real Estate Economics,* 9 (4), pp. 321-344.

Siljanovska, J. and Angelova, I., (2017). *The "Dynamic Edge": Re-Conceptualization of the Urban Fringe*. Places and Technologies 2017- Keeping up with technologies in the context of urban and rural synergy. Book of conference proceedings, Sarajevo, 8-9 June 2017.

State Statistical Office of the Republic of Macedonia , (2018). *Issued building permits for October 2018,* No: 6.1.18.71*,* State Statistical Office, Skopje, Macedonia, Available at: http://www.stat.gov.mk/PrikaziSoopstenie_en.aspx?rbrtxt=50 [Accessed 8 Jan. 2018].

Turnbull, G. K., (2004). Development moratoria. *Journal of Housing Economics,* 13 (3), pp. 155-169.

Warner, K., Molotch, H., (1995). Power to Build. How Development Persists Despite Local Controls. *Urban Affairs Review.* Vol 30, Issue 3,pp. 378-406.

Research Paper

SUSTAINABLE DEVELOPMENT, PLANNING AND POVERTY ALLEVIATION

Jean-Claude BOLAY, CODEV EPFL, Switzerland
Eléonore LABATTUT, CODEV EPFL, Switzerland

Abstract

In 2018, the world population is around 7.6 billion, 4.2 billion in urban settlements and 3.4 billion in rural areas. Of this total, according to UN-Habitat, 3.2 billion of urban inhabitants live in southern countries. Of them, one billion, or nearly a third, live in slums. Urban poverty is therefore an endemic problem that has not been solved despite all initiatives taken to date by public and private sectors.

This global transformation of our contemporary societies is particularly challenging in Asia and Africa, knowing that on these two continents, less than half of the population currently lives in urban areas. In addition, over the next decades, 90% of the urbanization process will take place in these major regions of the world. Urban planning is not an end in itself. It is a way, human and technological, to foresee the future and to act in a consistent and responsible way in order to guarantee the well-being of the populations residing in cities or in their peripheries.

Many writers and urban actors in the South have criticized the inadequacy of urban planning to the problems faced by the cities confronting spatial and demographic growth. For many of them the reproduction of Western models of planning is ineffective when the urban context responds to very different logics. It is therefore a question of reinventing urban planning on different bases. And in order to address the real problems that urban inhabitants and authorities are facing, and offering infrastructures and access to services for all, this with the prospect of reducing poverty, to develop a more inclusive city, with a more efficient organization, in order to make it sustainable, both environmental than social and economic.

The field work carried out during recent years in small and medium-sized cities in Burkina Faso, Brazil, Argentina and Vietnam allows us to focus the attention of specialists and decision makers on intermediate cities that have been little studied but which are home to half of the world's urban population.

From local diagnoses, we come to a first conclusion. Many small and medium-sized cities in the South can be considered as poor cities, from four criteria. They have a relatively large percentage of the population is considered to be poor; the local government and its administration do not have enough money to invest in solving the problems they face; these same authorities lack the human resources to initiate and manage an efficient planning process; urban governance remains little open to democratic participation and poorly integrates social demand into its development plans. Based on this analysis, we consider it is imperative to renovate urban planning as part of a more participatory process that meets the expectations of citizens with more realistic criteria.

This process incorporates different stages: an analysis grounded on the identification of urban investment needed to improve the city; the consideration of the social demands; a realistic assessment of the financial resources to be mobilized (municipal budget, taxes, public and international external grants, public private partnership); a

continuous dialogue between urban actors to determine the urban priorities to be addressed in the coming years.
This protocol serves as a basis for comparative studies between cities in the South and a training program initiated in Argentina for urban actors in small and medium-sized cities, which we wish to extend later to other countries of the South

Keywords

Urban planning, sustainable development, poverty, global South, intermediate cities

1. Urban complexity: Growing cities in developing countries, growing issues ?

The Global South is currently experiencing strong urbanization, particularly demographically and territorially. In parallel, cultural references are changing in terms of lifestyles and the social and economic integration of a growing urban population.
In 2018, the world population reached nearly 7.6 billion, 4.2 billion of which lived in urban areas and 3.4 billion in rural ones. According to UN-Habitat, 3.2 billion urban inhabitants live in South countries. Of these, one billion - or nearly a third - live in slums. Urban poverty is therefore an endemic problem that has not yet been solved, despite the many initiatives taken by the public and private sectors.

To better grasp this debate, we will discuss two distinct issues that have guided our many years of work. These issues could be described as two of the founding elements for urban planning designed to create sustainable, inclusive cities.

The first is urban poverty. Simply knowing that a third of urban dwellers in South countries are poor and live in material and economic precarity on a daily basis very much calls into question the work we do as urban development professionals. We must start thinking of urban planning as a way of fighting poverty.

The second is the focus on small and medium-sized cities, hundreds if not thousands of which (depending on the country) play a decisive role in the exchanges between the countryside and these cities, and serve as regional centers for a multitude of public services. 50% of the world's urban population lives in cities of 10,000 to 500,000 inhabitants. Often unknown outside of their regions, these intermediate cities face enormous challenges, particularly in South countries where they have the highest population growth rate. Over the next decades, 90% of the urbanization process will take place in Asia and Africa.

2. Urban planning in the Global South, occupational hazards

Many critics have voiced their opinions as to the real impact of planning that does not fully addresses the integration issues faced by a large proportion of the population.

Be it in Koudougou in West Africa, Chau Doc in the Vietnamese Mekong Plain, Montes Claros in Brazil or Nuevo de Julio in the Argentinian pampas - example that we will develop further

in this text - (Bolay, 2015; Bolay, 2016; Bolay, 2018) the issue of greatest concern to planners is "How can we beautify cities and make them more attractive to city dwellers and investors," not "What can we do to reduce poverty and better integrate poor people living in precarious conditions?"

Figure 1 Koudougou, Burkina Faso (Photo by J-C Bolay, 2014)

While not diametrically opposed, the thinking behind these two questions is nonetheless divergent. The former avoids delving too deeply into societal complexity and instead seeks technical solutions to improve the city's functionality (infrastructures, networks, communication routes, equipment, etc.), too often forgetting the universal need for accessibility (i.e. for the poor as well). The second makes citizens the focus by recognizing the fact that integrating people socially, economically and culturally fosters sustainable, inclusive urban development. In this sense, urban planning in South cities is too often incomplete at the spatial level, as experts only focus on specific parts of the territory and typically abandon poor, poorly-regulated and outlying neighborhoods. It is also poorly adapted socio-economically speaking, as it tends to focus on business districts and the "select" areas that privileged social actors invest in based on their financial status, relationship to power or even community or ethnicity.

Figure 2 New social settlement in Montes Claros, Brasil (Phot by J-C Bolay, 2018)

Based on a comparative study of nine South cities, Devas (2001) concluded that the standards established for infrastructure, facilities and buildings were completely unsuited to the conditions of the poor, but formed a perfectly workable system of regulation by individuals

with economic and/or political power. This is largely due to the fact that methodological and technical debates are dominated by Europe and North America, and take Western cities - whose characteristics radically differ from those of developing countries - as their point of reference and as experimental sites (Edensor & Jayne, 2012). Reproducing these recipes in different urban contexts is simply nonsensical and can only offer ineffective solutions. The management of public facilities and services is a good example. Today, the privatization of the latter – which in fact are often no longer public! - is a major trend. Hence the profitability of urban investments and their management takes precedence over their "universality."

Figure 3 Informal housing along the river in Chau Doc, Vietnam (Photo by J-C Bolay, 2018)

In many South countries and Western countries as well, the management of basic sectors such as water, energy, transportation, culture and public spaces (to name only the most obvious) is now in the hands of private companies. It is perfectly valid and healthy to worry about the balance of public finances. However, it is untenable to do so at the expense of the working classes, whose economic conditions impede their access to a whole range of amenities and services, the charges for which exceed the spending capacity of modest income households. Therefore, the question is who decides on urban investment priorities, based on which criteria, for whose benefit and according to which cost recovery mechanisms (i.e. from users)? For Watson (2009), demographic and territorial growth in South cities inevitably leads to a concentration of poverty and social, economic and spatial inequalities. Urban planning as applied in many developing countries cannot anticipate or solve the multitude of intertwined problems, between the local needs of each family, community and neighborhood, and the production of planning based on the entire urban territory (but with inexplicit priorities) by specialists.

As the saying goes, "We only lend to the rich." In South cities, the poor know this better than anyone else. Putting aside the social and economic repercussions of urban development, it is normal for companies (public and private) to favor individuals, social groups and, by extension, areas of those city they know will provide a return on their investments. However, they quickly forget that this short-term profitability reinforces social segregation and the fragmenting of the urban territory between rich and poor, and developed and marginalized areas. Though the costs of this are not immediately discernable, they are in the medium and long term. How? Firstly, by creating more and more poor neighborhoods that are in turn neglected by the authorities, with increased insecurity, both real and perceived. Wealthy neighborhoods are equally marginalized and isolated, with gated communities hidden behind walls and protected by private police. The environmental cost is very high, with some parts of the city lacking basic sanitation infrastructure. Natural resources (water, soil and air) are contaminated and impact the health of inhabitants. Again, it is the poor who suffer the most. More indirectly, however, it is society as a whole that pays the price; public schools and public hospitals are reserved for families without sufficient means, savings or social security, while clinics and private schools welcome well-to-do families.

And yet, statistics have long shown that the most dynamic, innovative, richest companies are those that invest in these "social" sectors that benefit all citizens. We must therefore bear in mind the idea of the common good, of going beyond individual dynamics and of rethinking urban planning in a vision of shared urbanity (harmony between the natural/built environment, fighting poverty by favoring social integration, etc.). Though this is feasible and already exists, it is far from being the rule in South cities. Thus, we must reverse the current logic and redefine the priorities of planning.

3. Planning against poverty, a priority for intermediate cities

The question of urban development is particularly critical for intermediate cities as well as small and medium-sized cities of 20,000 to 500,000 individuals (Bolay, Kern, 2019), firstly because they are home to roughly 50% of the world's urban population (United Nations, 2014) and secondly because they are the cities with the greatest urban growth. Despite this, these "ordinary cities" (Robinson, 2006; Parnell & Robinson, 2012) are generally not on the federal government's radar and receive relatively little federal funding to tackle the urgent issues they face or to invest for the future. Investment priorities are not always based on rigorous diagnostics involving long-term planning processes, but rather are often the result of "opportunities" or pressure from powerful stakeholders (from within the city or outsiders). Inhabitants of these cities suffer the consequences in terms social/material precarity, contamination of natural resources, informality of economic activities, and dysfunctional decision-making and governance.

Figures 4-8 “Ciudad Nueva”, a poor neighborhood in Nueve de Julio, Argentina (photos by Teo Vexina Wilkinson, CODEV, 2017)

4. Lessons? Learning from what exists and by doing (better)

With this urban context of insecurity and uncertainty about the future of these small and medium-sized cities, we can speak of "poor cities,” not only because many citizens actually live on the edge of poverty but also because the urban authorities cannot afford the investments needed to improve daily life for residents. Reversing this trend would involve changing urban planning by moving away from development models that were designed to comply with standards and rules in completely different contexts (i.e. Western countries) established by specialists with little to no knowledge of the Global South. The major risk here is projecting onto these cities based on criteria that only serve the interests of a minority – in other words, the wealthy – marginalizing the poor living informally in the most underserved neighborhoods. However, it is also an extraordinary opportunity to think about the future based on what exists, taking into account the actual financial and social resources of these cities, to design and implement urban planning that fights against poverty, and to invest in facilities with a sustainable impact on the poor’s living conditions.

Urban planning in developing and emerging countries must be entirely rethought. The essential point, which is too often overlooked, is to start from a participatory diagnosis in which the reality of the city is examined in its various dimensions (demographic, spatial, infrastructural, economic, social and environmental), thus allowing all stakeholders to find their place. This cartographic, documentary and anthropological information should serve as a basis for a database that can then be uploaded with real-time information, thus facilitating the monitoring of "urban development" and a collaborative, up-to-date decision-making process. In parallel remains the question of establishing priorities in terms of lacking

infrastructure, standards, rules and plans that are tailored to the context, the needs identified by specialists, requests from different social actors, and internal and outside financial resources.

Figure 9 Youth in Nueve de Julio, Argentina (Photo JC Bolay, 2018)

Two principles should guide this process: the first is that urban investments should be used to fight poverty either directly or indirectly; the second is a global vision to guide the specific actions in the short, medium and long terms. These precepts can only be applied if the framework conditions are respected: local and regional governments must have the human competencies and financial resources available that will enable them to take action. This is not impossible if the political will is there and is considered legitimate by the population. This inevitably involves consultation frameworks that will open up a dialogue between representatives of the population, public administration, political powers, industry professionals and other special interest groups (private sector; social, religious, and political groups; NGOs; etc.).

5. The city is full of decision makers, so let's train them to be good urban planners


Figures 10-11 Workshop in Pehuajo, Argentina (Photo JC Bolay & E. Labattut, 2019)

Training plays a key role, as does communication and dialogue. These same guidelines should govern implementation. Here, too, there is room for innovation, starting with social practices and human dynamics outside of the formal context at the local and regional levels. Though the technical know-how of urban and business experts (who too often are absent) is indispensable, inhabitants are nonetheless often forced to take matters into their own hands and wind up doing the job (building homes, community facilities, better managing their neighborhoods, etc.) themselves.

These vital forces should be neither overlooked nor set aside, for they are the very heart and soul of a participatory process that includes not only consultation, but conception and action as well. Rather, these forces can be incorporated into the planning process, where they can be useful in the implementation of collective decisions. Communication is also a key issue. How to learn from other cities via the Internet and increasingly frequent global exchanges on urban matters? As Campbell (2012) explains, we learn from both near and far, and no longer unilaterally from North to South but also from South to South and South to North.

6. From research to implementation: A collaboration with a network of Argentinian medium-sized cities

With this urban context of insecurity and uncertainty about the future of these small and medium-sized cities, we can speak of "poor cities,"

The best example of such an approach is what we currently share with the "Colegio de Arquitectos[i]" in District 7 of the province of Buenos Aires in Argentina, where we have created an urban planning training program for professionals in 15 intermediate cities in the northern part of the province.

This program is in line with SDGs (sustainable development goals) and their role in the urban context, as defined by Objective 11 "Sustainable cities and communities"[ii].

Figure 12 Localization of Nueve de Julio, Buenos Aires Province, Argentina (Google map, 2019)

The project was based on an initial collaborative project between the Municipality of Nueve de Julio – a city of 37,000 inhabitants located 260 km from the capital, Buenos Aires - and the CODEV. The collaboration helped us to better identify training needs and to determine the appropriate methods. The first project phase was based on the assumption that the urban planning tools available to the municipality were not adapted to the urban and social needs/reality. Effectively, the city's planning department possesses little data on the city. Moreover, it does not even have an updated plan of the networks or a mapping department; in fact, in 2018, it had a single urban planning unit with only two architects. The reference document is a zoning plan, which is a non-versatile urban planning tool that does not convey a project or a vision of the city's development.

Based on these observations, a collaboration agreement was established between the city of Nueve de Julio and the CODEV (Center for Cooperation and Development, Ecole Polytechnique Fédérale de Lausanne, Switzerland), with the central question: how to create a GIS (Geographic Information System) tool with limited resources? Both agreed that the priority was for the municipality to ensure the production and management of data in order to gain a better understanding of the territory while creating a common tool that would facilitate work between the various municipal services. Among the main findings were:

- A lack of human and material resources for urban planning at the municipal level;
- The lack of a unifying project for the city in terms of urban and territorial planning beyond the urban code (zoning plan);
- Incomplete urban data scattered among the various municipal services;
- A need to include more urban actors, namely residents but also service providers such as the service cooperative, the university sector, etc.

The municipality of Nueve de Julio agreed on the priorities of developing human resources and investing in material and technological resources. In turn, the CODEV agreed to support its effort on planning data acquisition. To do so, a list of 35 essential GIS layers was developed along with an inventory of the availability of this basic data within the municipality (Cortat, 2017). These 35 layers were ranked in order of priority from 1 to 3 depending on their importance (1 being of the highest importance, 2 of medium importance and 3 of minor importance). A synthesis of this work showed that a certain amount of data already existed, even if it sometimes appeared in an inappropriate file format, was not digitized or had not been updated. The conclusion was that half of the basic data existed and the other half needed to be collected.

Three priority actions were then proposed to the municipal planning department: (1) to start building an initial database with existing data after digitizing and converting it to the appropriate formats; (2) to prioritize by assessing the benefits and viability of each production or acquisition of an additional dataset; and (3) to work in collaboration with other actors in order to obtain as much data as possible. It quickly became clear that setting up data collection, even minimal, would prove difficult for the municipality's urban planning department, which has neither the staff, nor the equipment, nor even strong political support from the mayor. To circumvent these issues, the partners envisaged refocusing the project on the Ciudad Nueva neighborhood – an area of 10,000 inhabitants living in precarious living - by developing a participatory citizen mapping process to demonstrate that a lack of financial and human resources could be overcome using simple, inexpensive technologies. But by late 2018, the proposal had run up against political blockage and the project ended in a stalemate.

Figures 13-14 Information on the first training workshop in Argentina (CAPBA, 2019)

The second phase aimed to work with a network of cities in the Northern part of the province of Buenos Aires to overcome such local political blockages. In early 2019, the CODEV launched this phase along with the "Colegio de Arquitectos (CAPBA)," an important and recognized institution in Argentina that is present throughout the country thanks to regional and district representation. The Colegio de Arquitectos of District 7 (CAPBA D7) is setting up a network of cities, the "Red de Desarrollo Urbano Pampeano (ReDUP)," which comprised 15 cities of less than 50,000 inhabitants and includes Nueve de Julio. A first seminar helped highlight the fact that the problems in Nueve de Julio (unplanned urban development, lack of data, inappropriate planning tools, etc.) were in fact common to all the cities in the network. The CAPBA D7 and the CODEV thus established a research agreement in December 2018 to work at this new scale so as to overcome political blockages at the local level and provide support

to municipal staff in high demand. The project is in line with the network's general objectives of promoting knowledge sharing and experimentation at the regional level, pooling resources and developing appropriate tools and training for municipal technicians.

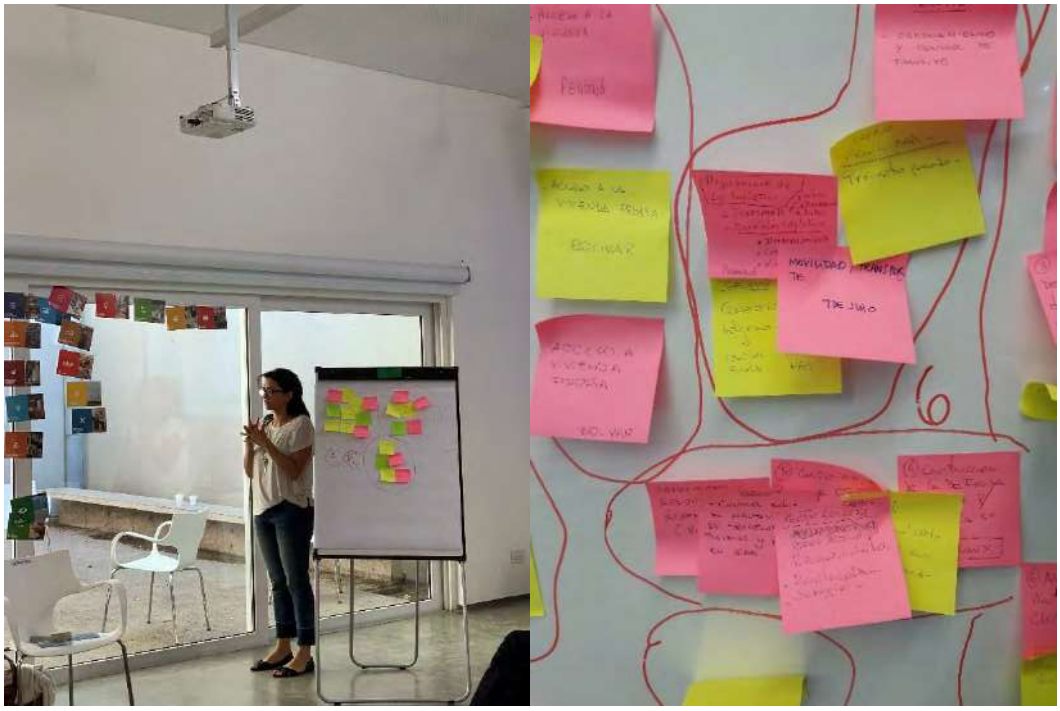


Figure 15 Workshop in Pehuajo, Argentina (Photo JC Bolay & E. Labattut, 2019

This new project phase, which ends in December 2019, will allow for a regional diagnosis of the priorities of each city and the network as a whole in terms of urban planning and the need for GIS tools development.

The working seminars with municipal technicians, the first one organized in March 2019 in Pehuajo and the second one planned for September 2019, will be used to draw up specifications for the construction of a GIS platform that is adapted to the needs of the network as well as for the implementation of a training program, supported by the Colegio and by provincial and national institutional partners who have since joined the initiative.

7. Conclusion: Between crises and urban strategy, the challenges of planning

Our conceptual thinking on the need to quickly find innovative ways to design and develop urban planning in South cities is reinforced by our fieldwork experience as well as the local and regional collaborations that have been set up.

Today we are at a turning point. Having spent a considerable amount of time studying its practical application in African, Latin American and Asian cities that are extremely divergent,

we have now moved into this new training and local capacity-building phase for urban and regional planning.

At the end of a first seminar that brought together municipal technicians from nearly 15 intermediate cities in the province of Buenos Aires, Argentina, some useful lessons were learned for the remainder of the process.

First, in order to define priorities for each city, a shared diagnosis must be established as a first step. This should not only be based on analyses by urban experts - municipal technicians and professionals – but should also include other stakeholder groups. To implement it, cities must have data and analyses at their disposal to observe the major phenomena and dynamics at work in their territory, at the environmental, economic, social and urban levels. But analyzing territories based on data would require a significant change in the municipal work culture, including new skills for technicians, integrating new tools and developing new approaches to interdisciplinary collaboration.

Secondly, for most of these technical experts, planning is first and foremost a task to be managed between planners, engineers and computer scientists. Other communal or regional services - social, health, environmental or cultural - are there to provide data that the former can then process and analyze. Municipal technicians' request is therefore primarily technocratic: to provide them with databases and computer platforms that they can then share, geotag and analyze. This hierarchy of responsibilities and tasks implicitly extends to other urban actors (inhabitants, lobby groups, social or economic groups). At this stage, however, citizen participation is still an abstraction. We still have a lot of work to do together to prove that this dialogue between all of the interested parties is not intended to minimize the work of technicians or their skills, but rather to enrich the database based on social demands. Above all, it should serve to boost urban management by taking collective responsibility for this "common good," this shared urbanity and living environment that is supported and respected by all.

Urban planning is not an end in itself: it is a human and technological way to anticipate the future and act in a coherent, responsible way to guarantee urban and peri-urban residents' well-being. To address the real problems that urban inhabitants and authorities face, planning must create collective infrastructures and access to services that aim to reduce poverty and develop a more inclusive city with better organization, in order for it to be environmentally, socially and economically sustainable.
The field work carried out during recent years in small and medium-sized cities in Burkina Faso, Brazil and Argentina is helping us to attract the attention of specialists and decision makers to intermediate cities that, though they are home to half of the world's urban population, are little studied. All of these small and medium-sized cities face various forms of precarity, with relatively large poor populations, local governments that lack both the financial means to invest in solving the problems they face and the human resources to initiate and manage an efficient planning process. In most of these cities, the governments are still not open to democratic participation processes and do little to incorporate social demands into their development plans.

Based on this analysis, we consider it is imperative to reinvent urban planning as part of a more participatory process that meets the expectations of citizens with more realistic criteria.

This process involves different phases: an analysis phase grounded in the identification of urban investments needed to improve the city; consideration of social demands; a realistic assessment of the financial resources available (municipal budgets, taxes, public/international grants, public-private partnerships), and; a continuous dialogue between urban actors to determine the urban priorities for the coming years.

This protocol shall serve as a basis for the training program initiated in Argentina for urban actors in small and medium-sized cities, which we hope to later extend to other the South countries.

Figure 16 The central place of Pehuajo, Argentina (Photo JC Bolay, 2019)

8. References

Bolay, Jean-Claude; Kern, Abigail Laure (2019) "Intermediate Cities", Wiley-Blackwell Encyclopedia of Urban and Regional Studies. Hoboten, Wiley-Blackwell.

Bolay, Jean-Claude (2018) "Planning the Intermediate City, or How to Do Better with Little: The Case of the City of Nueve de Julio, Argentina", Current Urban Studies, Vol. 06 No 03, pp.366-400, DOI: 10.4236/cus.2018.63020

Bolay, Jean-Claude (2016) "Prosperity and Social Inequalities: Montes Claros, How to Plan an Intermediary City in Brazil", Current Urban Studies, Vol 04 No 02, pp. 175-194, http://dx.doi.org/10.4236/cus.2016.42013.

Bolay, Jean-Claude (2015) "Urban Planning in Africa: Which Alternative for Poor Cities? The case of Koudougou in Burkina Faso", Current Urban Studies, Vol. 3, No. 4, pp. 413-431, DOI:10.4236/cus.2015.34033.

Campbell, Tim (2012) Beyond smart cities. How cities network, learn, and innovate, London, New York, Earthscan.

Cortat, Jasmine (2018) Stratégie d'implantation d'un outil SIG pour de petites villes dans les pays du Sud. Etude de faisabilité : 9 de Julio, Argentine, Lausanne, CODEV EPFL.

Devas, Nick. (2001) "Does city governance matter for the urban poor?", International Planning Studies, Vol. 06 No 04, pp. 393–408, https://doi.org/10.1080/13563470120092395

Endensor, Tim; Jayne, Mark (2012) Urban Theory Beyond the West. A World of Cities, London, New York, Routledge.

Parnell, Susan; Robinson, Jennifer (2012) "(Re)theorising cities from the global south: looking beyond neoliberalism", Urban Geography, Vol. 33 No 04, pp. 593-617.

Robinson, Jennifer (2006) Ordinary Cities: Between Modernity and Development, London, Routledge.

United Nations, Department of Economic and Social Affairs, Population Division (2014) World Urbanization Prospects: The 2014 Revision, Highlights, New York, United Nations. https://esa.un.org/unpd/wup/publications/files/wup2014-highlights.Pdf.

Watson, Vanessa (2009) "Seeing from the South: Refocusing Urban Planning on the Globe's Central Issues", Urban Studies, Vol. 46, pp. 2259-2275.

[i] Colegio de Arquitectos de la Provincia de Buenos Aires, distrito 7: ReDUP (Red de Desarrollo Urbano Pampanea)
http://www.capbad7.com.ar/default.aspx

[ii] https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-11-sustainable-cities-and-communities.html

Case Study / Project

Balanced Regional Development through District Planning

- A comparative analysis of Indian and South African planning frameworks

Tathagata CHATTERJI

Abstract

Regional planning literature suggest development of small and medium sized cities to counter balance mega-city-centric growth poles. Yet, implementations of such strategies are problematic, especially in fast growing transitional economies of the Global South. Market driven global economic environment typically favours metropolitan scale, connectivity and human resource talent pool, in channelizing investment generations. Moreover, newly industrializing countries often lack institutional and technical capacities to undertake integrated regional planning.

This paper compare and contrast approach towards balanced regional development through district planning in India and South Africa to draw policy lessons. Employment generation for surplus rural labour has become a crucial developmental challenge for both India and South Africa. Despite achieving impressive GDP growth rates, both the countries are suffering from job crisis. Youth unemployment rate of South Africa is 52.15 percent; while in India, official unemployment rate is 7.2 percent, but under employment is over 30 percent, as millions of people, are stuck in low skill-low wage casual jobs. Rural urban income differentials are high. Rural youth are migrating to big cities, but low skilled jobs are only available at the bottom tier of the urban informal labour market. To redress ruralâóîurban dichotomy, both the countries had sought to undertake regional planning at a district level, and district plans are seen as integrative platform for urban and rural area plans and sectoral agencies of the provincial government. In India District Planning process was institutionalised as part of a wider process of state restructuring and decentralisationunder the74th Constitutional Amendment Acts of 1992. District Planning is a mandatory statutory activity; but its implementation had been slow and uneven. Considerable state-wise variation exists in the planning process as well as its institutional arrangements. In states where properly implemented, District Planning has become an integral part of the participatory planning, gender empowerment, spatial targeting of developmental grants and disaster risk mitigation. India has also undertaken pilot project to develop 30 rurbun clusters to encourage skill development and training for artisans and handicraft sector. Compared to the Indian district planning model's emphasis on social equity through participatory planning, the South Africa's district planning approach is more top-down and has stronger emphasis on economic issues.

South Africa's innovative Spatial Planning and Land Use Management Act (SPLUMA) of 2013 has sought revive rural and small town economies by building logistics networks and product value chains for agro-processing sectors connecting different settlement hierarchies. It has also built in mechanism to harmonize strategic business plan with land use planning and infrastructure development. The comparative analysis of two major transitional economies shows potential of district planning to achieve balanced regional development. It also underscores the need for the regional planning mechanism to combine features of top-down strategic approach and bottom-up participatory approach

Research Paper

The Weak-sided Urban Fringe and the Flexible Planning Approaches

a case study of strategic plan of Yuhuatai District, Nanjing

Zhao CHEN, Urban Planner; China
Chunxiao Huang, Associated Professor; China

Abstract

Although urban fringe is regarded as a unified academic concept, the actual development results present a strong divergence into two categories: the strong-sided urban fringe and the weak-sided urban fringe. This paper starts from basic concept of the weak-sided urban fringe based on existing theory and summarizes the features of the weak-sided urban fringe according to empirical cases, including the low-quality, collage-style land use mode, the structural shortage of both core resources and fundamental facilities, and the fragmented spatial governance. Secondly, differing from the development of strong-sided urban fringe with high investment, urban sprawl and self-replication dominated by growth machines during the rapid urbanization period, this paper proposes the weak-sided urban fringe should adopt a flexible planning approach characterized by precise input, structural optimization and organic growth. Finally, taking the example of Strategic Plan of Yuhuatai District, this paper initially discusses the methodology of flexible planning, including repair of embedded structures, action-oriented organic regeneration and the organizational optimization of multi-governance systems guided by planning.

Keywords

Urban Fringe, Unbalanced Growth, Flexible Planning

1. Unbalanced Growth in Urban Fringe: The Propose of weak-sided Fringe

During the rapid urbanization of China in the past 40 years, the urban fringe area has undergone high-speed dynamic changes and has become the most important growth carrier for China's cities. Studies on China's urban fringe in recent years has achieved fruitful results have construct a preliminary theoretical framework from urban fringe's concepts and characteristics to economic, social, ecological, demographic dynamics and mechanisms, as well as corresponding planning issues and approaches.

When systematically browsing scientific literature on subjects related to China's urban fringe, one main research bias can be identified that more attention is paid to the benchmarking or pilot fringe areas with better development results and more distinctive features. The similarity of this kind of urban fringe is often located in the dominant direction of urban spatial expansion or the main regional traffic corridor, and therefore become the city's key

development area that undertakes core resources, forming a series of successful mode including residential new town, university town, economic development zone and airport city. This paper argues that the growth of urban fringe in most China's cities is unbalanced and despite the above mentioned 'strong-sided' fringe, urban fringe on the 'weak' side should not be ignored. Weak-sided fringe are usually located in the direction that deviated from the main direction of the city and hence incapable to attract high-quality functions and core resources, resulting in a clear gap compared with the strong-sided one. However, both existing researches and planning cases on urban fringe areas are unconsciously concentrated on the strong-side urban fringe while researches on the weak-side urban fringe area are insufficient, and the experiences of strong-side urban fringe cannot be replicated to the weak-sided one.

The conception of urban fringe was first proposed by Hebert Louts in 1936 based on his observation of the urban structure of Berlin. Louts found that the original rural area was gradually occupied by the urban construction and hence became part of the city. Robert Park and E. W. Burges generalized the city into the concentric zone model with CBD at the centre and the transitional urban fringe as the intermediate ring between urban and rural area. Hoyt further modified the concentric zone model account for the impact of transportation systems on accessibility enhancement brought by major transportation routes (e.g. metropolitan expressways and interstate highways). Hoyt theorized that cities would tend to grow in sectors patterns, emanating from the CBD and centred on major transportation routes. Higher levels of access translate to higher land values. Thus, many activities and functions would develop in a wedge surrounding transport routes.

Hoyt's model is also accord with the realties in China's cities. However, the establishment mechanism is slightly different from the spontaneous emerging process as Hoyt observed in U.S., but is formed through active planning regulation. In order to achieve the balance between the growth efficiency and the environmental conservation in the early stage of suburbanization and to avoid the development dissipation and ecological erosion due to the spontaneous sprawl, the municipal government intentionally concentrate the resources and investment in certain part of urban fringe, or the prior development zone, while the rest are regulated as ecological corridor, agricultural zone or restricted development zone. In other words, the emergence of strong-sided/weak-sided fringe is the not only decided by the fringe's relationship with transportation, but also the will of the municipal government.

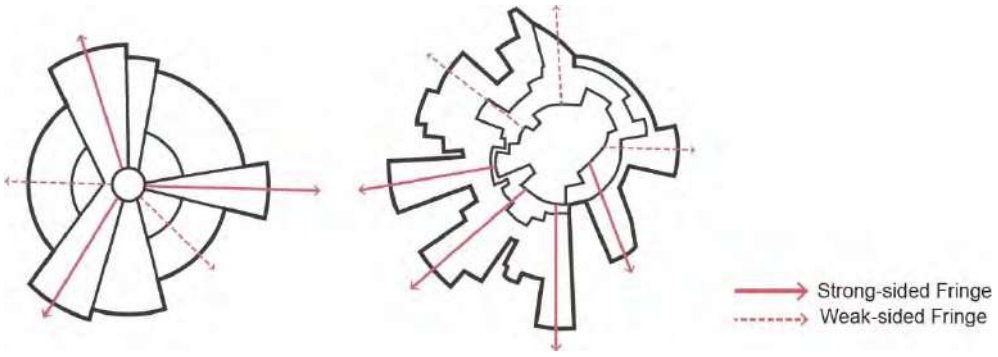


Figure 1 Hyot's sector model(left) and the nonequilibrium growth of urban fringe in Shanghai

2. History and Reality of the Weak-sided urban fringe: evidences from Yuhuatai

2.1. Historic trace: mega-project driven urbanization

As mentioned above, the intention of government played an important role in making the weak-sided fringe. Looking back in history, Yuhuatai District has long been regarded as the periphery outside the city in the government's plan, and therefore presents a typical exogenous urbanization pattern, whose driven power is not the spontaneous agglomeration of citizens, but the implanted mega-project initiated by the government.

After the founding of new China, the central government began to implement the heavy industries leap-forward strategy and anti-urbanism strategy. At that time the state-owned enterprise, or Danwei is more than a productive unit but a self-sufficient, isolated and closed small society for 'the working class', and is usually located away from the cities. As for Yuhuatai, it is firstly recognized in the 1960-70s as the concentration area of giant state-owned steel and mining enterprises for its deep-water harbour and appropriate distance with the city. And it became the initial driving force of the development of Yuhuatai.

After the opening and reform, exogenous industrialization and rapid urbanization process become the engine economic growth in China in the 1990, whose key contents are inter-city competition on attracting FDI and land financing mechanism. In 2000s, Yuhuatai District became the agglomeration of different types of public housing projects for its exploitable land low land price. Most of the housing projects are the removal settlement for the former peasantry whose land and houses in the land expropriation (land financing), and the rest are the indemnificatory housings for the low-income citizens. In 2010, it began to Government-led software Industrial Park for foreign and domestic IT companies, focusing on software outsourcing service, serving companies in Silicon Valley, Israel or Ireland.

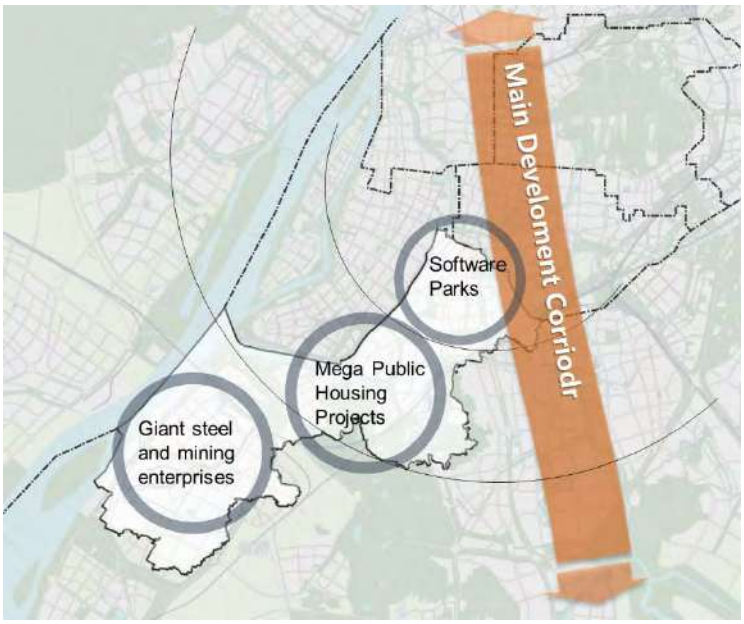


Figure 2 Location and status-quo functional zone of Yuhuatai

2.2. Desakota Land use Pattern and extreme nonequilibrium infrastructure supply

The overall land use of Yuhuatai District is a typical desakota pattern where urban and rural lands coexist and intertwined and strip-shaped sprawl alongside arterial and communication roads. The traffic network of the entire district is not complete, mainly relying on the radial trafficway start from the central city to the fringe, so the newly constructions including the residential areas, industrial areas are distributed on thin layer of the trafficway but lacked in-depth extension. This land use pattern has led to inefficient, fragmented land use. living land are mixed, which has a greater impact on the quality of life of residents. As weak-sided fringe, Yuhuatai District failed to attract the mass investment from the municipal government and public service supply on public transports, schools, hospitals, gyms or cultural facilities are extreme insufficient compared with the central city or strong-sided fringe. However, it become home to NIMBY facilities, such as large indemnificatory housings, large overpasses, building materials markets and cemeteries which occupied lots of land and may have negative impacts on surrounding area.

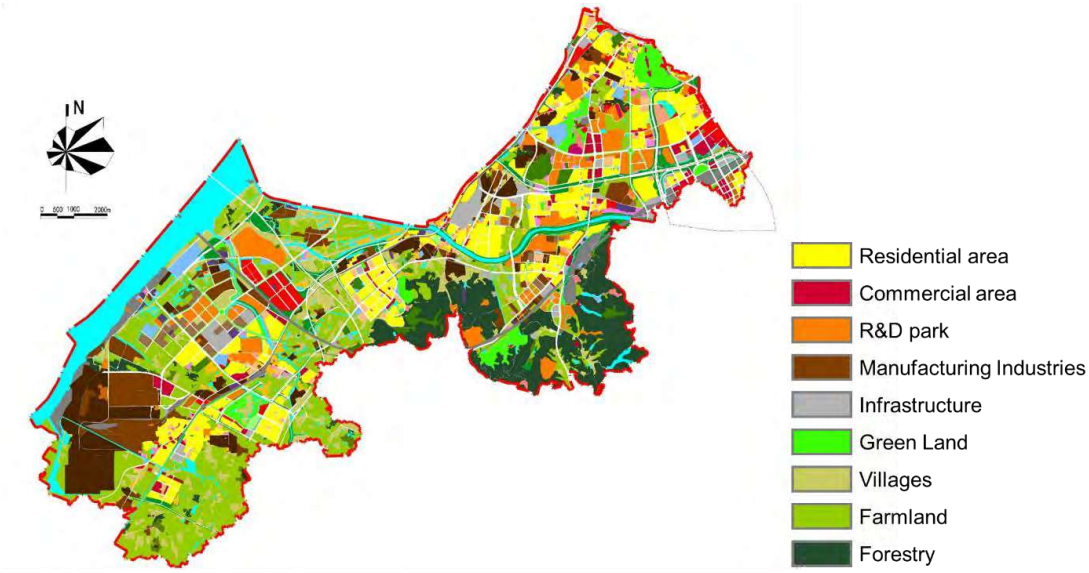


Figure 3 Land use status-quo of Yuhuatai District

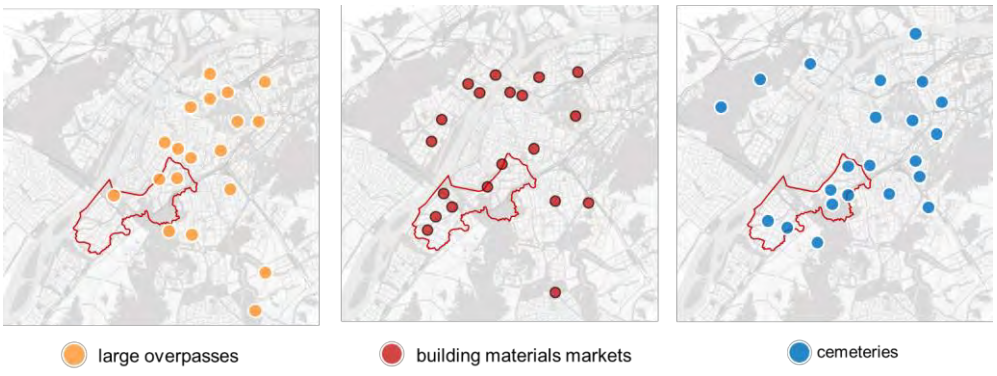


Figure 4 Distribution of the some kind of NIMBY facilities in NANJING

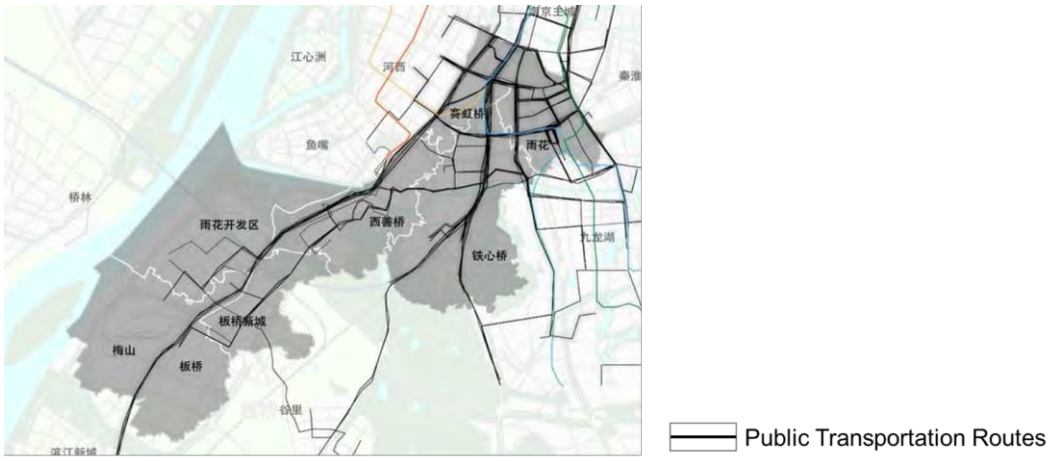


Figure 5 Distribution of the public transport routes of Yuhuatai District

2.3. Adaptive administration strategy and fragmentated governance

Not only the spatial change, but the power structure and governance behind is dynamic. Been regarded as reserve area of central city, Yuhuatai District undergone many administrative division adjustments, making room for the spatial expansion of the central city. To some extent, the 'fringe' should be defined by the dynamic change of the 'central-fringe' relationship, and the former fringe will become the future central city. Corresponding to the rapid urbanization and dynamic 'central-fringe' relationship, an adaptive spatial governance was formed. The adaptive adjustment strategy ensures the consistency of the development of urban fringe, which is an efficiency-first decision-making mechanism. However, the other side of the coin is its fragmentated sub-government power structure, which is caused by the coexistence of the normal government (e.g. town and street government) whose duty is social administration, and the quasi-government entity (e.g. administrative committee of economic development zone and new city) whose duty is economic growth. The two kinds of sub- government overlaps in administrative space but conflicts in the governance objectives and paths, resulting in the low-level redundant construction and disordered policy direction.

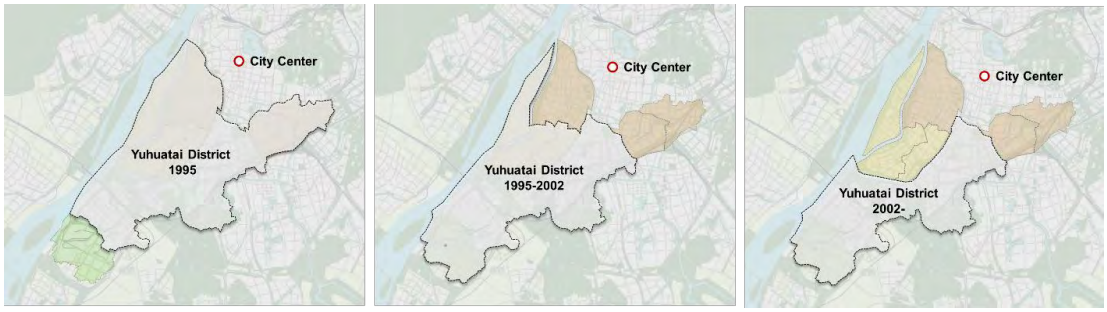


Figure 6 Changing of the administrative division of Yuhuatai District since 1995

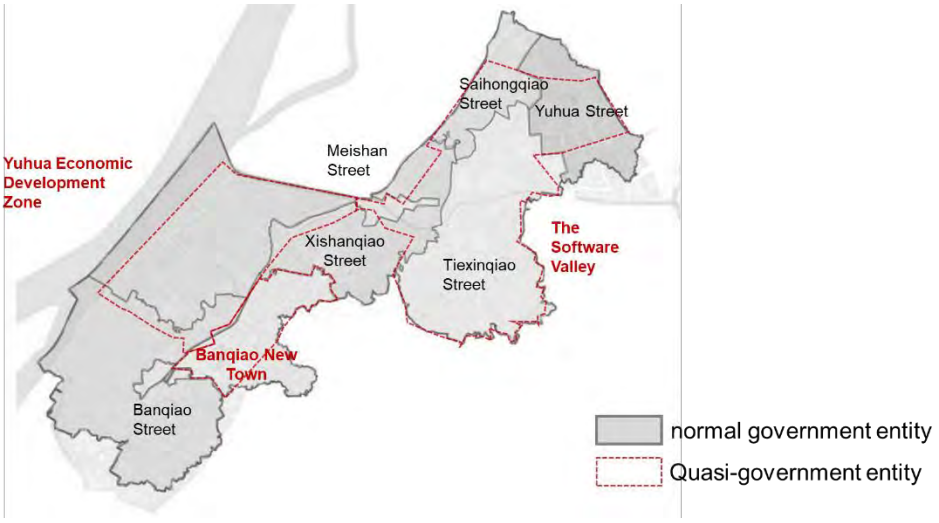


Figure 7 Division of normal government/quasi-government entity in sub-government level

2.4. Leap-forward industrial involution and divided society

Since the whole fringe is collaged by mega-projects or industrial giants in different times, the social structure tends to be polarized which makes the social integration become an important challenge. The two main social groups are the IT employees working in the Software Park and the public housing residents. The IT employees are young, well-educated and can earn higher income. Constantly, the residents in the public housing is aging, and many of them belong to vulnerable group who got unemployed live on the social assistance. The gather of low-income residents brings pressure on elderly care services, re-employment Public security service services. As for young IT employees the work-residence separation is obvious since the living conditions in Yuhuatai District cannot met their demands. Therefore, a large number of young people work here live in other districts, making the lack of urban vitality.

3. Reaffirming the weak-sided urban fringe: new opportunity under new context and the hypothesis of flexible approach

3.1. Paradigm Shift: Modernization 1.0 to 2.0

The characteristics of modernization in the past 40 years of China are quantitative economy and government's enterpriseization. As the economic system reform greatly stimulated the social demand, the 'quantitative economy' strategy is adopted to fill the gap between the demand and the low supply levels of the planned period (as well as the gap between unbalanced regional development) through increasing the productive quantity (e.g. GDP, FDI, etc.), as fast as possible. On the other hand, the GDP competition between cities made the local government set the economic growth as the top priority and the government itself become the biggest 'enterprise', which is described by David Harvey as the 'neoliberalism with Chinese characteristics'. In this way *the modernization 1.0* mode was formed, which is characterized by quantitative-prior industrial development and rapid expansion of urban fringe.

Marked by the global financial crisis in 2008, the global economic structure is undergoing profound changes. After 30 years of rapid industrialization, the demand on quality-prior

development replaced the demand on quantity economy, thus the path dependence of the *modernization 1.0* came to an end, giving way to *the modernization 2.0* or the 'the New Normal' era according to the government discourse. The *modernization 2.0* is distinct with its former version in many aspects, including the oversupply in normal products (rather than shortage in supply), the quality-prior economy (rather than quantity-prior economy), the endogenous development mode (rather than exogenous development mode), the comprehensive competition on both industries and services (rather than single economic competition on manufacturing), the post-Fordism social production (rather than the Fordism standard products) and so on.

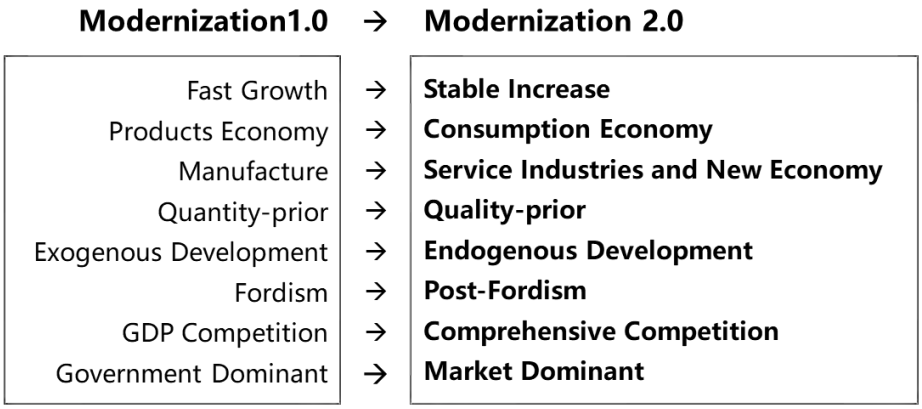


Figure 8 Connotations of the paradigm shift from modernization 1.0 to 2.0

3.2. New opportunities for weak-sided fringe in modernization 2.0

As mentioned above, the differentiation between the strong-sided and the weak-sided urban fringe lies in the different interrelationship with the urban development axis/ corridors, and stemmed from the paradigm of modernization. At present, with the continuous changes and restructuring of the region, the weak-sided urban fringe has also confronted with new development opportunities. On the one hand, with the evolution of transportation and information technology, the city-region has changed from hierarchy system to network, and new regional connections may be formed, thus giving weak-sided fringe like Yuhuatai District the chance to link to the new urban or regional development axis/ corridors. On the other hand, the goals of urban development change from monism to pluralism. In the modernization 1.0, the city emphases on economic growth, therefore mega-projects, large industrial zone and transportation hubs which exert directly affect on the growth of GDP become core resources and be placed in the strong-sided fringe. Under the current new context, the value judgment on resources begun for fringe development to diversify, extending to ecology, innovation, culture, leisure, etc. As a result, the weak-sided fringe faces new opportunities for further development.

3.3. Planning Methodology: flexible reconstruction, structure control and action-oriented approaches

Despite the new development opportunities, it does not mean that the weak-sided fringe can become the strong-sided one at one move. Currently China's urbanization has entered a quality prior, slower speed and market-driven phase after 40 years of rapid, hyper-dynamic and government-driven urbanization, and the general spatial structure and pattern of China's cities tends to be stable, in this way, the weak-sided fringe will remain the status of lacking core resources at least in the initial stage (after the accumulation of development it

is possible to undertake core resources). What is more, in *the modernization 2.0*, due to the deceleration in economic growth, it is impossible to duplicate the growthism-oriented 'rigid' development and planning approach as the strong-sided fringe did in the *modernization 1.0* era. Therefore, a flexible planning approach is required.

"Flexible" means affordable and sustainable, and it differs from the 'rigid' construction in terms of space, function and governance. In terms of spatial development, it will mainly rely on the integration, optimization or redevelopment of old urban space with very few incremental lands. In terms of function, the weak-sided fringe should not be an independent growth pole, but need to cooperate with the central area, to undertake the spill over resources of the central area and final become an indivisible plate of the city-region. And in terms of governance, the strong government dominant is difficult to achieve in the development of the weak-sided fringe, but it still needs the government to carry out limited but precise guidance and integrate existing dispersed entities.

In summary, the context shift of from 'building city upon blank land' to 'building city upon city' requires a different altitude in dealing with the ideal vision and the status-quo, and the key challenge is only not how to active the weak-sided fringe through a restrain but precise planning approach, but how to integrate the weak-sided fringe with the current loose, unordered, modernization characterized strong-sided fringe which formed mass through investment and coherently form a powerful overall structure of the city.

Table 1 Comparison between the rigid construction of strong-sided fringe and the flexible reconstruction of weak-sided fringe

	The Rigid Construction of Strong-sided Fringe	**The Flexible Reconstruction of Weak-sided Fringe**
Space	Highly Urbanized Spawl from the central city Building city upon blank land	Incomplete urbanization; Smart organic growth; Good ecological environment; Based on space renewal and structural optimization
Function	Undertake urban quality industry Compound function	Specialized functional nodes such as ecology, R&D and tourism
Governance	Government dominant; weak bottom-up self-organization	Market dominant; strong bottom-up self-organization

4. Case Study: Strategic Plan of Yuhuatai District

4.1. Ideal Vision: Flexible Specialized Embedded Structure

The methodology of planning is a challenging problem. As for strategic spatial plan there is also a lack of the best or only method of formulation. An important symposium classifies the researches on strategic spatial plan into three categories, thus the institutional, communicative/discourse and interactive approaches, which indicates the mainstream cognition of strategic planning methodology; Albrechts briefly proposed a four-track approach, including long-term vision, long-term and short-term actions, contact with stakeholders and basic process with citizens. Jean Hillier believes that transitional, potential,

and flexible post-structural methodology is a method to solve China's strategic planning. The above combing shows common attempt to make a simple, clear and understandable structure without losing flexibility and systemic. In view of this, this paper considers that a possible strategic planning structure consists of two parts: **structure control and action**.

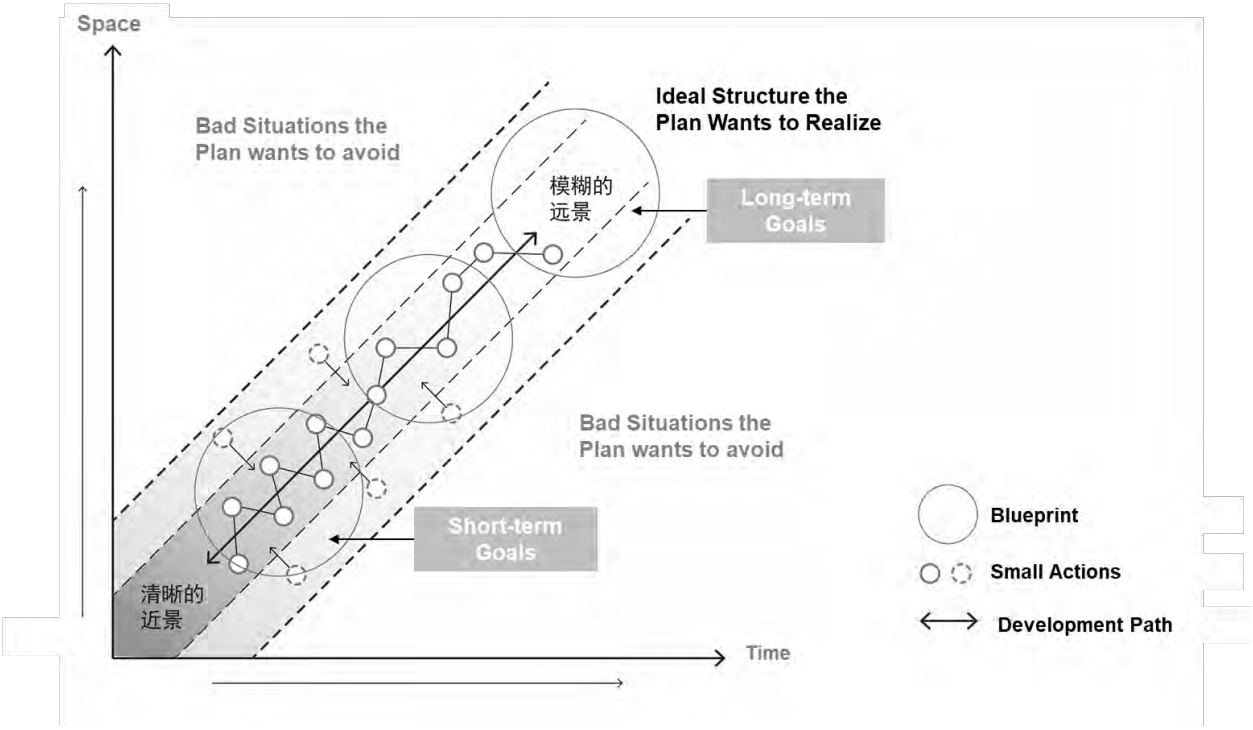


Figure 9 Topography of China's strategic plan

4.2. Structure Control: From Re-create to Re-connect: precise repair to existing socio-spatial structure.

The local Jiangnan Region (means south of the Yangtze River) excellent natural context, history and culture, relatively sustained incremental potential provides another possible solution for the transformation and upgrading of weak-sided fringe in the new macro development stage., the re-connecting solutions. Based on blue network, green network and grey (transportation and infrastructure) network, combined with functional quality organic upgrade and spatial scale shrewd, the plan attempts to constructing high-quality network integrated functional area, and realizing the systematic improvement of the entire structure. With the reconnection of urban space with green/blue/grey Network, the reconnection of social-spatial relationship and the reweaving of the fragmented governance, the plan realizes the restrain but precise intervene to the current space, which lead to the maximum of entire regional effect.

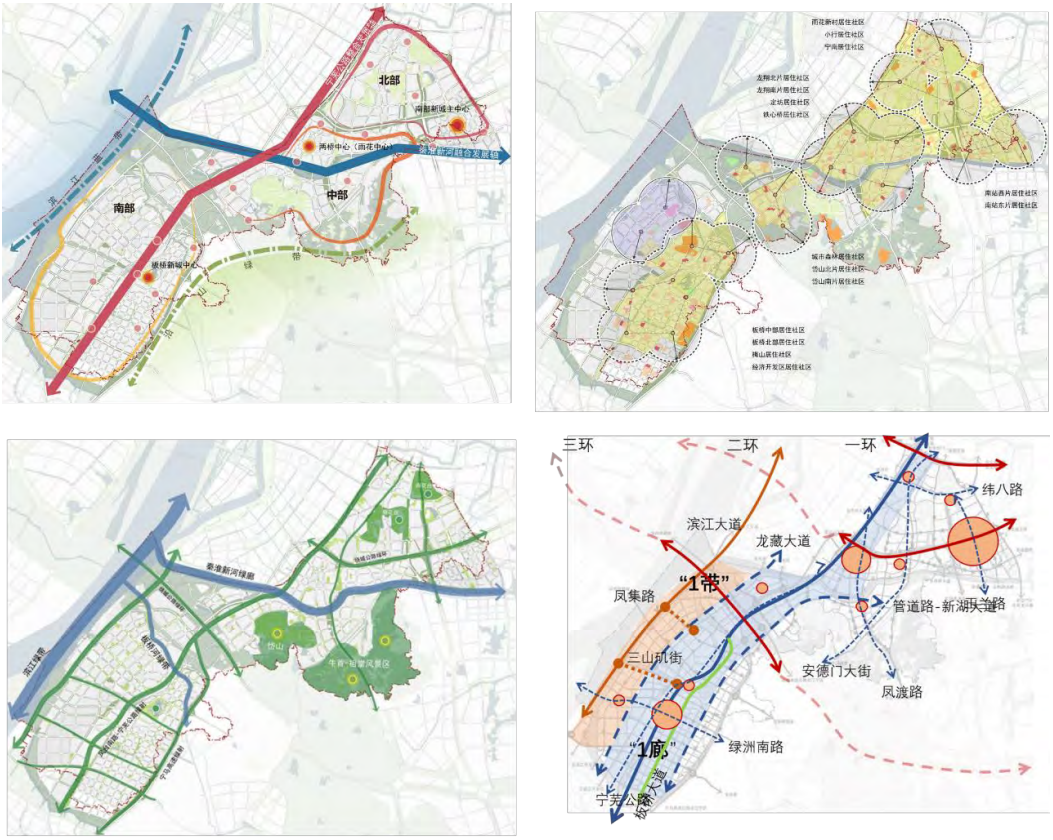


Figure 10 Reconnection and precise repair to existing socio-spatial structure

4.3. Action: Progressive Smart and Organic Growth

The development path of the modernization 1.0 period seems to be self-evident: urban space can be produced and duplicated through a very fast and easy way soon become reality. In this way the only task of strategic plan is the 'blueprint', and it required no attention to think about the action or realization of the plan. However, in the modernization 2.0 era, the plan should focus on helping realizing the blueprint or structure on step by another. In the case of the Yuhuatai, the action logic of strategic planning mainly presents the following characteristics:

Rooted development. Get rid of a single exogenous path dependence, seek to adapt to the new normal macro-development needs, endogenous exogenous compatibility, and develop a local development model by rooting local culture, society, space and other conditions;

Delicate development: Guide the smart growth, build exquisite space and promote lean economic development in the first big situation of large projects. Pay attention to the efficiency and efficiency of input, that is, by investing in key "points", realize self-efficiency and derivative benefits, comprehensive benefits, and maximize system benefits, and guide the rest to self-evolution.

5. Conclusion

As the macro environment enters the “new normal”, strategic planning is also facing transformation and upgrading. Starting from Yuhuatai, we seem to see a new paradigm that differs from traditional strategic planning. Is our goal to create a new paradigm to replace the old paradigm? Not exactly. Paradigm can be seen as a possible approach or solution under a certain period of time or contexts, and the reason why strong-sided fringe development well in the past 40 years is not because of some certain paradigm, but because the paradigm chosen best met the modernization 1.0 context. Therefore, when faced with the macro-transformation of modernization 2.0, the pursuit of good planning and correct knowledge is the only possible eternal paradigm of strategic planning.

6. References

Albrechts, L. (2004). Strategic (spatial) planning reexamined. Environment and Planning B: Planning and design, 31(5), 743-758.

Harvey, D. (2007).A brief history of neoliberalism. Oxford, UK, the Oxford University Press.

Healey, P., & Underwood, J. (1978). Professional ideals and planning practice: a report on research into planners' ideas in practice in London Borough planning Yeh, A. G. O., & Wu, F. (1999). The transformation of the urban planning system in China from a centrally-planned to transitional economy. Progress in planning, 51(3), 167-252.

Innes, J. E. (1995). Planning theory's emerging paradigm: Communicative action and interactive practice. Journal of planning education and research, 14(3), 183-189.

Leaf, M. (1998). Urban planning and urban reality under Chinese economic reforms. Journal of Planning Education and Research, 18(2), 145-153.

departments. Progress in planning, 9, 73-127.

Wu, F., & Zhang, J. (2007). Planning the competitive city-region: The emergence of strategic development plan in China. Urban Affairs Review, 42(5), 714-740.

Research Paper

HOW TO GRASP THE POWER OF THE PLACE:

The TELLme Project and Metro-dology

Antonella CONTIN, Politecnico di Milano; Italy

Sandy Jiyoon KIM, Politecnico di Milano; South Korea

Abstract

Metropolitanisation processes caused by unplanned urban growth have generated an enormous demand for infrastructure and services, as well as impacts on the environment that can lead to imbalances in social development. In order to promote sustainable growth, it is necessary to plan a fair distribution of services throughout the development of the city with efficient infrastructure system. Our answer is a proactive project, which holds the social and ecological function of the city that restores safe environmental conditions. In the ongoing TELLme Erasmus+ project, we attempt to define a holistic methodology, the Metro-dology; structure a training lab where academia and practitioners can discuss the issues, principles, and gaps of the metropolitan area; and develop mapping tools to comprehend the metropolitan complexity and support the training. We are looking for new relations among the parts of the city through first, mobility project to transform the times of the city; second, identification of suitable places for the production of a modern and clean circular economy; and finally selection of areas for urban regeneration to rediscover and renew the identity of the metropolitan city.

Keywords

metropolis, TELLme, metropolitan complexity, metro-dology

1. The Complexity of Contemporary Metropolitan Issues

1.1. Contemporary Debates on Metropolitan Issues

Rapid urbanisation has been one of the urgent issues across the globe in the past few decades. As a consequence, more and more cities are now becoming part of larger metropolitan areas. As the growth and the environment resemble nothing of the past events, it is essential to distinguish the new metropolis and understand the difference from a traditional city.

In the early 20th century, to describe the extensive urban scale change triggered by the industrial revolution, the word ‘metropolis’ reappeared in the Western world with more modern meaning. It described the urban expansion that had been occurring at different times in different locations around the world over the past two centuries. In this context, the use of the term metropolis emphasised the size of the city that had changed. Otto Wagner and Ludwig Hilberseimer were amongst the first scholars who raised the issue of the Großstadt,

that is the "big city", in reference to the change of measure and scale of the urban settlements in the wake of the industrialisation in the western world.

The phenomenon of the contemporary metropolis, however, differs from the modern industrial "big city". The unrestricted urban growth we are experiencing nowadays has exceeded the timeframe of planning. The nowadays concept of the metropolis is related to a measure and scale which is not associated with human dimensions or commensurate with the urban fabric and the density parameters represented in the concept of proximity. "Metropolitan" as a category is related to a context of mass mobility of people and goods, which implies a different relationship between individuals and groups. The technological utopia, embodied through the spreading of metropolitan infrastructure networks and the overlapping natural universe, has erased previous continuous geographical traces and has disarticulated agricultural and urban historical topological patches. As a result, we may notice a sense of loss of productive and symbolic connotations of the cultivated land.

Moreover, the main drivers of urban development in the past two centuries were not the physical shape of the city but external logic such as economic models, political agenda, and technological optimisation. These growth models focusing on the efficiency of growth demonstrated their limits in addressing the quality of the well-being of the citizens. The prevailing inequality has escalated the conflict amongst groups of people around the globe where existing urban spaces have not been able to accommodate the incoming population. Unplanned occupancy in areas such as main water basins that serve the entire city became a risk for all inhabitants, only exacerbated by the effect of global climate change. The colonial past, on the other hand, has cast long shadows over many of the developing countries to struggle with not only the physical, social, and economic difficulties but also with the cultural identity of the population.

These backgrounds of extreme urbanisation leave us with the big question of how to deal with the metropolitan complexity to realise sustainable growth to reach the well-being of the population in the post-colonial, Anthropocene era. Metropolitan Complexity refers to the issues of the contemporary metropolitan system. Social and economic inequality, the fragility of environmental eco-systems in relation to the global climate change, the emergence of the political idea of the metropolitan dweller as a global citizen, the preservation of cultural heritage; the post-colonial identity, and the governance and policy issues are only a few of these issues framing the Metropolitan Complexity. These issues cannot be addressed with a single, static, and traditional disciplinary approach, but needs a comprehensive and multidisciplinary vision to understand them.

1.2. The TELLme Project and the Metropolitan Approach to Complexity

The TELLme (Training for Education, Learning and Leadership towards a new MEtropolitan discipline) is a three-year Erausmus+ project started in 2017 where the cooperation for innovation and the exchange of good practices are the key actions. The project addresses the urban and architectural disciplines at the higher education level, based on the assumption that cities in the 21st century are the crucial field of complex issues derived by the extreme urbanisation and the HEIs have a social responsibility in providing solutions.

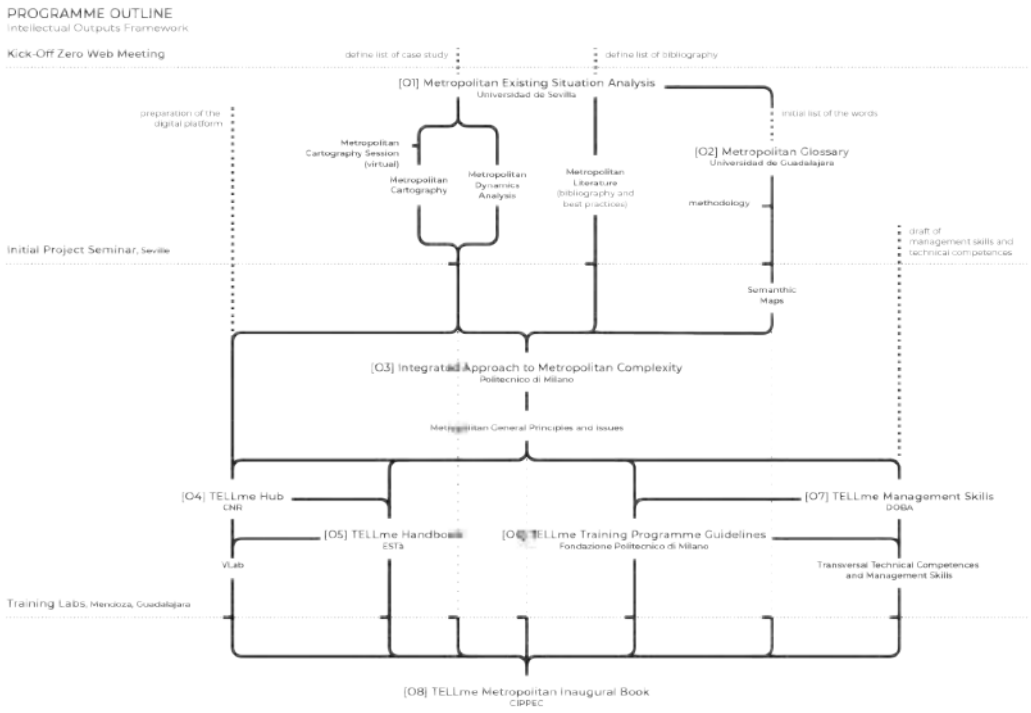


Figure 1 TELLme Intellectual Output Framework

Ten partners and four associate partners from Europe (Italy, Spain, Slovenia) and Latin America (Mexico, Argentina) are working on developing the theoretical framework, methodology, and tools to address the metropolitan complexity holistically. The eight outputs range widely from the theoretical studies to practical training guidelines, yet closely linked to one another through framework and methodology of the Metropolitan Discipline. (Figure 1)

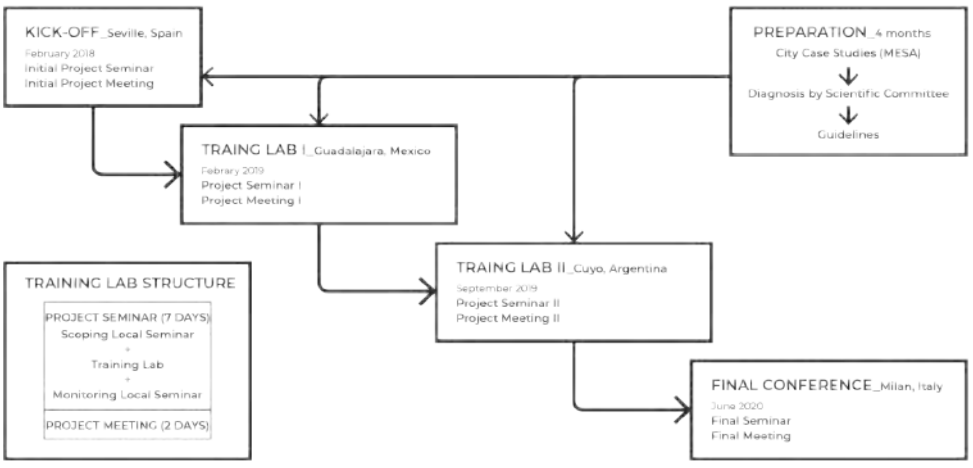


Figure 2 TELLme Training Schedule

In particular, there are two training labs where we test the methodology with actual case studies involving local government and stakeholders. (Figure 2) During the training lab, besides identifying the urgent metropolitan issues of the location, all participants provide feedback and discuss further project developments. The expected impacts of the TELLme project are:

- A multidisciplinary and trans-national collaboration, sharing knowledge, skills and best practises, developing new tools will directly improve the involved HEIs in their capacity to address the Metropolitan Discipline
- Building a community of practice of the discipline amongst higher education institutions through technological innovations that interact with local governments, NGOs

In order to define the metropolitan approach, it is crucial to recognise the paradigm shift from the urban to the metropolitan scale, thus seeing the contemporary metropolis as a “net-city”. According to D. G. Shane, the Net City is “a multi-centred network system” emerged “to handle the apparently chaotic flows of diverse participants in an increasingly global network.” The Net City is essentially a system of cities of different sizes functioning as a whole throughout a network of physical and virtual infrastructures. (Figure 3)

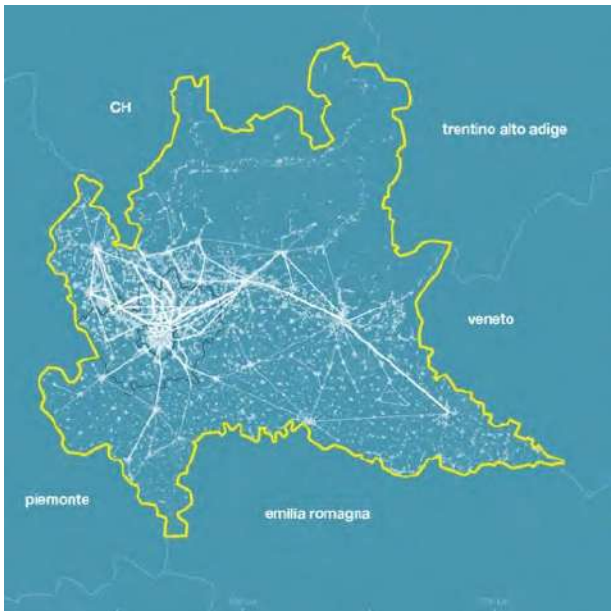


Figure 3 Milan PGT, Metrogramma, 2007

In this polycentric system, however, we are not only dealing with the nodes and edges of the network. According to authors such as Terry McGee, Edward Soja, Neil Brenner, and many more, we are facing a hybrid territory where urban and rural scales define a seamless heterogeneous landscape. This space in-between the network is called “body space”, where the continuity and the connection with the previous system are lost due to metropolitan infrastructure systems. The Body Space needs to be reconceptualised with new meaning and new image in the metropolitan era.

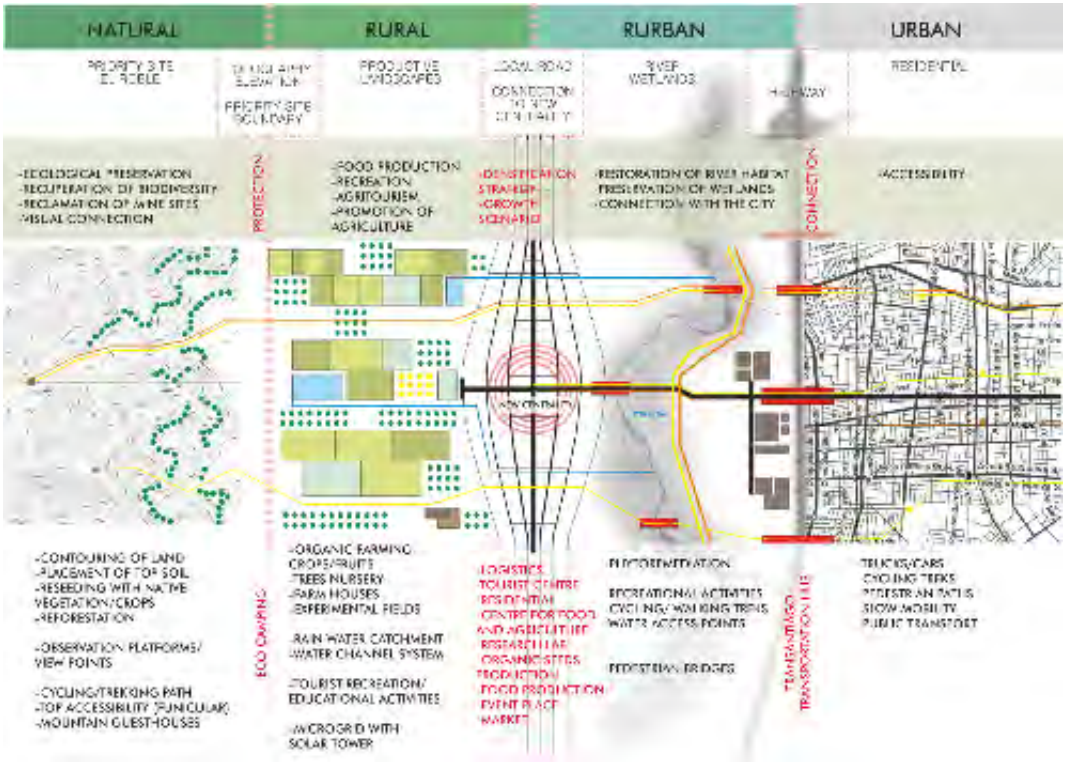


Figure 4 Urban-Rural Linkage Pattern Study, MS Lab 2018

The recognition of "body-space" allowed us to discover new patterns of settlements that are beyond the dichotomy of urban and rural patterns. (Figure 4) It opened the whole new possibilities of shifting between different scales and time that require new spatial practices, social behaviours, and organisational structures. This change also fostered engagements of new spatial agencies such as private and public organisations, universities, families in the interactions amongst global and local forces challenging fixed administrative boundaries at different scales and requiring innovative forms of institutional organisation, and planning.

The necessity of a comprehensive and multidisciplinary approach to the study and practice of metropolis became a common ground for our academic exchange in the past years. The metropolis spatial structure needs a Metropolitan Discipline able to support its construction with organisational, technical expertise, and a big project of urbanity based on a physical and virtual network between the new city shape and the new forms of conviviality. The metropolitan vision will lead to the improvement of the Practice of the Metropolitan Discipline (figure 5) with new competencies.

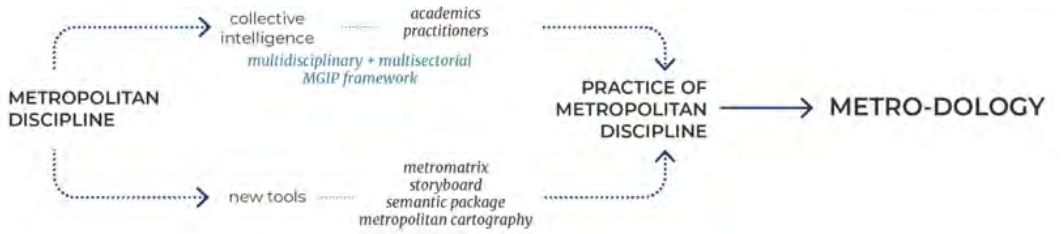


Figure 5 Practice of Metropolitan Discipline

2. The methodology for the Practice of Metropolitan Discipline

2.1. Metropolitan General Issues and Principle (MGIP)

The aim of the Metropolitan General Issues and Principle (MGIP) framework is to create a feedback mechanism where practical experience is reflected in the theoretical work of the Metropolitan Discipline, taking the local environment, community, wealth, governance, and culture dimensions into consideration. Within this basic structure, the collaboration of the collective intelligence yields holistic solutions addressing all dimensions of the metropolis.

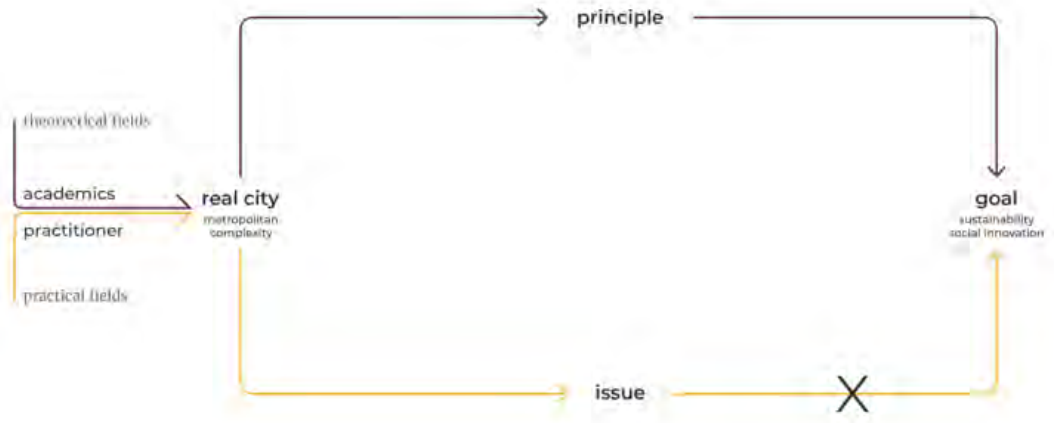


Figure 6 Current Situation in the Metropolitan Practice

The reality indicates the existing situation of a built metropolis. It is the starting point of acknowledging the issues to address, and the principles ruling the specific context. The goal is the ideal objective of a metropolis, which is ultimately the sustainability of the metropolis for the wellbeing of its citizens. From the literature and the case studies, academics set the principles that define what to achieve, how, and why for reaching the goal. On the other hand, practitioners face the issues, which are the undesired outcome of a metropolitan dynamic and often act as a hindrance for meeting a metropolis expectation. (Figure 6)

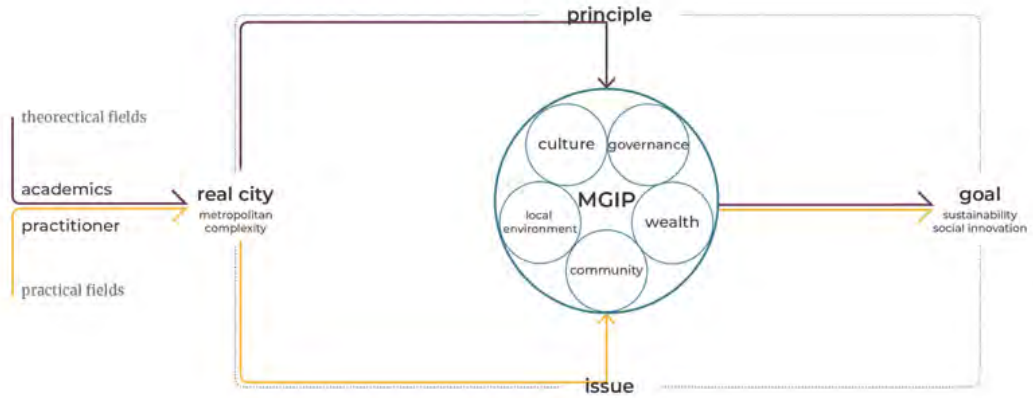


Figure 7 The Proposal of Metropolitan General Issues and Principle (MGIP) Framework

The reconnection of the ideal city with the real built city in the MGIP framework (Figure 7) comes through the process of operator and operation that bring the principles and issues together for finding how to transform, develop, or maintain the existing situation and reach

the goal of sustainability. From this perspective, both the theoretical field of academic knowledge and the practical field of the governance and management of a metropolis are equally acknowledged. The framework attempts to merge the field experience with the theoretical issues of the complex process in Metropolitan Projects by translating the general and theoretical point of view into the more specific practical operations in the metropolitan construction.

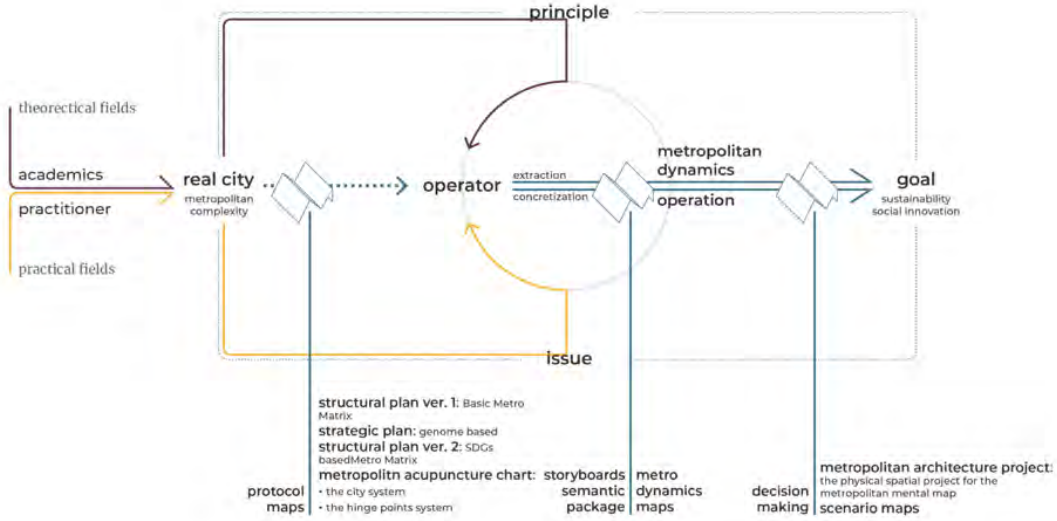


Figure 8 The Tools used in each step of the MGIP Framework

Each step of the framework requires specific tools as part of the methodology and the framework to bridge the gap between the theory and the practice. (Figure 8) Narrative and mapping tools that allow the study of the metropolitan phenomena with a multi-disciplinary and multi-sectoral stakeholder becomes another main pillar of the discipline.

A feedback mechanism follows after the initial establishment of the MGIP framework, where practical experience will be reflected in the theoretical body of the Metropolitan Discipline, taking into consideration the local environment, community, wealth, governance and culture dimension. These categories seek to understand the metropolitan question from a holistic standpoint, in contrary to the traditional methods that have a vision that comes from the sectors in the way which academy and local governments are organized. This gathering of knowledge is the fertile soil that gives place to Metropolitanism: the capacity to give a comprehensive solution rather than a sectoral answer to the problems related to the management of large metropolitan areas.

2.2. Metro-dology

Metro-dology is the collective design process of the Metropolitan Architecture projects based on the MGIP framework. (Figure 9) It is a sequence of phases implemented with specific tools that support the decision-making process of the physical transformations of a metropolis through the building of a metropolitan narrative. The result is a metropolitan narrative, which is not meant to be a linear process, but consists of different phases that relate to each other through a feedback mechanism: Narrative, Interpretation/Diagnosis (Protocol Maps & Metro

Matrix (Ortiz, 2013)), Dynamics, Storyboard, Glossary, Metropolitan acupuncture chart and Metropolitan Project.

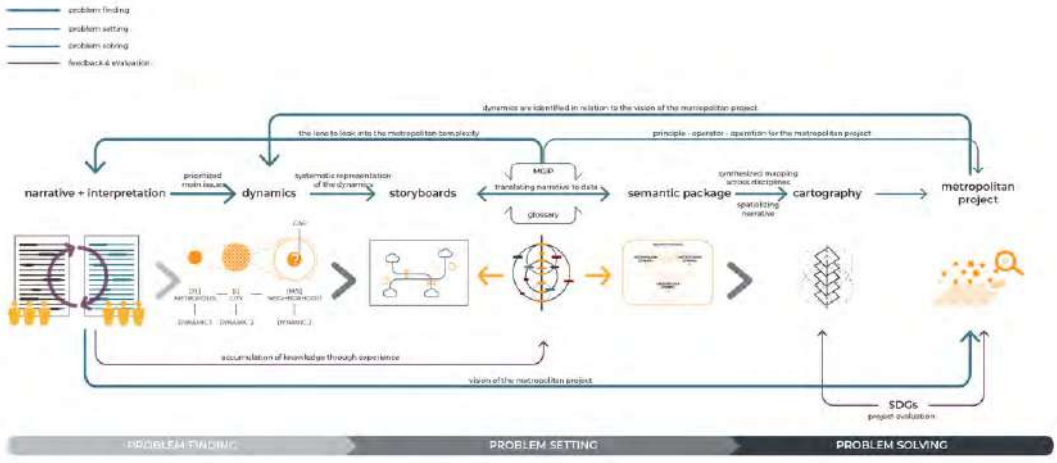


Figure 9 The Metro-dology

The Metro-dology is applied to metropolitan contexts that are a territorial assemblage of rural and urban patterns of settlements; infrastructural networks merging with the natural elements; and the historical traces of places and producing hybrid landscapes that are the new living environment for billions of metropolitan citizens. In order to build a multi-dimensional and multi-scalar narrative of these territories, it is essential to investigate the complexity of a metropolis.

Following the definition of a stakeholder's map, through a workshop dedicated to this phase, we first set up a comparison between a pool of experiences of the different actors of the metropolitan city (Issues) and a reference to principles of general sustainability (Principles) expressed through words and key concepts. Throughout the process, the cartography tool spatially highlights the data that are the premises for orienting metropolitan planning.

Problem Finding

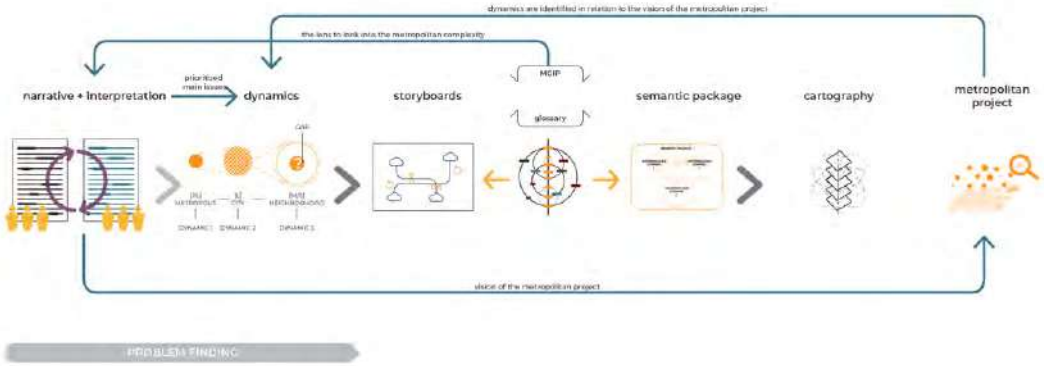


Figure 10 Metro-dology: Problem Finding Phase

Problem or Fact-finding is the first phase of the Metro-dology. (Figure 10) It starts with the narrative of internal experts, namely local decision-makers and civil servants of a metropolis.

They describe the problems, needs, and expectations of their metropolis and the tools available to address them. Metropolitan experts, who are external experts, analyse the storytelling in a constant dialogue with local authorities and have an insight into the problems of the metropolis and of the processes that may produce them.

Simultaneously, a primary study of the metropolis is conducted. By using the global data set, the Metropolitan Cartography tool generates a set of Protocol Maps that become a base for discussions. Protocol Maps are a set of maps showing the fundamental relationship amongst elements constructing the metropolitan system. They reveal the metropolitan structure by layering physical aspects of geographic, historical, and geometrical data. All metropolises have the same set of comparable maps.

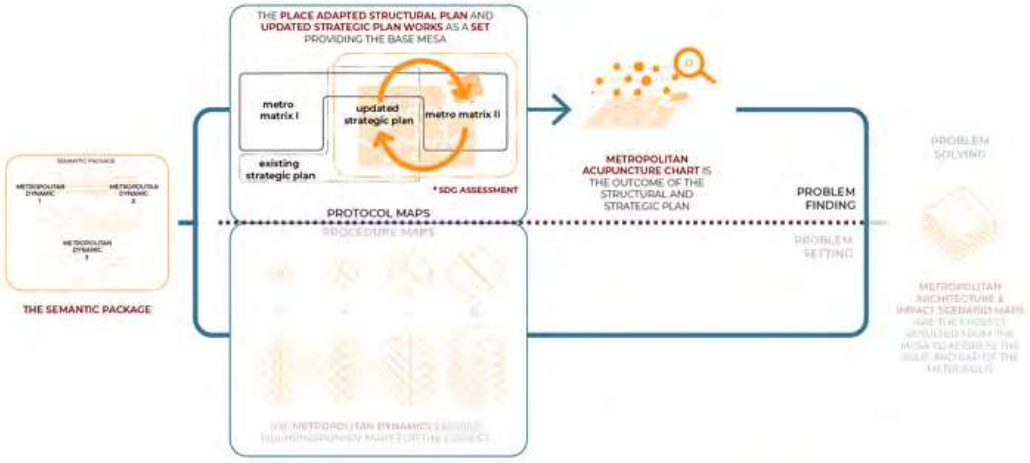


Figure 11 Protocol Maps, Metro-Matrix, and Metropolitan Acupuncture Chart

From the Protocol Maps, the Metro-Matrix is produced. It is a reticular system of axes: few structural geographical axes and some penetrative artificial ones, which first, determine the development of the centre along lines and, second, define hinge points of densification. The matrix assumes its value through the definition of the logic of settlement-distribution, which makes possible the localisation of interchange nodes in peripheral areas. (Figure 11)

Problem Setting

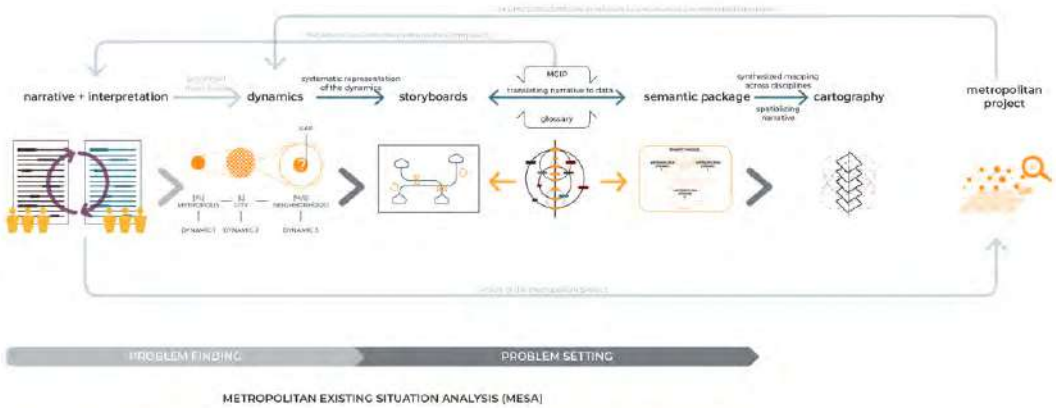


Figure 12 Metro-dology: Problem Setting Phase

The subject of the problem setting is the metropolitan city and its dynamics. (Figure 12) The local actors selected based on their actual involvement in decision-making of a metropolitan area, have chosen a metropolitan transformation, report verbally on the issues (challenges, strengths and weaknesses, gaps and tools used) that affect the expectations of their city and their limits.

The objective of the narrative is to create a complex of observation plane conditions in which data provided exclusively by the local subject are integrated with spatialized data and presented through open source maps. All the data, therefore, are initially observation data, analysed by the metropolitan expert through the general principles agreed upon based on the Metropolitan Genome (Ortiz, 2013).

Once the observation data have been collected, then, through the dialogue conducted in working tables, the process of correlation and interpretation takes place. The metropolitan experts describe the dynamics through a synthesis scheme called a storyboard, an interpretation of the process of the cause of the issue that emerged during the discussion. The storyboard represents the big picture of the issues of a given metropolis and of the dynamics that produce them.

Based on the storyboard and the semantic package, procedure maps are produced. Procedure Maps are a set of maps representing the spatial impact of the process of ongoing metropolitan dynamics identified during problem finding phase. They operate at a large scale and aim at highlighting the dynamics and defining strategies for promoting the sustainable development of the metropolis.

The result of Problem Setting phase is the verification of the hypothesis of the metropolitan dynamics produced with the tools of the TELLme project and identification of further metropolitan project themes and its development hypotheses.

Problem Solving

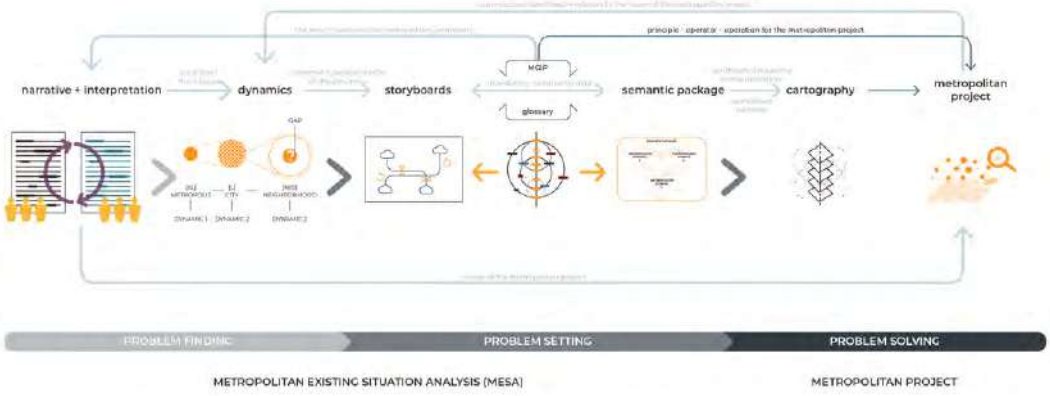


Figure 13 Metro-dology: Problem Solving Phase

In the problem-solving phase, (Figure 13), the metropolitan architecture projects are developed through site-specific operations as a response to the existing gap and in relation to their potential location defined with the metropolitan acupuncture chart. Nevertheless, the latter act as a framework that stresses the value of the metropolitan architecture projects in

building the connections between the big scale of the metropolitan network and the archipelago of the local scale of places to enhance our experience in the space-time of the metropolis.

Maps are also instrumental in the final decision-making act. The use of data enables the production of Impact Scenario Maps that simulate long-term scenarios of metropolitan development to evaluate the impact of Metropolitan Projects on the territory.

The metropolitan dynamics transform existing landscapes, infrastructure networks and city fabrics. The dynamics are processes of transformation of form and map of the urban field on a metropolitan scale. Growth through densification and investment of larger spatial fields change the value of the existing poles and settlement patterns, concerning the new metropolitan paradigm. For this reason, Metropolitan Architecture needs to protect the local value, and also be equipped with "sensitive" infrastructures so that they do not remain or are uprooted or "museumised".

3. Guadalajara Case Study

The case of Mexico offers a unique opportunity to observe how and why drastic change is occurring in migration patterns. The case study of Guadalajara is a result of the TELLme Training Lab held in February 2019. The aim of the training lab was to test the problem finding and setting of the Metro-dology by identifying the issues and dynamics of the metropolitan region with the local government, academia, and local stakeholders, and verifying them with the Metropolitan Cartography tools.

3.1. Problem Finding

The project began with comprehension of the city's geographical position and geopolitical role as an attracting point by identifying possible reasons and directions of migration, and the city's capacity in handling its growing population, land use and ecological footprint. The city's economic growth and social connections are the mechanisms that facilitate migration and determine the scale of impact.

Guadalajara is the second most important city in the centre-west of Mexico, capital of the State of Jalisco. It is also the place of origin of mariachi and tequila, and one of the most important industrial and commercial centres of Mexico: some even call it the Mexican Silicon Valley. The agglomeration that forms the metropolis has around 4.1 million inhabitants. The city of Guadalajara has started to grow again (0.09 %/year), after a period of decline from 2000 to 2014. Today, even though the population growth until the last survey seemed stabilized, the whole metropolitan area shows an expansion in terms of land consumption that has generated sprawl, and illegal occupation of natural and agricultural areas.

The first analysis started with a set of protocol maps to achieve a structural plan of Guadalajara that reveals the relationship between different municipalities and their roles in the metropolitan region. (Figure 14) Guadalajara has a strategic geographical position for the relationship between the two oceans. Today, it is also in a position of the junction between

the axis that connects the city to Mexico City and the axis that connects Guadalajara with the port of Manzanillo. (Scale XL)

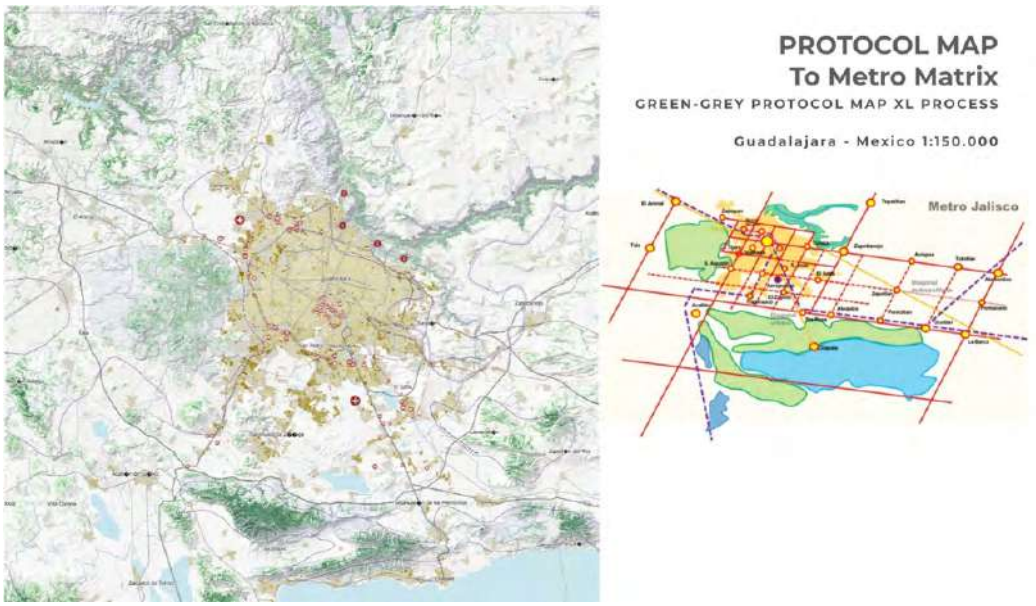


Figure 14 Protocol Map and Metro Matrix of Guadalajara (XL Scale)

After the discussion with local actors such as the universities, municipalities, civil society, and IMEPLAN (Instituto de Planeación y Gestión del Desarrollo del Área Metropolitana de Guadalajara), and based on the Protocol Map and the Metro Matrix, we observed the formation of a metropolitan axis in the metropolitan region of Guadalajara in the L scale (Figure 15): Villa Corona - Acatlán de Juárez - Tlajomulco de Zúñiga. Each municipality has its strong characterization within this axis: Villa Corona is a tourist resort, whereas Acatlán de Juárez has the freight railway that connects Guadalajara to the port of Manzanillo, and Tlajomulco de Zúñiga is an airport city.

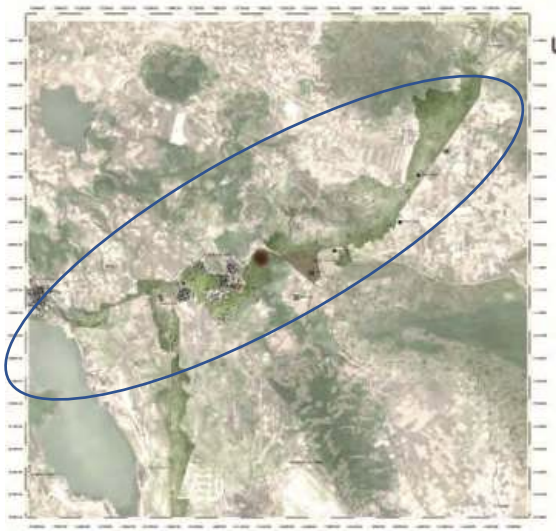


Figure 15 The New Metropolitan Axis of Villa Corona - Acatlan de Juarez - Tlajomulco de Zúñiga (L Scale)

Finally, at the M scale, the area between Villa Corona and Acatlán de Juárez is chosen as a strategic position for the relation with Guadalajara and the Manzanillo Valley. (Figure 16) Since its proximity to the railway station for freights, with a provision of conversion to a passengers station, the area is defined as a buffer zone, that is, the area under tension between three different physical states generating abandoned areas, infrastructural barriers, and informal settlements: City (Guadalajara), Agriculture (Valle del Manzanillo), and Nature (Lagoon). In the area, due to the increasing housing demand from all social levels, there is a planning proposal for mass residential development. The identification of this threshold as an urban-rural linkage landscape that interacts with other existing landscapes, networks and fabrics, encouraged the participants to consider a type of settlement can merge the urban and rural landscape.

Figure 16 The Field of Action between Villa Corona and Acatlan de Juarez (M Scale)

3.2. Problem Setting

After defining inequality and fragility of the territory as the main issues, the participants worked on defining the dynamics causing the issues. The following discussion was focused on answering the following question: Considering the vulnerability of the territory, is it possible to determine sustainable locations for metropolitan residential projects? Based on the initial survey, the TELLme team prepared the procedure maps as a base for discussion. As a result, the participants defined the following dynamics, varying in scale:

- Dynamic 1: The conversion of agricultural land to urban and peri-urban settlements. (Urban-Rural Linkage XL scale)

- Dynamic 2: The expansion of settlements within the valley and the development of small centralities due to a robust localisation of mining centres and productive food processing industries. (Urban-Rural Linkage L and M)

The issue that we started in the Guadalajara-Acatlan de Juárez-Villa Corona area is related to the intensive exploitation of agricultural land due to the presence of red fruit production managed by American multinationals. This production, which has led to a substantial increase in the standard of living of the populations involved in its management, has also caused a significant eutrophication of Lake Chapala with a consequent reduction in the size of the lake, a worsening of the landscape conditions, and now recognised health problems for the indigenous people who lived in the lake (respiratory diseases and malformations).

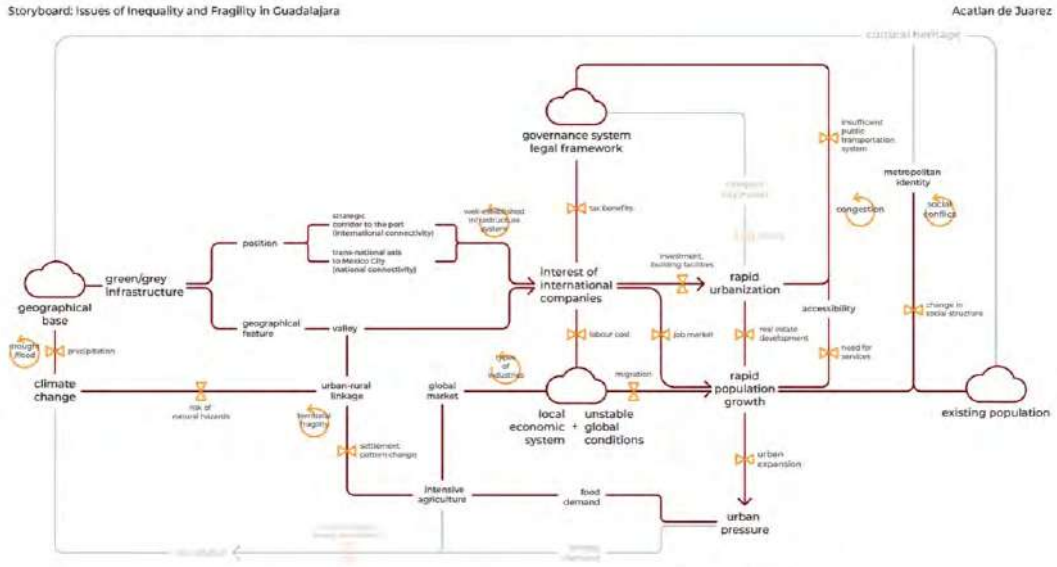


Figure 17 The Storyboard of Dynamic 2: The expansion of settlements within the valley and the development of small centralities due to a robust localisation of mining centres and productive food processing industries

The loss of local markets and knowledge of the cultivation of local products (for example, amaranth) is a possible consequence of having opted for a single international client. From the social point of view, internal and external immigration will focus on an area that is already characterised by the presence of indigenous communities living on the edge of poverty. (Figure 17)

The agricultural vocation of the area is confirmed by the presence of the Metropolitan Trail of Acatlán de Juárez, which had to solve the problems of compliance with the Official Mexican Standard for Treatment of Wastewater Discharges that the municipal rakes did not guarantee to observe. The Metropolitan Trail, which cost 1000 million pesos, however, was only operational for 13 months, due to problems of management and adequate treatment of water; It was the primary source of work for 250 families.

The presence of this plant has caused an increase in demographic pressure in the town of Acatlán de Juárez. This pressure could increase if the hypothesis of implanting the Mexican "Silicon Valley" in Acatlán took shape. The State of Jalisco puts great emphasis on technology. It annually exports the equivalent of 21,000 million dollars in services and technological

devices and, between 2014 and 2016, hundreds of new companies in Guadalajara have received investments -most of US origin- amounting to about 120 million dollars, according to Washington Post. The evident vitality of the territory has also attracted the attention of large companies, and multinationals in the information technology sector, which have decided to open their offices there: Intel, IBM, Hewlett-Packard and Dell are present in Guadalajara and its surroundings.

Based on the storyboard produced by the external expert team after the discussion with stakeholders, the key elements of the dynamic were highlighted in the semantic package. The semantic package is a list of keywords that refers to a set of data, the informative levels, which becomes the legend of the maps describing the phenomena produced by the metropolitan dynamics. To represent a given phenomenon, data within different catalogues are selected through transversal "zone of reading". The storyboard is translated into a Semantic Package by selecting the informative levels representing each element of the storyboard. (Figure 18) Experts in various fields provide the connection amongst the main keyword and the data keywords.

Figure 18 The Semantic Package of Dynamic 2: The expansion of settlements within the valley and the development of small centralities due to a robust localisation of mining centres and productive food processing industries (M Scale)

The Procedure Map reveals the physical dimension of the identified dynamic. Related to the dynamic 2 of Guadalajara, the maps seek to highlight the following aspects (Figure 19):

• Connectivity intercepted by the presence of federal roads, regional roads, municipal roads and rural roads, by rail and by the electricity grid;

• Natural Resources intended as a green system that demonstrates a discontinuity in its extension through a limited number of protected vegetative species, agricultural soils and rural settlements;

• Informal and urban-rural settlements and the relative urban growth understood as the settlement pressure that every single urban centre exerts on the territory: Public services and

the degree of social marginalisation make it possible to give a quantitative and qualitative connotation to the area;

• Water governance through the identification of the main surface and underground water flows (blue system) and water collection points divided according to their use (pastoralism and agriculture, industry, public): The network of telecommunications determines virtual flows that generate networks with interchange points with a high level of accessibility;

• Circular economy of the area represented through land specialisation and land use: Spatialization of agricultural activity is readable through the actual growth of recorded production and the mapping of potential agricultural areas.

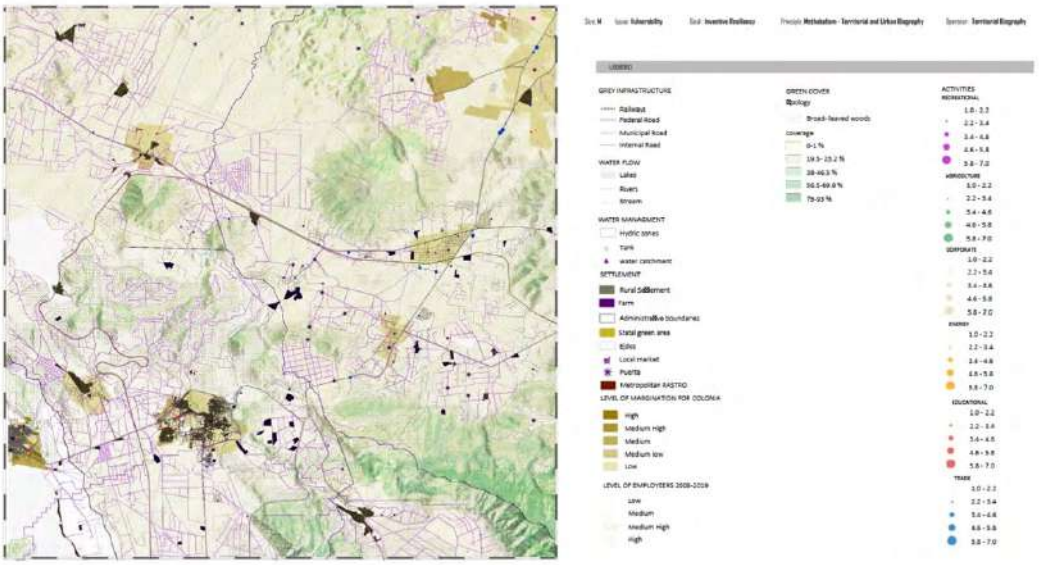


Figure 19 Procedure Map of Dyanmic 2: The expansion of settlements within the valley and the development of small centralities due to a robust localisation of mining centres and productive food processing industries (M Scale)

3.3. Conclusion: Direction for Problem Solving

The main result of the Guadalajara Training Lab was that we identified a metropolitan axis beyond the administrative boundary of the Metropolitan City of Guadalajara. The project needs to be further developed in a sustainable accessibility project that allows the community to experience the environment while avoiding the risk of isolation, and the creation of tourism on which it is possible to invest energy and resources to improve cultural and landscape heritage. The community presence is essential in the area assessments because it reflects the agricultural system of the ejidos, a rural area that can be managed privately or publicly. The lands in common use and the fragmented ones define plots, alignments and geometries as signs that affect the soil and determine the landscape.

4. Conclusion

From the analysis mentioned above, starting from the question about the size of the city, each metropolitan aspect is progressively studied, bonded to a scale and framed throughout the steps of Metro-dology. The necessity for the delineation of fields of action (the bounding box) out of the traditional municipal boundaries emerges as a fundamental step to identify the speed of change produced on the different metropolitan dimensions.

A following step of evaluation needs to be pursued to render territorial criticalities and assets and to help future policy-making processes or ad-hoc interventions. Through a multi-scale integrated approach for assessing metropolis impacts and drivers, the Metro-dology allows us to investigate the relationships among the facets of a city over its surrounding territory.

5. References and Acknowledgment

Burkhard B; Maes J (Eds.) (2017) Mapping Ecosystem Services. Pensoft Publishers, Sofia

Chiesa A, (2013) "Landscape urbanism: *un approccio ecologico al territorio urbano"*, ARC 2 CITTA' (June).

Corner J. (2006) Terra fluxus, in Waldheim C., The landscape urbanism reader, Architectural Press.

Diagnostico de la Region Lagunas, Jalisco, IIEGI, 2017

Ficha Tècnica Hidrologica Municipal Acatlan de Juarez, Comision Estatal Agua Jalisco, 2015 Ficha Tècnica Hidrologica Municipal Villa Corona, Comision Estatal Agua Jalisco, 2015

Febvre L. (1922), *La Terra e l'evoluzione umana*, Einaudi, Torino

Ortiz P.b.; Kamiya M. (2016) The Political Economy of the Metropolis in the Global North and South: Connecting, Financing, and Ruling, in Governing the Metropolis, World Bank, UN-HABITAT, IADB

Ortiz P. (2013) The art of shaping the metropolis, New York, McGrowHill

Plano Desarollo de la Region Lagunas 2015-2025, IIEGI

Plano de Desarollo Urbano, Acatlan de Juarez, 2015-2025, IIEGI

Pollak P. (2006), Constructed ground: questions of scale content, in Waldheim C., Landscape Urbanism Reader, Princeton Architectural Press, Hudson

Shane G. (2005) Recombinant Urbanism: Conceptual Modeling in Architecture, Urban Design and City Theory, Wiley, London

Soya E.W (2000) Postmetropolis: Critical Studies of cities and regions, Bleckwell

UN Habitat (2018) Policy guide on entrepreneurship for migrants and refugees, United Nation Conference on Trade and Development (UNCTAD)

UNHABITAT (2014) RDD, vol 35 Urban Rural Linkages in Support of the New Urban Agenda

http://habitat3.org/the-new-urban-agenda/

Acknowledgment

Marzia Di Fini, and Valentina Gagliulo within the master thesis “Acatlan de Juarez: nuove tonalita' di paesaggio. Strategie per gli equilibri ambientali e agroalimentari nella regione metropolitana di Guadalajara”, 2018 Politecnico di Milano School AUIC, gave a meaningful support to the research project.

Case Study Paper

THE CRISALIDE PROJECT:

When innovative planning processes re-balance urban development and create new quality of life using the opportunities provided by the rise of the digital city.

Pietro ELISEI, Eurasia; Romania

Elena BATUNOVA, Southern Urban Planning Centre; Russia

Miruna DRAGHIA, Urbasofia; Romania, Ion Mincu University of Architecture and Urban Planning, Bucharest, Romania

Abstract

CRISALIDE (City Replicable and Integrated Smart Actions Leading Innovation to Develop Urban Economies) is one of the very few projects financed between EU and Russian Federation through the ERA NET RUS PLUS (ENRP) programme. It is the only financed project in ENRP dealing with topics related to urban planning in this current EU programming period (2013-2020). Societal transformation happens in the cities. Cities are the natural habitat for developing innovation. Innovation inherently requires change. Great cities, especially in their golden ages, have been considered as "innovative milieus" or "cradles of civilization" (Hall, P., 1998). The change, as the catalyser of innovation, is embedded in urban life. The change covers different fields, for instance, the demography (e.g. ageing, in-im-emigrations), the citizens' behaviours (e.g. higher mobility, digital literacy, social media addiction), the working patterns (e.g. continuous learning, higher commuting, virtual offices), the use and extension of both public space and sphere (e.g. location-based services, public/private urban spaces as hyper-location, re-use and temporary uses of buildings and brownfields) the modes/means of production (e.g. just in time products, global trade and distribution, effective governance schemes adoption and tools for Public-Private-People Partnerships - PPPP) and so on. Nonetheless, we are in an age of rapid urbanization. In Russia, a polarization of population around major urban areas is evident. This trend led, a few years ago, to the design of a policy facing planning issues related to Russian Urban Agglomerations. Urbanization is a great opportunity for supporting innovative choices and urban solutions. Strategic, smart and integrated urban management is a key tool to promote stable growth and effective processes of innovation. New efforts to modernize the Russian economy and face global issues as well (e.g. climate change, migration, sustainability), have taken on an even greater significance since the implementation of Western sanctions. Cities can be the natural catalyser for promoting innovation, as they contain all strategic elements (e.g. available spaces and infrastructures both public and private, research centres, universities, science parks, creative communities, large industry, SMEs), at a scale of proximity. CRISALIDE is experimenting in Rostov-on-Don, through a collaborative approach involving EU and Russian researchers, the creation of a digital innovative platform aimed at facilitating the renewal and regeneration of brownfields. The platform is abstracting, digitalising and finally creating a replicable and user-friendly tool based on an enlarged participatory planning process grounded on PPPP (Public Private People Partnership) principle. The platform is harmonising the contribution of stakeholders in diverse planning domains and formalize them through KPIs (Key Performance Indicators) providing values at disposal to decision makers linked to

grade of smartness and comprehensive quality of life generated by the triggered regenerative planning process.

Keywords

smart cities, strategic planning, urban policy, urban regeneration, brownfields

1. Linking innovation to the Russian planning context explaining the need for a platform

1.1. The idea of CRISALIDE

The opportunity of designing the project CRISALIDE (**C**ity **R**eplicable and **I**ntegrated **S**mart **A**ctions **L**eading **I**nnovation to **D**evelop Urban **E**conomies) has been given by the opening of the second call of the EU/Russian Federation Programme called ERA.Net RUS Plus. The major objective of ERA.Net RUS Plus is to deepen the transnational collaboration between EU MS/AC and Russia and to reduce the fragmentation of research programmes along national funding lines. Other principal goals of ERA.Net RUS Plus are to further develop the instrumental setting for joint funding activities and thus to provide a solid basis for a cooperative programmatic approach to be pursued in the near future. This programmatic approach will assure the desired and necessary sustainability of the cooperation between EU Member States and Russia and a lasting impact.

The project's name is already a synthesis of the project attitude towards the application of innovative methodologies in the urban realm. The chrysalis (CRISALIDE is the Italian version of the word chrysalis) is a butterfly at the stage of development when it is covered by a hard case, before it becomes an adult insect. It is a metaphor of the translation towards a new state of play characterized by the application of innovative solutions, as innovation is the result of a process that transforms the state of things bringing them to a completely new situation: the chrysalis becoming a butterfly. CRISALIDE through its methodology and participatory activities is developing a stable, engaged stakeholder group, which will assist in the establishment of the innovative development schemes (IDS) tackling aspects related to housing, mobility and infrastructure, public space and services/ facilities, environment, landscape and heritage, as well as urban management and governance. The results and the impacts are organized in three innovation areas:

- organizational innovation (such as new niches for local, city-based private sector to boost R&D and innovation activities, policy impact to reinforce local and national related policies regarding collaboration in the field of R&D and innovation),
- technological innovation and
- social innovation (enhanced Local Identity to improve social capital, increased climate and environmental awareness to favour community's preparedness, increased ICT development awareness to enhance local economics).

1.2. Being innovative in Urban Planning in the EU

We are in an age of rapid urbanization. Nowadays globally, more people live in urban areas than in rural areas, with 55.3 % of the world's population residing in urban areas in 2018 (World Bank Data, 2019). In 1950, 30 % of the world's population was urban, and by 2050, 68% of the world's population is projected to be urban (UN, 2018). Innovation in urban planning covers different fields, for instance,

- the demography (e.g. ageing, in-im-emigrations),
- the citizens' behaviours (e.g. higher mobility, digital literacy, social media addiction),
- the working patterns (e.g. continuous learning, higher commuting, virtual office),
- the use and extension of both public space and sphere (e.g. location-based services, public/private urban spaces as hyper-location, re-use and temporary uses of buildings and brownfields)
- the modes/ means of production (e.g. just in time products, global trade and distribution, effective governance schemes adoption and tools for Public-Private-People Partnerships - PPPP) and so on.

In the European context, especially of urban policies promoted by the EU, in the last few years, the theme of urban innovation has become a mantra that supports various direct financing programs (mainstream funds) and indirect ones (specific initiatives and programs managed directly with the cities or metropolitan areas). The Innovation Union was launched in 2010 as a flagship initiative of the Europe 2020 strategy to build on Europe's strengths and address its weaknesses with respect to innovation and thereby make Europe more competitive in times of budgetary constraints, demographic change and increased global competition. The main achievements under this priority are the implementation of the European Research Area (ERA) and the launch of Horizon 2020, the new research and innovation framework programme, streamlining funding and encouraging cross border and transnational collaboration.

The flagship programme of the EU in this respect is the UIA (Urban Innovative Actions). Cities are going to be financed after proposing innovative ideas co-designed together with a local partnership constituted by key stakeholders, basically following the quadruple helix principle. Urban Innovative Actions test innovative ideas and support urban authorities in their efforts to ensure sustainable urban development. In 2015, urban stakeholders and Member States identified 12 topics which represent common challenges cities are facing: 1) Air quality, 2) Innovation and responsible public procurement, 3) Circular economy, 4) Integration of migrants and refugees, 5) Climate adaptation, 6) Jobs and skills in the local economy, 7) Digital transition, 8) Housing, 9) Energy Transition, 10) Sustainable use of land (nature-based solutions), 11) Urban mobility, 12) Urban Poverty (deprived neighbourhoods).

All over Europe, there are currently 54 projects experimenting urban innovative solutions for current issues faced by EU cities in the above listed challenges (https://uia-initiative.eu/en/uia-cities-map).

Figure 1 Innovative Actions currently financed all over EU

1.3. Being innovative in Urban Planning in the Russian context

Investing with proper methodologies in the urban realm means creating conditions for developing consumer orientated sustainable products and efficient/effective services. In fact, despite the big role of Russia's science and its potential, today the country seems to be lagging behind in cultivating high-tech technologies for innovating the economy of cities. Although it is one of the leaders in developing space, defence and nuclear technologies, Russia is drastically falling behind in producing consumer technologies (Koshkin, P. 2015). Innovations in the contemporary Russian urban planning system are mainly seen in the usage of the new technological tools, such as GIS, but the urban planning system is far from the introduction of organisational or social innovations. Despite the fact that the country' s transition to the new socio-economic model is associated with the introduction of the unknown for the Soviet model conditions, such as private property and private actors, and the creation of the new urban planning system, this system in many aspects replicates the obsolete socialist model of planning. It is still top-down, centralised, comprehensive and does not consider public participation as an important element of decision-making.

CRISALIDE's approach is to build innovative solutions through a dialogue between stakeholders placed before the transformation of a given urban context. A remarkable asset of this project lies in the fact that it is necessary to arrive to the definition of a platform, based on specific urban and territorial indicators, which facilitates decision-making choices in urban transformation and regeneration processes. in this sense both the European and the Russian partners are bound by the concreteness of the real problems connected to the transformation of an urban area. CRISALIDE is currently being implemented, so it has not yet come to define this platform, but concrete hypotheses have been put forward on how to build it. From a strictly urbanistic point of view (there is also in CRISALIDE a translation of qualitative themes into ontologies useful to computer scientists to create the platform, but they are not the main object of this article) the themes (urban functions) on which to work, were identified. Each of these themes is being evaluated based on a set of KPIs (key performance indicators) `based on the following functions:

- The places of living (housing)
- The spaces for production
- The Public space
- Mobility and accessibility
- Governance and participation
- Green infrastructure (NBS, Nature Based Solutions)

2. Applying a participatory based methodology supported by evidence-based planning actions

2.1. Contextualisation of participatory based methodology in CRISALIDE

CRISALIDE project is experimenting a joint EU-Russian research and collaborative approach for the creation of a digital innovative platform, designed to facilitate the renewal and regeneration of abandoned areas and brownfields. As an outcome, the platform is envisioned to become a replicable, user-friendly tool, aligning and harmonising visions from a diverse ecosystem of stakeholders.

In order to achieve its final outcome, CRISALIDE project leverages on the principle of participatory planning, its methodology being guided by a simple vision: to establish a multi-stakeholder group to sustain the collaboration in the field of R&D and innovation through a set of participatory workshops with a two-fold objective: 1) lay the foundation for the platform design by mapping the existing knowledge and gather evidence-based information and 2) design the technical and locally-rooted requirements for the online collaborative platform, the Innovative Decision-Making Tool (IDMT). Based on a set of KPIs (Key Performance Indicators) debated and agreed with the multi-stakeholder group, the IDMT will provide values at disposal to decision makers linked to grade of smartness and comprehensive quality of life generated by the triggered regenerative planning process.

2.2. Participatory based methodology conceptualisation

The conceptualisation of the participatory based methodology is embedded into a theoretical background on participatory planning processes and design thinking methods, in order to design the most suitable workshop scenario for identifying local needs, problems, opportunities and brainstorming potential solutions to the most pressing challenges. One of the main expected outcomes of the participatory based methodology is to boost, strengthen and consolidate the collaboration between multiple stakeholders towards RDI in the city of Rostov-on-Don. By applying a participatory based methodology and approach, the idea of empowerment will provide stakeholders with the ability and capacity to become agents for change in the process of decision-making concerning their own lifestyles and environment (Benson, Roe, 2000). As a natural consequence, the IDMT (Innovative Decision-Making Tool) will be defined in a participative environment and setting, following the core principles of stakeholders' empowerment.

Participatory processes are widely known practices in city planning and development projects. Several methods and practices can achieve certain levels of citizen/ stakeholder

involvement. Research on participatory processes is categorising and classifying practices between four impact levels of participation: information, consultation, collaboration and empowerment (Stelzle, Noennig, 2017). In this context, CRISALIDE project focuses mainly on consultation and collaboration methods, in order to achieve long-term collaboration in the field of RDI among researchers, businesses and companies (technology providers) and the public sector. The engagement and active participation of different local actors is crucial for reaching a successful design and conception of the IDMT. The challenge lies mostly in the process of discovering the diversity of interest and viewpoints and managing to conduct a work of matchmaking until reaching the point of interest alignment and harmonization, without overvaluing certain opinions or excluding too many interests (Healey, 1997).

2.3. Need for evidence-based decision-making

Going beyond the narrative of participatory approaches and stakeholders' empowerment in the process of planning and decision-making, another key challenge lies in the gap between the ideology-based policy making and the more pragmatic evidence-grounded decision-making process (Davoudi, 2006). According to Davies' understanding, the evidence-based policy and decision making represent an approach that „helps people make well informed decisions about policies, programmes and projects by putting the best available evidence from research at the heart of policy development and implementation". Therefore, it is evident that the IDMT should be founded on sound reasoning processes and backed by reliable and actual information and data, leveraging on the evidence-based planning as a rigour and systematic approach to achieve replicable and scalable results (Elisei et al., 2018).

The design and conceptualisation of the IDMT will surely benefit from an evidence-based planning and policy-making approach, considering the following key points: a) better understand the locally rooted needs and challenges from multiple viewpoint; b) demonstrate and amplify the connection between strategic planning and policy-making and political decision-making; c) agree and share a common objective language among the multi-dimensional ecosystem of stakeholders and design a convergent transformation vision; d) open up a transparent communication channel through an open and accessible platform and last, but not least, e) strengthen and consolidate the cooperation between local stakeholders to reach agreements for proceeding towards joint RDI.

2.4. Participatory approach and methodology

The participatory approach and methodology for CRISALIDE project aims at creating the proper framework for developing a shared vision between local authority representatives, researchers/ professionals, businesses, other local stakeholders, civil society and public audience, which enables early stage planning, in order to 'ignite' the collaborative process. In order to select the most suitable tools for participatory approach, we take into account the following five elements: objectives (reasons for stakeholder involvement and expectations/outcome), topic/ planning domain (scope of the issue/ challenge), participants (who is the provider/ beneficiary/ end user), time resource (amount of available time) and financial resource (available budget or funding opportunities).

Figure 2 CRISALIDE Methodological approach

The participatory approach and methodology is clearly linked with the participatory planning cycle, addressing the following steps:

1. Step 1. State-of-play screening, resulting in a set of planning pre-conditions, divided into two main categories: drivers and challenges in respect to the local specificities and the available resources. The first step will take into consideration the following components: defining (local) issues, challenges and needs in relation to (global) challenges; mapping relevant stakeholders (in accordance with the priority planning domains), gathering evidence (collecting relevant data) and mapping resources (opportunities and threats) and assessing the available policy tools.
2. Step 2. Strategic planning, resulting in a set of key priorities, materialised through strategic objectives and intended results for a specific timeframe (short/ medium/ long horizon), which will set the basis for the scenario building and strategic options/ alternative solutions. The second step will have as outcome the selection of the most suitable scenario, taking into consideration the urgencies of the pilot area.
3. Step 3. Action and experimenting, resulting in a list of actions, following a certain prioritisation criterion and allowing for collective brainstorming on the most suitable management structures and organisational logistics for the experimentation. Therefore, the third step will propose a correlation between the actions' repository, the funding opportunities, the implementation timeframe and the monitoring plan. Experimentation should be an intermediary step between action planning and large-scale implementation and it should temporarily test potential solutions (such as the IDMT, to provide room for improvement and preparation for the market uptake).
4. Step 4. Implementation, resulting in the physical implementation of flagship projects and programs, as well as feasibility studies and concrete investment plans. Within this final step, transferability, replicability and up-scaling aspects will be considered.

Within CRISALIDE, the set of participatory workshops is one of the stepping stones for the participatory approach, its objectives being threefold: 1) gathering local stakeholders from

different planning domains and sectors and brokering between diverse interests (main sectors identified so far as being of high interest for the context of Rostov-on-Don: housing; mobility and infrastructure, public space, environment, landscape and heritage, as well as urban management and governance); 2) brainstorming on the IDMT concept and identifying major local issues/ challenges, as well as tool technical requirements and functionalities; 3) debating and discussing further needs, opportunities and possibilities for collaboration.

The methodology for conducting participatory workshops comprises of a toolkit of methods, formats, as well as possible instruments, tools and techniques to be applied within interactive sessions. The following set of recommendations is taken into consideration: a) clear definition of workshop objective (aims and intended outputs/ achievements), b) suitable setting and scene (ice breaking session), c) participants skills and capabilities acknowledgement, d) proper selection of tools and instruments for creative problem/ solution exploration, based on collective intelligence of the entire group for idea generation, e) outputs co-creation (make outputs visual and avoid too-long texts), f) collection of feedback and suggestions/ recommendations and g) evidence and time keeping.

3. The area-based approach and the selected area for experimentation in Rostov-on-Don

3.1. A need for solutions from the bottom

Brownfield redevelopment in Russia is a quite new and challenging issue of urban planning. As such, planners' attention to it has just started to arise, which is being explained by several factors and determinants. Firstly, compared to the highly urbanized territories of the European countries, where the issue has become one of the EU policy's priorities (Science for Environment Policy: Brownfield Regeneration, 2013), Russia has vast greenfield areas near the cities, whose development requires significantly less efforts in terms of economy and legislation. Similar situation is observed in the US, where the interest to brownfield redevelopment is also much lower than in the EU (Meyer, 1998). Secondly, the traditional socialist way of extensive urban growth was not limited by any economic factors and there were not any incentives to recycle land (Bertaud & Renaud, 1997). The following post-socialist construction boom provoked even higher land consumption and urban sprawl due to the high housing demand and interest from both public and private parties to satisfy the population's needs (Stanilov, 2007). However, after three post-socialist decades, the unsustainability of such approach is becoming evident especially in large capital cities, which have been attractive poles for both population migration and investments into housing construction. Traffic, air pollution, lack of social facilities, services and technical infrastructure make new peripheral areas of the large cities less attractive and problematic for the city management. These problems provoked several attempts to reorient urban development inside the existing city territory and consider brownfields as an important development resource, given its intention of appearance in the national policies (Batunova & Trukhachev, 2019).

These first attempts to introduce new approaches in urban development have not yet triggered significant changes, although there are several successful examples in different cities and the request for such changes is rapidly increasing. Recently, a framework for such strategies' implementation has been introduced at the national level programs , however it

is mandatory to be supported from the bottom. At the same time, numerous information systems in Russia that serve to support decision-making processes when creating urban strategic and territorial plans, formulating urban policies, promoting e-government, managing urban infrastructure and housing stock or land use in cities, are often designed and created separately and their integration may be even more difficult than in pre-digital period. In such conditions, participatory and area-based strategies are necessary for better problems' identification and solutions' delivery (Dakin, Burgess & Adamson, 2012). Addressing brownfields redevelopment issue requires a more comprehensive approach that allows understanding the root-causes of the existing problems (Harfst, 2006). The focus on local conditions will also allow to test the CRISALIDE IDMT during the entire process of development and implementation, to put into practice the results of theoretical studies, to receive feedback from users and, in return, to enrich the theoretical work (often desk-based research) with empirical experience (evidence-based system). In addition to technological innovations, the introduction of organizational and social innovations in the spatial planning of the selected city, which will contribute to the reconfiguration of the urban planning process at the local level, will further enhance the set of positive practices of Russian cities.

3.2. Criteria for the city selection

When choosing a city for the implementation of a decision support system, the most important aspect was the presence of a case's characteristics that would allow up-scaling the R&D results and their application in other Russian cities. At the same time, the local peculiarities had to form a set of conditions on the basis of which a wide range of strategic options and planning tasks could be formulated, in search for the solutions of which the CRISALIDE project could be tested. Accordingly, for the city selection we defined nine criteria presented in the table below (tab.1).

Criteria	Relevance and Importance
Administrative status: urban okrug1, capital of the subject of the federation	A status of regional capital and urban okrug provides expanded power of city authorities, an expanded structure of local governments, active interaction of local and regional authorities, the implementation of interests of multiple governmental levels within a city, better representation in statistical databases, in the regional and federal strategic and program documents. Municipal planning is characterized by the presence of approved strategies, territorial planning documents, as well as detailed municipal programs, which makes it possible to get a solid vision of the future urban development

[1] According to the Federal Law #131-FZ of October 6, 2003 On General Principles of the Organization of Local Self-Government in the Russian Federation, as amended by the Federal Law #243-FZ of September 28, 2010

Criteria	Relevance and Importance
Population: more than 500 thousand inhabitants	High concentration of population and economic activities, high population density, buildings and infrastructure, the presence of important educational, scientific, social and administrative institutions, which allows to effectively develop horizontal links between local participants and introduce innovations. Possibility to expand the interaction at the inter-municipal level and to increase the efficiency of the implementation and dissemination of innovative solutions.
Diversified economy with a tendency of growth of the tertiary sector	Request for the transformations of urban areas and presence of potential stakeholders interested in such transformations. Interaction between enterprises of various industries and the activation of the synergic effect of their interaction.
Scientific potential	Involvement of local scientific experts at various stages of the project development and implementation leading to improvement of the quality of decisions made and an opportunity to receive expert assessment.
Positive dynamics of the construction industry	An active construction sector with high competition creates conditions for a variety of products and solutions in urban development. Companies representing the construction sector are among the key participants in the decision-making process for managing the urban environment.
Limited territorial resources for expansive development and internal transformation processes	The limitation in external territorial resources stimulates the search for solutions on the intensive use of urban areas, which is a key component of sustainable development. The presence of implemented redevelopment projects in the city provides the accumulated positive and negative experiences, as well as various management and interaction schemes, the rethinking of which will become the basis for innovative decision-making schemes of the proposed hardware-software complex.
Availability of internal territorial resources that can potentially be used for development	The city planning documentation should identify promising areas for redevelopment. The presence of such decisions in the documentation means the readiness of the local authorities to implement the concept of a “compact city”, as well as the existence of grounds for implementing policies in this direction.
Experience in the development of information systems to support urban management and planning	Experience in the development and implementation of projects, as well as the experience of cooperation of private development companies with government authorities and management allows involvement of representatives of government and business into the project development and implementation, which will further ensure the sustainability of the project.
Participation in federal programs related to priority projects in the field of urban development.	State investments nowadays play an important role in urban development in Russia, therefore, the active participation of the city in state development programs is a prerequisite for the successful implementation of the project, as well as its distribution in the future.

Table 1. Case Study Selection Criteria

In correspondence with the previously described criteria for the CRISALIDE project implementation, the city of Rostov-on-Don has been selected. The city is located in the south of the European part of Russia , being the capital of Rostov region, one of 85 Russian regions. With its population of 1,130,305 people[2], Rostov-on-Don is the 10th city out of 1,113 cities of the Russian Federation. Being an attractive growing pole, the city is characterized by the diversified economic structure with the current prevalence of the industrial production and dynamic development of the tertiary sector. There are 38 institutions of higher education and 40 scientific organizations including the Federal Research Center of the Southern Scientific Center of the Russian Academy of Sciences (FIC SSC RAS), where 400 researchers work (Investment Passport, 2018). The city continues its demographic growth and its housing construction sector expansion, represented by numerous competing companies that together build about 1,100 thousand sqm annually (Investment Passport, 2018). At the same time, Rostov-on-Don is limited in extensive development by its administrative borders and it's forced to seek internal resources for development, which are represented by numerous brownfield sites as a legacy of post-socialist transition and post-industrial development. Those sites are defined as priority areas for redevelopment and housing construction by the Rostov-on-Don General plan (2015) and its Strategy of socioeconomic development (2018), the main long-term municipal planning documents. Several projects of the former industrial areas' redevelopment have been already realized: e.g. the former tobacco factory transformed into the business center 'Tabachka' or a part of the helicopter plant's industrial site Rostvertol, transformed into a business and exhibition center. Rostov actively participates in all national programs and projects. In 2018, the city became one of 36 pilot cities, in the priority project "Smart City". The need for the implementation of intellectual (IQ) solutions in the housing sector of the city of Rostov-on-Don is also stated by the Strategy of the City's Socio-Economic Development (2018), as a measure to reduce the cost of utility resources, improve the safety and quality of housing and communal services, and also to optimize the process of controlling and monitoring the consumption of resources through Internet services.

3.3. A site for experimentation

The site for implementation was selected together with the local administration among several former industrial areas in Rostov-on-Don. It is recommended for redevelopment by the Strategy of Socioeconomic development and attracts high investors' interests. The choice was due to the value of such a significant territorial resource for the development of the city, great prospects for the application of innovative methods and technologies in planning the development of this territory and its development, the potential for creating a high-quality urban environment, creating opportunities for innovative economic development, forming a positive image of the city and attracting investments .Moreover, the large area of the site (about 350 ha) involves a long-term phased implementation of the project.

[2] Federal State Statistic Service (Rosstat), 01.01.2019. http://www.gks.ru/

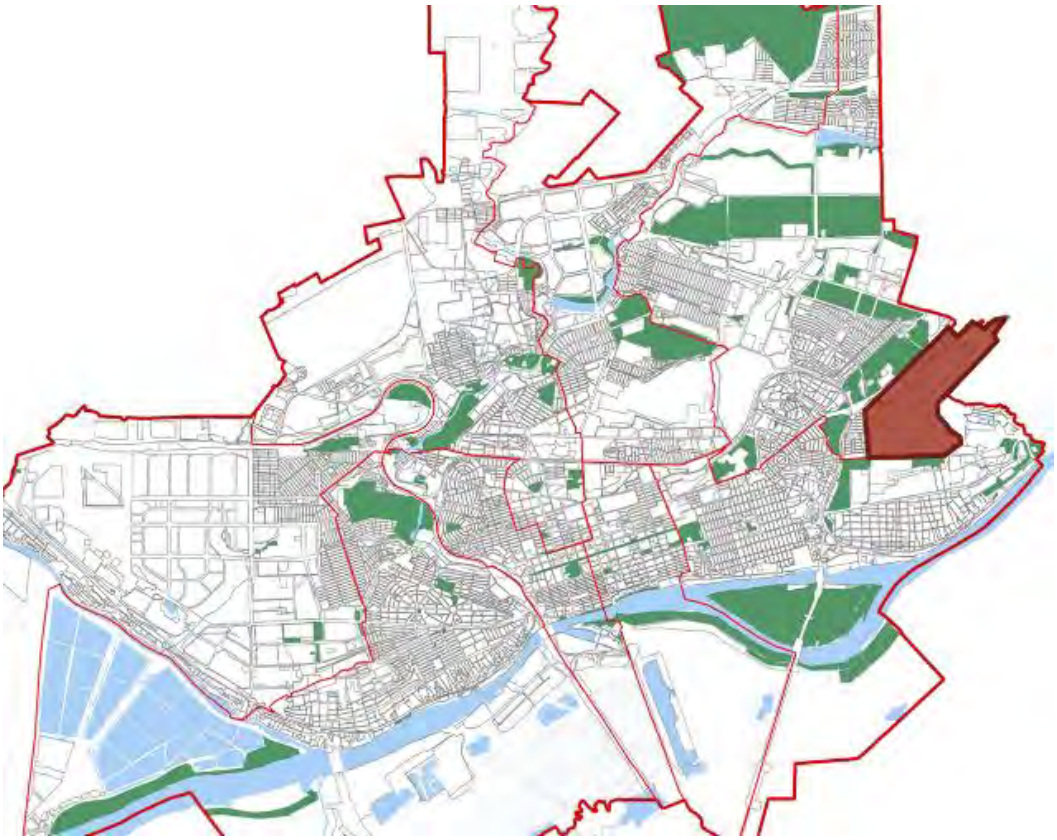


Figure 3 Location of the old airport area and intervention area (old airport) in Rostov on Don

The area of the former airport 'Rostov-on-Don' is located in the eastern part of the city in nine kilometres from the city center, in the Pervomaysky administrative district. The airport stopped its operation in December 2017, when the new international airport was opened - Platov International Airport. In the local planning documents, the old airport's territory was considered as an internal spatial resource for development years before the actual realization. Thus, the city General plan approved in 2015 proposed the construction of 1,596 thousand square meters of housing within the plot of 267 ha until 2035. After the new airport construction, the local authority started to promote the area for redevelopment and several projects have been done, one of which was presented at the Russian Investment Forum in Sochi in 2018. The site is located in the peripheral part of the city, but at the same time in the centre of Rostov-on-Don metropolitan area (named 'Big Rostov') that consists of eight cities and a number of rural settlements and whose population number is estimated at about 2.2 million people. The site is surrounded by the important areas of commercial activities of regional significance: the regional markets and shopping malls with such actors as IKEA or Auchan are operating here. The transport axis on which the site is located, links the city center with the new airport and the very important federal road M4 Don, which connects the national capital Moscow with the Black Sea coast and countries of the Caucasian region.

Conclusions

The CRISALIDE project heralds a way of working on the cities that is very distant from the ordinary practices operated in Russia. The CRISALIDE methodology builds the solutions from

the bottom, works with the stakeholders in identifying the problems to be faced and defines the figure of the planner as that of a mediator and facilitator of complex processes. A methodology that has no a priori solutions, which does not have the innovation package ready to be sold and applied top down.

The CRISALIDE project being oriented to the development of a digital innovative platform, creates an opportunity to introduce social and organizational innovations in urban planning through participatory bottom up approach. The digital dimension is an arrival point of a real participatory planning process. The platform, as a tool that facilitates balanced planning and as a tool that facilitates sustainable decision-making, is born of an advanced dialogic context (IDMS, Innovative Decision Making Scheme). Reducing the complexity of a complex process to an IT tool means losing many nuances, but the advantage of the digital tool (IDMT) is to focus on the essential elements of the planning process, in terms of urban functions and related indicators.

The first results gained from the series of public discussions and CRISALIDE events demonstrated agreement between most local experts on necessity to transform outdated approaches to planning and construction in contemporary Russia. The public opinion demonstrated the need to have an experimental platform for the introduction of new planning methods and practices, advanced construction technologies, organization and management of the urban environment, taking into account such modern challenges as climate change, environmental pollution, demographic problems, socio-economic stratification of society and the rapid development of new technologies. Avoiding the construction of commercial housing, the formation of high-comfort public spaces, the introduction of new forms of mobility and environmentally friendly technologies, the creation of conditions for maintaining the health of the population, the realization of its creative and intellectual potential, the activation of innovative forms of economies. To achieve this, CRISALIDE defined the urban functions listed above in chapter 1.3 as the starting point. For this reason the experimentation underway in Rostov-on-Don, in the area of the old airport, is defining interesting ideas, but also opening up conflicts on the different ways of approaching the problem, on the scale of transformations, on the different way of relating to the use of environmental resources or conceiving innovation in design and use of public space and services. However, in this way, the development of a prototype IDMT in the field of urban planning, based on a real case, is not only the possibility of creating an innovative software and hardware complex for Rostov on Don that meets the principles of the Smart City Concept, but also a real chance to launch socio-cultural and organizational innovations in planning that could be upscaled both in EU member states and in Russian Federation. Finally and definitely, the involvement of pro-active human capital (people, researchers, private actors, administrators…) and scientific potential of the city (university and enterprises…) in the innovation process and experimental activity will contribute to the formation of new products and businesses in the ‘smart city’ sphere, which will strengthen the economic position of Rostov-on-Don and create conditions for the development of new niches of economic activity, especially related to creation of a local new economy building upon the connection Economy of Knowledge <-> Quality of Life <-> Start-ups creation facilitation <-> Sustainable use of Resources.

4. Acknowledgements

This paper is based on the project "CRISALIDE: City Replicable and Integrated Smart Actions Leading Innovation to Develop Urban Economies", the winner of a joint Russian-European competition of innovative projects under the ERA.NET-RUS PLUS program (project no.42016, application ERA-RUS-4188).

The implementation of the CRISALIDE innovative project is funded by the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI), Romania [grant number CTR 69/2018]; the Foundation for Assistance to Small Innovative Enterprises in Science and Technology (FASIE), Russia [grant number 395ГР/42016].

5. References

Batunova, Elena; Trukhachev, Sergey (2019). "Searching for smart solutions in urban development beyond the political slogans: a case of Rostov-on-Don, Southern Russia". REAL CORP conference proceedings, ISSN 2521-3938. Available at https://archive.corp.at/cdrom2019/papers2019/CORP2019_121.pdf

Benson John; Roe Maggie (2007). Landscape and sustainability. Second edition. Routledge Taylor & Francis Group, London and New York.

Bertaud, Alain, & Renaud, Bertrand. (1997). Socialist Cities without Land Markets. Journal of Urban Economics, 41(1), 137–151. doi:10.1006/juec.1996.1097

Bisello, Adriano; Elisei, Pietro; Stephens, Richard; Vettorato, Daniele; Smart and Sustainable Planning for Cities and Regions. Springer, 2015.

Dakin, Andrew; Burgess, Kyle; & Adamson, Dave. (2012). CREW Discussion Paper 1: Targeting Area-based Regeneration: Methods and Issues. Available at: http://regenwales.org/resource_5_CREW-Discussion-Paper-1--Targeting-Area-based-Regeneration---Methods-and-Issues-

Davoudi, Simin. (2006): Territorial Cohesion, European social model and spatial policy research, in A. Faludi (ed.) Territorial cohesion and European model of society. Cambridge, Mass: The Lincoln Institute for Land Policy.

Dezhina (2011), "Policy framework for innovation in Russia", EBRD, mimeo

Elisei, Pietro; Leopa, Sabina; Drăghia, Miruna (2018). Territorial Attractiveness Monitoring Platform. A Handbook for Policy Planners, Bucharest. Available at: http://www.interreg-danube.eu/uploads/media/approved_project_output/0001/25/064d81849140676a3f2a51001d860b3d710abbd3.pdf

Elisei, Pietro (2014); Strategic Territorial Agendas for small and middle sized towns and urban systems, https://issuu.com/sabinadimitriu/docs/status-book_final_web

ERA.Net RUS Plus, https://www.eranet-rus.eu/index.php, accessible on July 2019

Hall, Peter (1998), Cities in Civilization

Harfst, Jan. (2006). A Practitioner's Guide to Area-Based Development Programming, UNDP Regional Bureau for Europe & CIS. Available at: https://www.undp.org/content/dam/undp/library/corporate/speakercorner/a-practitioner-guide-to-area-based-development-programming.pdf

Healey, Patsy (1997). Collaborative planning: Shaping places in fragmented societies. Houndsmills, England: Macmillan. Available at: https://books.google.pl/books?id=xkxdDwAAQBAJ&lpg=PR10&ots=qS1K28MKIg&dq=Healey%2C%20P.%20(1997).%20Collaborative%20planning%3A%20Shaping%20places%20in%20fragmented%20societies.%20Houndmills%2C%20England%3A%20Macmillan&lr&hl=ro&pg=PA297#v=onepage&q=challenge&f=false

Investment passport of Rostov-on-Don (2018). Rostov-on-Don City Administration. Available at: http://investrostov.ru/pages/investytsyonnyi-pasport-goroda

Koshkin, Pavel (2015), Turning Russia into an innovative country is still a challenge

Meyer, Peter B. 1998. Accounting for Differential Neighborhood Economic Development Impacts in Site-Specific or Area-Based Approaches to Urban Brownfield Regeneration. Working Paper. Center for Environmental Management, University of Louisville, Louisville, KY, 15 pp. Available at: https://www.researchgate.net/publication/251169893_Accounting_for_Differential_Neighborhood_Economic_Development_Impacts_in_Site-Specific_or_Area-Based_Approaches_to_Urban_Brownfield_Regeneration (accessed May 28, 2019)

OECD (2011), Review of Innovation Policy: Russian Federation, Paris.

Science for Environment Policy: Brownfield Regeneration (2013). Thematic Issue 39. European Commission's Directorate-General Environment, Science Communication Unit - University of the West of England (UWE) Bristol

Stanilov, Kiril (Ed.) (2007). The Post-Socialist City: Urban Form and Space Transformations in Central and Eastern Europe after Socialism. Springer Netherlands

Stelzlea, Benjamin; Noenniga Jörg R. (2017). A Database for Participation Methods in Urban Development. International Conference on Knowledge Based and Intelligent Information and Engineering Systems, Marseille, France, Elsevier B.V. Available at: https://www.researchgate.net/profile/Benjamin_Stelzle/publication/319445455_A_Database_for_Participation_Methods_in_Urban_Development/links/5a90159645851535bcd476f1/A-Database-for-Participation-Methods-in-Urban-Development.pdf

State of the Innovation Union (2015), https://publications.europa.eu/en/publication-detail/-/publication/0487b7b9-b5d6-11e5-8d3c-01aa75ed71a1/language-en/format-PDF , accessible on July 2019

UN, World Urbanization Prospects: The 2018 Revision. 2017, Insider's guide to Russian high-tech hubs, http://www.russia-direct.org/catalog/archive/russia-direct-report-insiders-guide-russian-high-tech-hubs

World Bank (2011), Reliving the Sputnik Moment: Innovation Strategies for the Post-Transition Economies, Washington, D.C

Research Paper

Research of Traditional Village Conservation and Development Planning in the Perspective of "Multiple-planning"

Taking Liugou Village in Beijing as an Example

Zhengkun GAN, Beijing University of Civil Engineering and Architecture; China
Lingege LONG, Beijing University of Civil Engineering and Architecture; China
Dayu ZHANG, Beijing University of Civil Engineering and Architecture; China

Abstract

As a primary material carrier of Chinese farming civilization, traditional villages have the dual attributes of villages and heritage. The traditional village cannot be regenerated if they were destroyed. Therefore, it is urgent to find a suitable development model and way out in the context of high-speed urbanization. The proper planning of traditional villages mainly covers two aspects of protection and development for a long time. The preparation and management of various types of planning are also intertwined and even contradictory. "Multiple-planning" is an effective way to solve the conflicts between different administrative departments and different types of planning in the current planning process, and also provides a practical planning idea and method for the future of traditional villages. Firstly, the research analyzes the existing planning types of traditional villages and points out that because of the difference of objectives, strategies, and executives, there come three common problems: The protection measures are not easy to implement; The development strategies are unsustainable; The planning and implementation are not connected. These problems directly affected the implementation of planning. They not only hinder the effective conservation of cultural heritage but also restrict the revitalization of the village's economic development. Furthermore, the research discusses the necessity and feasibility of "Multiple-planning" in the conservation and development of traditional villages and proposes a conservation and development planning framework for traditional villages from the perspective of "Multiple-planning." Finally, the research is taking a traditional village conservation and development planning of Liugou in Yanqing District of Beijing as an example. Accomplished valuable planning in the perspective of "Multiple-planning" through objective and systematic status analyzing, exceptional and feasible conservation planning, scientific and sustainable development planning.

Key words

Traditional villages, Conservation and development, Cultural heritage, Multiple-planning

Introduction

Traditional villages, as primary material carriers of China's farming civilization, cannot be regenerated once destroyed. In the era of high-speed urbanization, it is urgent to find a

suitable development model and way out. For a long time, the proper planning of traditional villages mainly covers two aspects of protection and development. The preparation and management of various types of planning are also intertwined and even contradictory. "Multiple-planning" is an effective way to solve the conflicts between different administrative departments and different types of planning in the current planning process and provides a practical planning idea and method for the future of traditional villages. Governments and planners should face many shortcomings in their past work and actively explore to find a scientific and practical way for the planning and construction of traditional villages, keep rural memories and valuable village cultural heritage for future generations.

1 Compilation Model of Relevant Planning for Traditional Chinese Villages

There are many types of planning for traditional Chinese villages. They can be divided into three classes from the purpose of preparation, promotion planning for people's livelihood, industrial development planning, conservation, and remediation planning. Each broad category contains several small planning types (Table 1).

Planning Type	Planning Title	Planning Purposes	Planning Object	Executive Body	Planning Points
Promotion Planning for People's Livelihood	New Rural Beautiful Village Planning	Improving the Quality of the Village	Villages, Buildings	Government	Taking policy as the guidance, improving the basic conditions of village in an all-round way
	Village Environmental Improvement Planning	Improving Environmental Quality	Villages, Buildings	Government	Focusing on infrastructure upgrading
Industrial Development Planning	Tourism Planning	Developing Tourism Industry	Villages	Government, Enterprises, Villagers	Developing tourism resources and expanding village development Market
	Industrial Upgrading Planning	Promoting Economic Development	Industries	Government, Enterprises, Villagers	Build the core industry and enhance the economic strength of the village
Conservation and Remediation Planning	Cultural Relics Conservation Planning	Conserving Important Cultural Relics	Cultural relics Noumenon and Environment	Government	Conserving the core value of cultural heritage
	Conservation Planning of Famous Historical and Cultural Villages	Conserving Village Heritage	Villages, Buildings	Government, Villagers	Conserving the cultural heritage on a large scale
	Traditional Building Renovation Planning	Repairing Important Buildings	Buildings	Government, Villagers	Maintaining the buildings with high value
	Village Landscape Planning	Improving Landscape Quality	Village, Landscape	Government	Design a rural landscape with outstanding characteristics
	Traditional village Conservation and Development Planning	Conserving and Developing at the Same Time	Villages, Industries	Government, Enterprises, Villagers	Establishing archives, analyzing the current situation, conserving heritage, improving people's livelihood, and looking for the characteristics of village development

Table 1 Classification Comparison of Traditional Village Related Planning by Author

1.1 Promotion Planning for People's Livelihood

Objectively speaking, the promotion planning for people's livelihood is usually the most popular type of villagers. The typical representative of such a plan is the Beautiful Village Planning. The planning content does not involve the relocation of villages and the transfer of construction land, with emphasis on the rectification of the village landscape, the construction of infrastructure and public service facilities. Its purpose is to improve the living environment and production conditions through correction and finally promote economic development and social progress. Most of these planning is implemented in a top-down way, which usually ignoring the characteristics of specific villages. Project selection, site selection, and construction scale often do not meet the needs of village development, especially when it comes to heritage conservation and inheritance. It is easy to ignore the repair of traditional buildings and the preservation of classic features, thus resulting in the disappearance of traditional elements in the implementation of planning.

1.2 Industrial Development Planning

The starting point and foothold of industrial development planning are in the market expansion and industrial development of the village. Due to the hollowing and aging of the rural population, most of the traditional villages have a single industrial structure and a small development space. The positioning of the industry is mostly concentrated in the tourism of the tertiary industry. From the perspective of the development of international urbanization, when most people live in cities, rural pastoral scenery and traditional culture will become scarce resources, and the continuous appreciation will attract urban residents to come for sightseeing. Such planning often relies on the core values of traditional villages, led by the government and enterprises, and the villagers participate to a certain extent. However, because there is no sustainable integrated of material and non-material traditional cultural resources, once it is not operated correctly, it will bring irreparable damage to the village.

1.3 Conservation and Remediation Planning

The core of conservation and remediation planning is centered on how to protect the cultural heritage value of traditional villages. The means adopted are often rigid and have a significant positive effect on the conservation of villages in the short term. Due to the attention from the state, most villages in the list of National Traditional Villages have prepared conservation planning, and their control covers village space patterns, traditional buildings, historical relics, and environmental factors. Many of the conservation programs currently in place can technically protect historical buildings and ancient villages as well as intangible cultural heritage. However, how to meet the needs of the residents' living modernization while conservation is a problem that has not been completely solved. For this reason, the state began to require traditional villages to prepare conservation and development planning to handle the relationship between conservation and development.

2 Common Problems in the Planning of Chinese Traditional Villages

Since the objectives, strategies, and executive bodies of traditional village-related planning are different, the following three types of problems have arisen. They directly affected the implementation of the planning and even hindered the effective conservation of cultural heritage. This is also the contradiction that the "Multiple-planning" should strive to improve.

2.1 Conservation Measures are Single and Difficult to Implement

In the conservation-based traditional village planning, the conserving strategy often only pays attention to the object ontology, neglects many objective laws of the village development, and then leads to an inefficiency implementation. In China's urban and rural planning system, the planning and construction of general villages and towns are managed by the Ministry of Natural Resources, the material cultural heritage is governed by the National Cultural Heritage Administration, and the intangible cultural heritage is managed by the Ministry of Culture and Tourism. Traditional villages have a particular cultural status of tangible and intangible cultural heritage, lacking guidance, and coordinating from higher levels of government. For example, because the reduction of construction land can effectively control the population size and alleviate urban diseases, land supply policy in China is generally decreasing. When protecting critical cultural relics units, it is often necessary to vacate some buildings within the scope of conservation, but there is no reasonable area for subsequent resettlement planning. If the conservation and development planning does not combine the land use superior planning, it will not be able to create enough circulation space for conservation. The conservation will eventually not be implemented.

2.2 Development Strategy Is Not Sustainable

With the acceleration of urbanization, traditional villages continue to suffer from "constructive, developmental, and tourism" damages. The relevant planning does not control development in appropriate measures is the root of the problem. Some local governments have neglected the environmental capacity of traditional villages and just compiled industrial planning that caters to the needs of society. Coupled with the spontaneous and decentralized management of the villagers, there has been a severe homogenized phenomenon in the type of industry and structure of the function. The value of "characteristic" in rural areas has not been reflected. Such extensive development strategies continue to impact and erode an accelerated decline of traditional villages.

2.3 Lack of Convergence between Planning and Implementation

The planning implementation of traditional villages is different from another general village planning. The general village planning is characterized by focusing only on the recent construction task, the improvement of infrastructure, and environmental remediation. The planning of traditional villages should pay more attention to the conservation of historical environmental elements and traditional features, which also puts higher requirements on implementation. The reality is that the township-level government, as the main body of the application, lacks professional planning management and supervision and evaluation, and often focuses on project thinking, focusing only on the specific projects in process. There is no macroscopic and systematic overall development thinking, which inability leads to integrate the actual construction of the traditional villages with the planning. As the person in charge of the planning and preparation, the planner only completed the preliminary design work, lacked two-way communication with the villagers, and rarely played the role of dynamic adjustment and feedback during the implementation process. The participation of the villagers as an object of implementation is not high, the information is also asymmetrical, and the acquisition sense of villagers is low, too. In summary, planning is only meaningful if it

plays a role in the process of practice. This is also the key to whether planning can exist and be implemented under the market economic system.

3 The Necessity and Feasibility of "Multiple-planning" in the Development of Traditional Village Conservation

3.1 Necessity

From the international cognition process of heritage conservation, ICOMOS adopted the " The Valletta Principles for the Safeguarding and Management of Historic Cities, Towns and Urban Areas " at the 17th General Assembly in November 2011. It was in a time which politic, economic, culture, and social realm are facing a period of significant change, and it is the necessary revision of the Washington Charter. It proposes that the values of historic towns and their backgrounds should be protected and have integration with the social, cultural, and economic life of our time. It is not difficult to see from the Valletta Principles that in the context of sustainable development over the world, to better conserving the material and intangible historical values of traditional villages, action should be strictly linked to economic and social development. To improve the quality of the environment and life, we must make good use of the "Multiple-planning" model.

Judging from the current situation of the conservation and development of Chinese villages, we are also facing a very severe test. As summarized in the previous article, merely thinking about the future of the village from the safeguarding level is not even keep up with the pace of the times, and it is impossible to restore the decline of the village substantially. At the same time, the previous model faced conflicts between the various departments. The "Multiple-planning" approach is used to coordinate the value orientation of the ideological level, coordinate the planning of the technical method level, and coordinate with the main body of the implementation level. It can provide new ideas for the implementation of traditional village conservation and development. So far, several provinces have issued proposals to strengthen the protection of traditional villages and proposed to prepare of the village "Multiple-planning scientifically."

Also, the state has proposed to adopt the "One Blueprint Strategy" to optimize the urban spatial layout for the new urbanization construction many years ago and promote the "Multiple-planning" used in economic and social development master planning, urban planning and land use planning. This not only provides a clear demonstration of the "Multiple-planning" of the traditional village planning but also emphasizes the necessity of "Multiple-planning" in the future planning of traditional villages from the national level.

3.2 Feasibility

Since 2014, the four ministries and commissions jointly issued the "Notice on Carrying Out the Pilot Work on Multiple-planning in Cities and Counties." Twenty-eight cities and counties across the state have launched the "Multiple-planning" exploration work. Many successful explorations at the town level have provided valuable references for the current "Multiple-planning" transformation of traditional villages, significantly increased confidence.

The sustainable development of traditional villages has also received considerable attention from the Ministry of Housing and Urban-Rural Development. In the basic requirements for

the preparation of the traditional village conservation and development planning (Trial) issued in 2013, it is clearly stated that the conservation and development planning should be formulated, and it is necessary to adhere to the principle of conservation, taking into account development, respecting tradition and living heritage, and conforming to the laws of reality and farmers. The requirements focus on scientific decision-making with multi-disciplinary integration and solicit opinions from the government, experts, and villagers to improve the practicality and quality of planning. Based on satisfying this requirement, the villages meet conditions should further expand the content and depth of the deepening planning according to the actual needs of the village and the circumstances of economic development. This requirement integrates the traditional village planning work, which previously separated from conservation and development. It also integrates the urban and rural planning law, the cultural relics conservation law, the village and town construction management regulations, and other relevant regulations — this laying a sound system for the adaptation of traditional villages to a new era. At the same time, planning of conservation and development and form of project demanding have become a necessary condition for the declaration of the list of traditional Chinese villages and have also created a favorable political environment for the "Multiple-planning" of traditional villages.

3.3 Traditional Village Conservation and Development Planning Framework from the Perspective of "Multiple-planning"

The traditional village conservation and development planning from the perspective of "Multiple-planning" should combine the long-term overall structure with the implementation of recent projects. Seeking to improve the village's long-term development confidence while enhancing the villagers' current sense of acquisition. The planning content needs to fully consider factors such as building style, land use, infrastructure, landscape, street, and industry. The planning content of conservation and development should be coordinated, and the characterization of rural areas needs to be tapped. We must change the pursuit of a single economic value that will make traditional villages a capable carrier of the circular economy. The planning also needs to build a coordination platform for the government, planners, and villagers, strengthen cooperation means at the implementation level and establish a system of responsible planners. Long-term two-way supervision and control should be carried out to implement the planning content and control the quality of each construction project.

4 Preparation of Traditional Village Conservation and Development Planning in Liugou Village, Yanqing District, Beijing

Liugou Village is a well-known rural tourist destination in Beijing north area. The ancient castle in Liugou is formerly known as "Phoenix Castle," which is an important military castle along the Great Wall with a profound cultural connotation. The preparation of the traditional village conservation and development planning fully exploits the advantages of the "Multiple-planning" perspective. The planning systematically and comprehensively integrates the heritage conserving, industrial upgrading, environmental remediation, aiming at promoting the coordinated development of conservation and construction and grasping the new opportunities created by the International Horticultural Exposition and the Winter

Olympics 2022. It is carrying out a tourism quality transformation core on the safeguarding of Liugou ancient castle.

4.1 Analyzing Present Situation with Objective System

Liugou Village is located in the middle of Jingzhuang Town, Yanqing District, with Jiulong Mountain in the west and Yanyu Mountain in the east. Liugou ancient Castle was built in the Ming Dynasty (1551). It is also known as the Phoenix Ancient Castle because it resembles a phoenix that spreads its wings. Its city wall system is a National-Level Cultural Relics Preservation Unit. The nature of the current land within the scope of planning is mainly for construction and agriculture. The village's texture is basically in line with the traditional characteristics which the courtyard is dominated by the Triad Courtyard, and the preserved Quadrangle is less. The road grades in the village are divided into three levels: Main Street, Secondary Street, and House Front Road. The roads in the village are hardened with concrete which does not conform to traditional practices. There are three types of public spaces: squares, nodes, and front houses. The landscape of Liugou Village is generally good, with two listed ancient trees.

One of the most critical aspects of the analysis is the delineation of preservation objects. The principal preservation of heritage objects in Liugou Village is (Figure 1): ground ruins of the earthen Great Wall (National-Level Cultural Relics Preservation Unit) and the Ancient Castle Wall and Gate (as an essential part of the Great Wall defense system, National-Level Cultural Relics Preservation Unit), Chenghuang Temple (District-Level Cultural Relics Preservation Unit), the Ruins of General's Residence, Supply and Marketing Cooperatives (Modern Heritage). Among them, the North Gate and Barbican Entrance have been repaired and preserved in good condition; the Chenghuang Temple and the Supply and Marketing Cooperatives are generally in a reasonable situation. The earthen Great Wall, the Ruins of General's Residence and the rest of the City Walls have been in disrepair for a long time, and

Figure 1 Main preservation heritage objects in Liugou Village by Planning Team

they have suffered severe human-made and natural damage.

The building of Liugou Village is mainly composed of single-story and scattered two-story houses. Due to the long-term disorderly development, many buildings were spontaneously transformed into tofu banquet farmhouses by the villagers, resulting in a severely damaged traditional style (Figure 2). Therefore, the overall appearance of the streets and lanes formed by the building is worrying. Most of the dwelling façades are modified in a vulgar modern style. The walls are painted with white coating or grey cement, some air conditioners and pipelines are exposed, and the billboards are bright and rough (Figure 3). The infrastructure conditions of the village are also relatively backward, lacking basic management and maintenance, especially the insufficient carrying capacity of the drainage pipeline, no separation of rain and sewage, water accumulation will happen during heavy rainfall.

Figure 2 Architectural style evaluation by Planning Team

Throughout the current situation of Liugou Village, it has a specific tourism industry foundation with earthen Great Wall, Ancient Castle, Revolution Culture, Intangible Cultural Resources, Convenient Transportation, and Natural Resources. However, the lack of effective preservation of the wall heritage, the lack of reasonable strategies for cultural exploitation, the weak infrastructure, and the poor village environment have caused the village development hardly to move forward. Therefore, it is necessary to take advantage of the construction of the Great Wall Cultural Belt, the 2019 World Horticultural Exposition, and the 2022 Winter Olympic Games, change the development model of the individual catering and lodging economy, break through the bottleneck and gain new future.

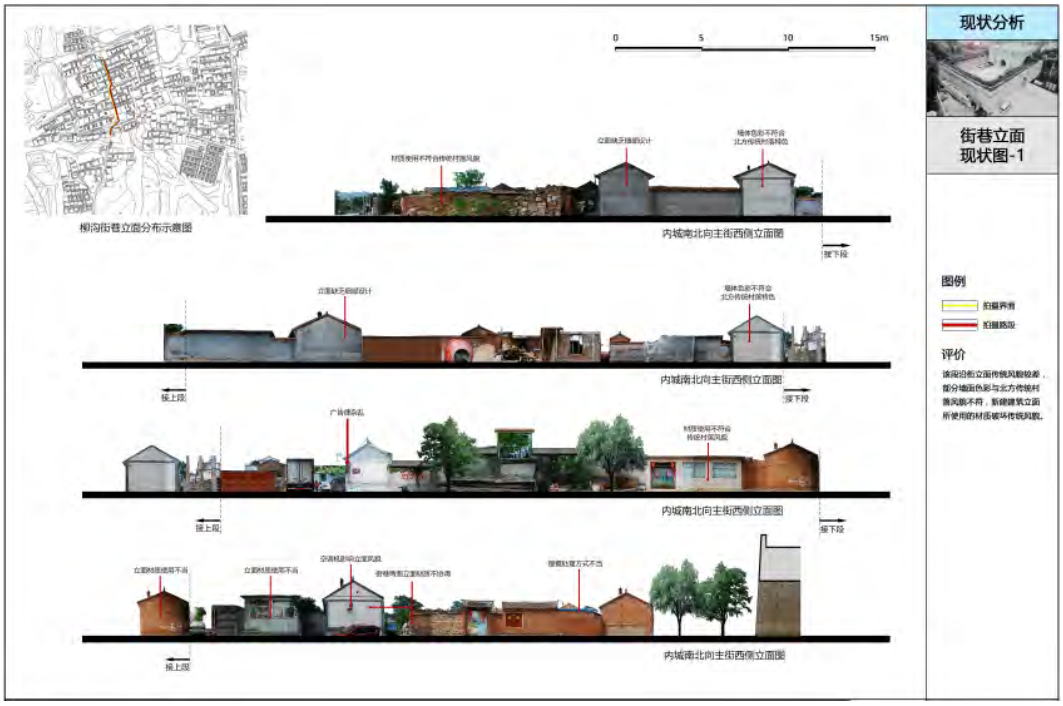


Figure 3 Lane facade status by Planning Team

4.2 Fine and Feasible Conservation Planning

The southwest of Liugou Village Castle connects with the earthen Great Wall; therefore, preserving the Great Wall is the most important principle. Delimiting conservation boundary and construction control zone should also include compliance with the following principles: preserving complete village traditional pattern, keep historical style continuous and cultural relics are authentic.

There is no detail delineated about conservation boundary of Liugou Ancient City in upper-level planning "Great Wall Preservation Scope and Construction Control Zone." This upper-level planning only indicated that 500 meters on both sides of the wall of the Great Wall are the scope of preservation, and 500-3000 meters is the level I construction control zone. Theses cannot solve the practical problems faced nowadays and difficult to guide the future development of the village. Therefore, conservation and development planning of Liugou Village combined upper-level planning regulation with the actual construction condition of the village, put forward specific construction control requirements for non-built areas and built-up areas. Non-built-up areas within the scope of preservation: only greening and fire-fighting passages shall be carried out, and no buildings or above-ground structure could be built. The built-up area within the scope of preservation (Ancient City and surrounding areas): The ancient city and surrounding built-up areas are reserved single-story buildings. The existing buildings in the zone should be maintained in the traditional style. And buildings are not allowed to be rebuilt or added without approval by planning. The ones that have a greater impact on the ancient city are recommended to be retired or demolished. (Figure 4). Peripheral control area: there is a certain distance from the ancient city. It is not allowed to build more than two floors buildings in this area. The height of the building's cornice is no more than 7.2 meters, and rest requirements are the same as the first two areas.

The conservation measures are carried out one by one around the object of preservation, the texture of the village, the characteristic space, the streets, and the buildings. Aiming at the different status quo of the heritage, the planning adopted several technical measures such as cleaning, repairing, and reinforcement, and dismantled all kinds of building or facilities which harm to the heritage. The preservation measures of village texture are divided into three types: control and conservation, carding and repairing, regenerating, and restoration. Control and conservation refer to the preservation of areas with better status quo. Carding and repairing refer to repairing the texture of the area where the current texture is poor. Regenerating and restoration refer to rebuilt to restore the texture were seriously damaged. Establish a three-level feature space system of points, lines, and surfaces. I am using the east-west and the north-south direction main street of the ancient city to form a linear characteristic space skeleton and connect characteristic space nodes such as a village entrance, Chenghuang Temple, green parks.

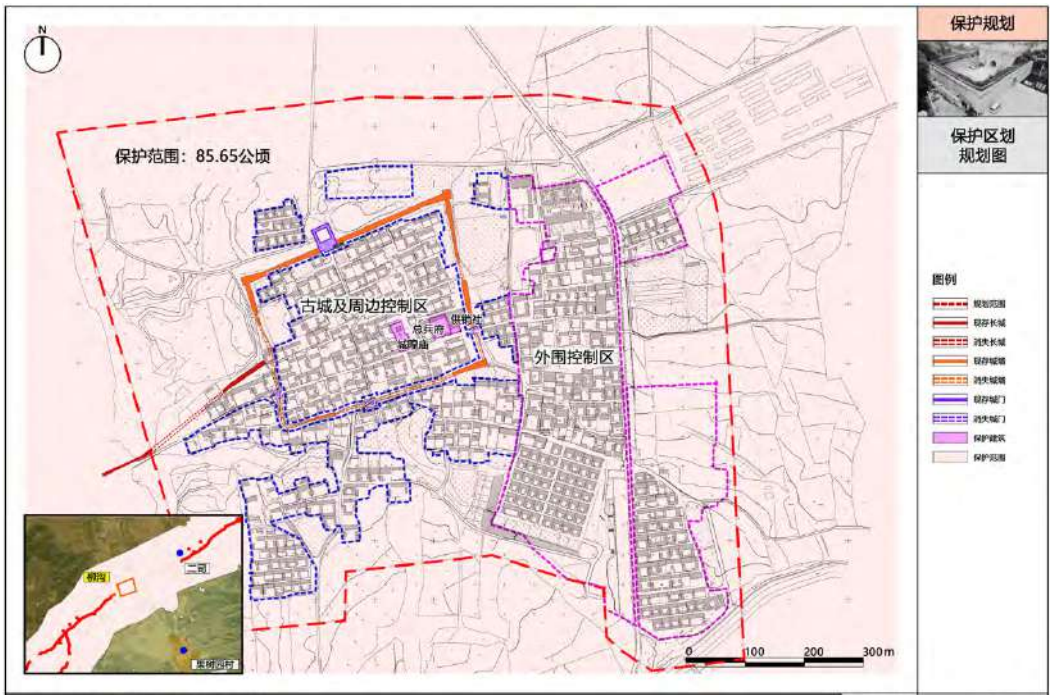


Figure 4 Preservation Zoning by Planning Team

The rectification of the streets and lanes is a key content that Liugou Village needs to focus on, mainly including the two dimensions (Paving and facade). The main street should be changed from cement hardened road surface to tile floor. The pavement should be changed to stone paving or smaller floor tiles in the secondary street and the housing front road. The modern style of doors and windows along the street can be modified according to the traditional style library provided by the planning, and the concrete wall and red brick wall can change into gray brick walls under suitable opportunities. It is necessary to uniformly manage billboards for street-facing shops, to make concealed air conditioners and pipelines outside the building, and to set up green areas along the wall in suitable conditions (Figure 5).

Due to the lack of style management and misunderstanding of the historical environment for years, many buildings to be decorated. It is necessary to control the color of the building in a

warm gray system and use the appropriate building materials recommended in the planning. For dozens of buildings that are within the scope of preservation and hurt heritage, it is recommended to gradually retreat to the demolition and resettlement residential areas that use the newly constructed construction land in the eastern part of the village.

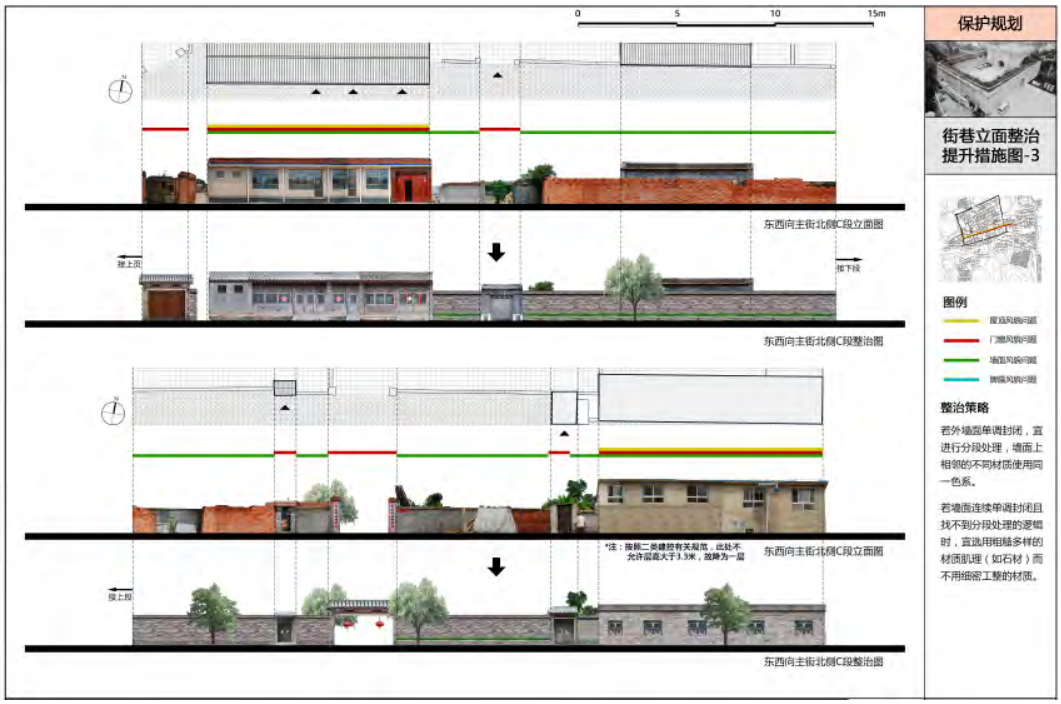


Figure 5 Renovation measures of street façade by Planning Team

4.3 Scientific and Sustainable Development Planning

Compared with other traditional villages with heritage preservation as the primary target, how to develop and upgrade through conservation strategy is the challenge of Liugou Village. Based on in-depth field research, the planning team careful study various related planning, communicate with locals for many times, and have found a clear development orientation for Liugou Village: 1) Vigorously exploring the precious historical and cultural resources of Ancient City, tightly integrate the construction of the Great Wall cultural belt, and create a model for the use of the culture of the city. 2) Using its own and surrounding natural resources, fully integrate and develop particular industries and individual activities to build a famous rural tourism destination in the suburbs of Beijing. 3) Preparing effectively support to the 2019 World Horticultural Exposition and the 2022 Winter Olympics affiliated tourism industry.

The development part of planning creates a general special develop structure of "One Castle, Two Wings, One Belt" which consisted of Liugou Ancient Castle, Jiulong Mountain Sports, and Leisure Park – Yanyu Mountain Forest Park, and Great Wall Cultural Belt (Figure 6). Formulating long-term land use strategies, especially refining the small categories in the Type V village construction land, balance the demolition and construction needs with new construction land supply and increasing the proportion of Type V12 mixed-use residential land to provide support for villagers' business operations.

I am using the cross-shaped main streets of the ancient city to create a skeleton commercial tourism axis and cultural experience axis and at the same time, arranging the tofu experience zone, the traditional Chinese medicine zone, the characteristic commercial zone, the residential zone, and the cultural experience zone throughout the whole village and utilizing excellent natural and historical resources to improve environmental quality and create landscapes and public spaces with local characteristics.

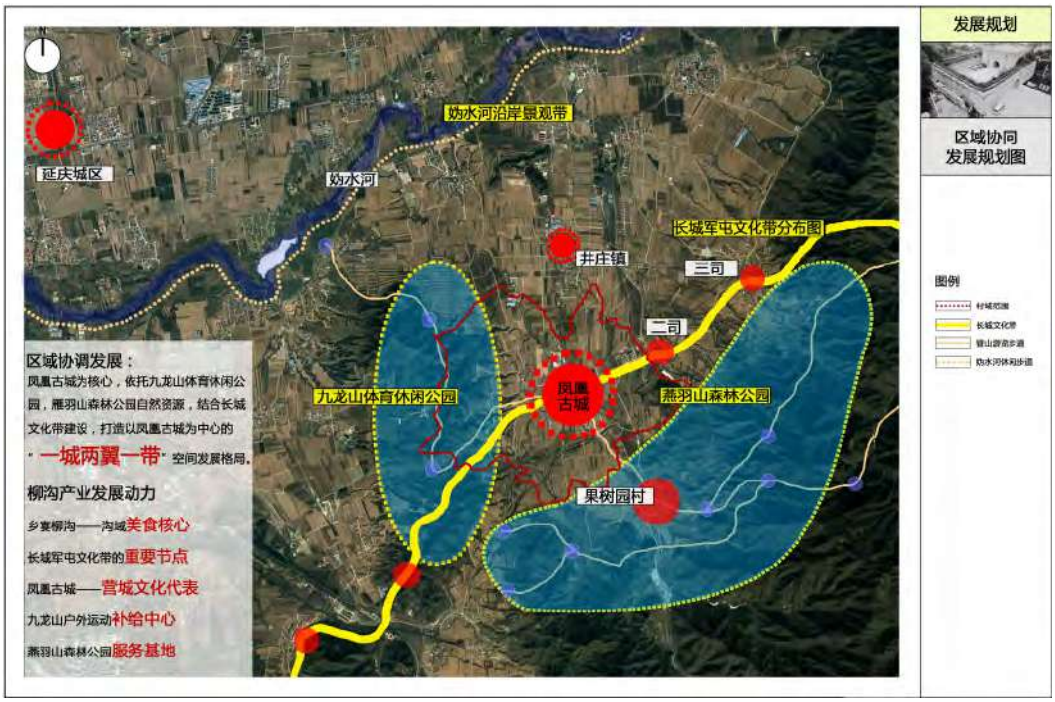


Figure 6 Regional coordinated development planning by Planning Team

The planning will vigorously strengthen the tourism-oriented tertiary industry and expand tourism, including the Great Wall City Tourism, Red Culture Tourism, Folklore Tourism, Agricultural Tourism, and Ecological Agricultural Products Experience. Building a new tour industry structure of Tour (ancient city), Eating (specialty food), Living (high-end B&B), and Purchasing (country specialties), guiding the development of the village from quantitative change to qualitative change. A variety of tourist routes are set up for different cultural landscape nodes, and a guided navigation system with clear levels guides the tourists. Based on conservation and restoration, planning will make rational use of the heritage such as the earthen Great Wall, the ancient city wall and the Chenghuang Temple, so that the value of the heritage can be fully demonstrated in the new era.

At the implementing level, the planning also fully designed the feature space for transformation and utilization, and drafted renovation promotion strategy for typical courtyards (Figure 7). These specific design schemes adopt the typology method, which provides a reference for the future regeneration practice of Liugou Village, such as architectural styles, proportions, materials, colors, and formats. Furthermore, the planning also develops different strategies to meets development needs in terms of safety and disaster prevention, water supply and drainage, power, and gas.

The planning period of the Liugou traditional village conservation and development planning is consistent with the new master plan of Beijing (2016-2035), which is divided into three stages: short term, medium term, and long term. In the coming five years, planning will mainly implement projects that are urgently needed for the development and strengthened the preservation of the ancient city walls. In the eight years of the medium term, planning will gradually improve the overall industrial layout of and tourist facilities of the whole village. In the long-term five years, planning will archive the layout of "One Castle and Two wings" to connect surrounding areas, form a tourism industry development economic belt centered on Liugou Village, and finally realize all the planning goals.

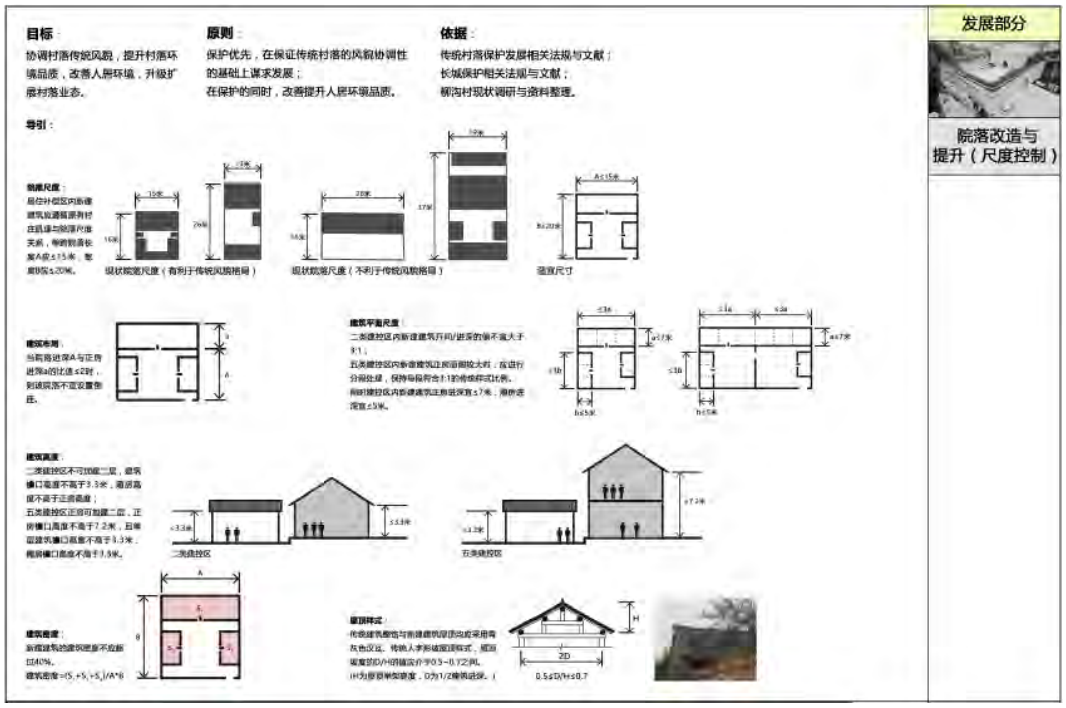


Figure 7 Guideline for courtyard promotion by Planning Team

5 Conclusion

The conservation and development of traditional villages rely on scientific planning to guide, and scientific planning needs constant exploring of new methods from more reasonable and effective perspectives. In the face of the accelerating urbanization process and the unsuccessful rural decay, the planning of traditional villages must adopt a "Multiple-planning" approach. Putting different levels, different goals, and various implementation subjects together through "One Blueprint." At the same time, planning needs to connect the implementing projects that putting the future vision nowadays practice on the same track. These will ensure that the conservation and development planning of traditional villages can play a crucial role in the revitalization of traditional cultural and local economic. As the main responsible person for planning, the government and planners should unify their thinking and act in unison. Continuous supervision of implementation, management of planning, and enthusiasm for public participation will provide diverse and reliable intellectual support for planning.

References

[1] Qiu, Baoxing (2015) "The role of government in conserving traditional villages", China Famous City, Vol.3.

[2] Liu, Ziyi (2016) 2016 China Urban Planning Annual Meeting Paper Collection, Some Thoughts on the Planning Strategy of Traditional Villages in Beijing in the New Period, Beijing, China Urban Planning Association.

[3] Zhu, Chunmin; Zhang, Lianchun; Shan, Zhuoran; Wu, Bihu (2013) "The Construction of Theoretical System of China's Collaborative Planning in the New Era," Planner, Vol.29 (December).

[4] Li, Qiong; Lai, Xuemei (2015) "The Application of Anti-Planning Theory in "Multiple-planning", Contemporary Economy, Vol.15.

[5] Gan, Siyan (2017) "Protection and Development Planning of Traditional Villages——Taking Haidian Village of Shangri-La as an Example," Modern Horticulture, Vol.23.

[6] Ding, Zhicai (2017) "Analysis on the Development of Traditional Village Culture under the Five Development Concepts——Taking the Village of Yongmei as an Example", Ningxia Social Sciences, Vol.6.

[7] He, Yunhua (2017) Research on the implementation of traditional village protection development planning, Kunming University of Science and Technology.

[8] Li, Yanpen (2016) 2016 China Urban Planning Annual Meeting Paper Collection, Research on the traditional village protection planning method of Madai Village based on the Valletta Principle, Beijing, China Urban Planning Association.

[9] Yuan, Fang (2016) 2016 China Urban Planning Annual Meeting Paper Collection, Analysis on the status quo and countermeasures of the traditional villages in Beijing, Beijing, China Urban Planning Association.

[10]Yuan, Wei (2016) Discussion on the protection and renewal design of traditional villages in Hani terraced heritage area under the background of "Multiple-planning", Kunming University of Science and Technology.

[11]Cheng, Chao (2016) Research on urban and rural space control zoning based on "multi-regulation", Huazhong University of Science and Technology.

[12] Yu, Guangyu (2014) "Reflections on Several Issues Concerning the Development of Traditional Village Protection Planning in China", Urban Construction Theory Research, Vol.9.

[13] Ouyang, Wen; Zhang, Dayu; Gan, Zhenkun (2018) Protection and Development Planning of Liugou Village, Jingzhuang Town, Yanqing District, Beijing Construction Engineering Design and Research Institute.

Research Paper

Two Thousand New, Million-Person Cities by 2050 – We Can Do It!

E. Stephen GOLDIE, RFD, BTP, MPIA, MCNU
City Planning Advisor, Abu Dhabi Department of Urban Planning & Municipalities, UAE

Abstract

In 1950 three quarters of a billion people lived in large towns and cities, or 30% of the total world population of over 2.5 billion. By 2009 this had grown to 3.42 billion, just over half of a total population of over 6.8 billion. The United Nations Secretariat currently forecasts that in 2050 6.4 billion, 67% of a total of almost 9.6 billion people will live in urban areas.

Just over a third of that growth, around one billion people, is expected to be in China, India and Nigeria, but the remaining two billion will be in the countries around those countries: a massive arc stretching across the world from West Africa through the Middle East, across Asia and into the Pacific.

In these other countries, an additional two billion urban residents over thirty years translates into a need to build a new city for a population of one million people, complete with hospitals, schools, workplaces, recreation and all the rest, at a rate of more than four a month: 2000 cities, in countries with little urban planning capability!

In addition, the United Nations' sustainable development goals (SDGs) include goal 11: Sustainable Cities & Communities "Make cities and human settlements inclusive, safe, resilient and sustainable", so these new cities should demonstrate a level of planning competence and city management ability that many towns and cities in the world are struggling to achieve.

Notwithstanding the scale of the problem, the size and cost of the planning effort is demonstrated to be feasible, provided that action is swift and new technologies are developed and applied to the planning and approvals processes.

Of course, taking these plans to construction is a much bigger effort, but the economy of cities is strongly circular, meaning that the initial cash injection generates jobs that pay wages that are spent on rent and goods within the city, which then generate profits that fund developments that generate jobs, etc. However, this requires good governance, a planning consideration that must also be addressed if the full benefits of planning, designing and building 2000 cities in the Third World are to be enjoyed by the citizens of those cities.

Finally, failure is not an option, because "If we don't solve this equation, it is not that people will stop coming to cities. They will come anyhow, but they will live in slums, favelas and informal settlements" (Arevena, 2014), and we know that slums the world over produce crime, refugees and revolution, and then export these problems internationally, one way or another. The world most certainly does not want more refugees or another Syria, so planners must rescue us from that future, before it happens!

Keywords

Rapid massive third-world, urbanisation, RAMTU, SDG 11, transect planning, artificial intelligence

1. Introduction

1.1. The "3S" menace

In Portland, Oregon, on 23 October 2017, the keynote speaker to the ISOCARP-UNESCO Special Event to discuss Sustainable Development Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable (SDG 11 - Cities) was Ms. Hawa Deme, co-founder of Umuganda Africa. She highlighted that 95% of future urban expansion will occur in the Third World. The next speaker, Mr. Nicholas You, noted that in the next fifty years, humanity will spend more money on cities than we have cumulatively spent in all of human history, because the quantity of urbanism will double in capacity from 3 billion to 6 billion people (personal notes taken at the event).

The core of the problem is that there will be an additional urban population of 3 billion by 2050. Just over a third of that growth is expected to be in China, India and Nigeria, but the remaining two-thirds will be in the countries around those countries: a great arc of growth stretching from West Africa, through the Middle East, across Asia and into the Pacific. An additional 3 billion urban residents in thirty-three years translates into a need to build a new city for a population of one million people, complete with hospitals, schools, workplaces, recreation and all the rest, at a fantastic rate, and it has to happen in places with low capacity and poor infrastructure. In short, the problem is one of rapid, massive third-world urbanisation (RAMTU). The scale, speed and scarcity of resources required to address this problem are staggering and Chilean architect Alejandro Arevena rightly calls this the "3S Menace":

> *Let's start with the global challenge of urbanization. It's a fact that people are moving towards cities. and even if counterintuitive, it's good news. Evidence shows that people are better off in cities. But there's a problem that I would call the "3S" menace: The scale, speed, and scarcity of means with which we will have to respond to this phenomenon has no precedence in history. For you to have an idea, out of the three billion people living in cities today, one billion are under the line of poverty. By 2030, out of the five billion people that will be living in cities, two billion are going to be under the line of poverty. That means that we will have to build a one million-person city per week with 10,000 dollars per family during the next 15 years. A one million-person city per week with 10,000 dollars per family.* ***If we don't solve this equation, it is not that people will stop coming to cities. They will come anyhow, but they will live in slums, favelas and informal settlements****. [my emphasis] (Arevena, 2014)*

Hence, while diplomats and activists must keep us safe from nuclear war, and scientists and engineers must save us from global warming and species extinction, it falls to urban planners to keep the peace through the provision of healthy and harmonious cities for three billion people by 2050, and - as the Emperor Napoleon reportedly said - "We don't have a moment to lose!"

1.2. Two Thousand New, Million-Person Cities by 2050

When the priority is speed the need for effective planning is even greater than usual, because both the planning process and the plan itself must be first class. So, our first task is a plan for

a program to plan and build new urbanism equivalent to two thousand new, million-person cities by 2050, in countries with little to no capability for this task.

I have written and/or presented on aspects of this problem and of possible solutions before, but have never previously attempted to prescribe a holistic solution. The earlier papers and presentations are here referenced as:

A. **"The Impending Revolution in Urban Planning Practice: Intelligent and automated, but will it be garbage in, garbage out?"** (51st ISOCARP Netherlands, 19-23 October 2015)
B. **"What's So Special About Special Districts?"** (CNU 24, Detroit MI USA, 8-11 June 2016)
C. **"Sustainability and the Revolution in Urban Planning"** (52nd ISOCARP Congress, Durban, South Africa, 12-16 September 2016)
D. **"Smart Planning for Smart Cities"** (PIA National Congress, Sydney, NSW, Australia, 3-5 May 2017).
E. **"The Jobless City – Revolution or Paradise?"** (53rd ISOCARP Joint Congress, Portland, OR, USA, 24-27 October 2017).
F. **"The Periodic Table of Urbanism**" (presented at CNU 26, Savannah, USA, 15-19 May 2018 and at ISOCARP, Bodo, Norway, 1-5 October 2018).

These papers and presentations have all been deliberately leading to this point (although not without some serendipity): the feasibility of solving rapid, massive third-world urbanisation (RAMTU). Therefore, this paper relies heavily on parts of these preceding works, but they will only be further referenced where specifically referred to, in order to better emphasise the references to other author's work than my own.

This paper also assumes that the reader is familiar with the principles and practices of the New Urbanism.

1.3. The New Urbanism

The true impact of the post-Second World War, Brutalist deflowering of cities everywhere took some time to become apparent, but by the early 1960's writers such as Jane Jacobs (Jacobs, 1961), Herbert Gans (Gans, 1968) and Robert Goodman (Goodman, 1972) were exposing the symptoms. In some cases, they also provided insights into the causes and solutions, but it took another thirty years before the more advanced planners, architects and designers banded together and responded to auto-dominated urban sprawl with practical solutions. In the United States this took the name "The New Urbanism".

The New Urbanism has more than a passing similarity to City Beautiful: "Like New Urbanism, the 19th century [City Beautiful] movement redeemed city planning principles whose influence had waned, and recognized that the design of physical space is important to the identity and cohesiveness of a community." (Stueteville, 2004). In the United Kingdom it does not have a clear name, and is perhaps more a loose alliance of the Prince's Foundation for Building Community, English Partnerships, the now superseded Commission for Architecture and the Built Environment (CABE) and the still active Town and Country Planning Association (TCPA), founded in 1899 by Sir Ebenezer Howard himself. New Urbanist practice is also strong in parts of Australia and New Zealand (personal observation).

The New Urbanism, and its overseas cousins, have led a gradual roll back of decades of auto-dependent sprawl while simultaneously (and necessarily) developing a practice that has progressed rapidly from rediscovering the techniques behind the delightful works of past urbanist planners, architects and designers, such as Camillo Sitte, Raymond Unwin and John Nolan, to a body of knowledge and skills that is now well able to plan, design and build sustainable towns and cities: but is it ready for the Digital Revolution?

The description of a whole philosophy of planning is a task requiring many books, not just part of one paper, so I will leave the interested reader to inspect the 1993 Charter of the New Urbanism (Talen, 2013) and then read one of any number of books about the movement. A good place to start is the insightful and witty *The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape* (Kunstler, 1993), perhaps followed by the *The New Urbanism – Towards an Architecture of Community* (Katz, 1994), which provides an excellent, concise, technical introduction and a comprehensive collection of early examples.

2. Revolution in Urban Planning

2.1. An Additional Three Billion People

Urban planners and designers are faced with the task of housing an additional three billion people in towns and cities by the year 2050 (figure 1). It will be shown later that, not including China, India and Nigeria, this requires the equivalent of 2000 new, one-million person cities to be completed by 2050; the equivalent of building more than six one million-person cities every month for forty years. If climate change displaces another 200 million people, the task will be that much greater (Brown, 2008).

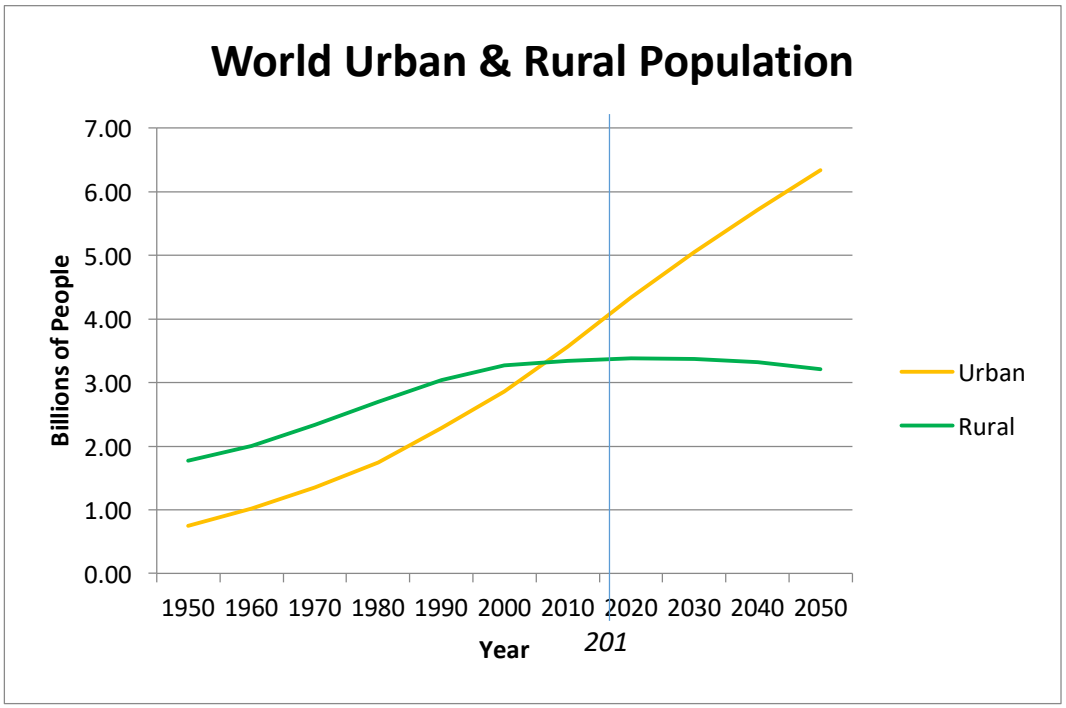


Figure 1: World Urban and Rural Population 1950 to 2015 (United Nations, 2014)

Compounding this problem, but also demonstrating that it might be part of the solution, the developing economies are generating large scale employment in their urban areas, some 900 million jobs in the thirty years from 1980 to 2010 (figure 2), but most of these jobs require the level of education that only a well-designed and managed large town or a city can provide.

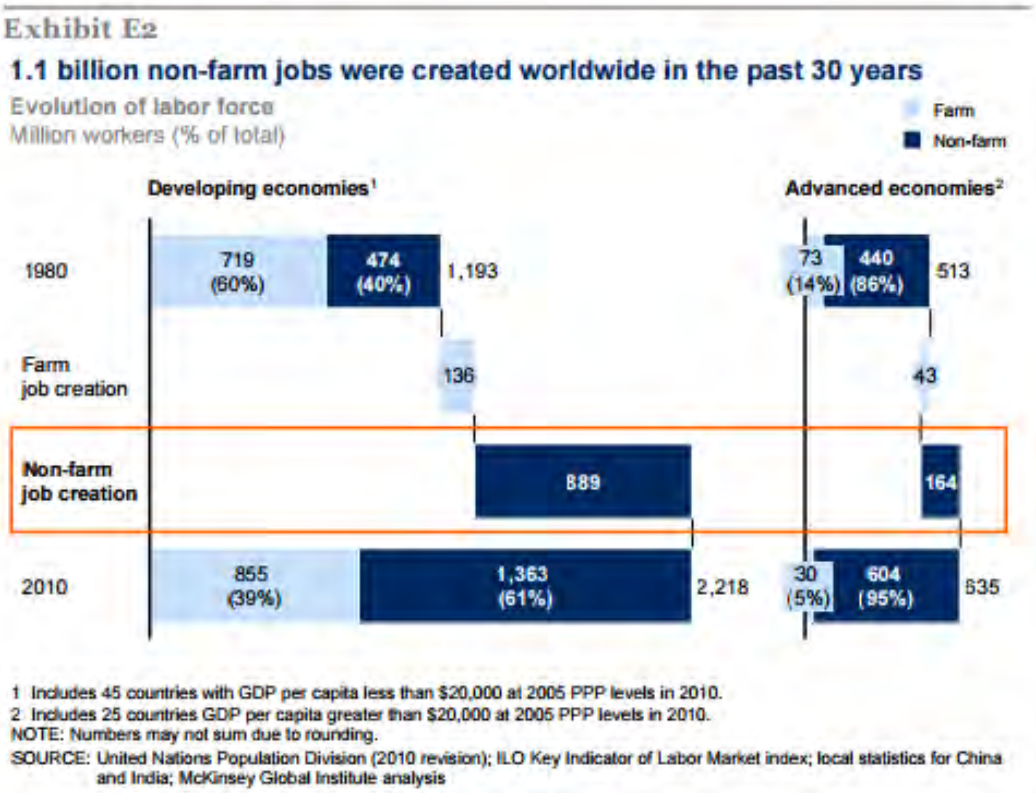


Figure 2: The growth of urban jobs from 1980 to 2010 (Dobbs *et al*, 2012)

China, since the 1980's, and India more recently have recognised this issue and responded with massive city building or urban improvement programs (World Bank, 2014, p. 3; Vikram, 2014), but only one-third of the additional three billion new urban dwellers are expected to be in China, India and Nigeria, the remaining two-thirds will be in the countries around those countries: a great arc of growth stretching from West Africa, through the Middle East, across Asia and into the Pacific.

Clearly, if massive new urban areas are required very quickly, then a plan that previously took the best part of a decade to prepare will now need to be completed in a tenth of that time. The planning process must therefore move from "slow and ponderous" to "fast and reliable", and must be conducted by efficient, well-managed planning agencies and at least equally competent consultants. This requires not only the adoption of all that the new technologies have to offer, but also the development of a plan-making paradigm that optimises the application of that technology in a way that produces good urbanism. In short, a planning paradigm that avoids the possibility of "garbage in, garbage out".

Over the last quarter century, the most significant advances in the understanding of urban areas, the practice of producing good urban planning and sustainable built outcomes, has

come from the practitioners and academics who constitute the movement known as the New Urbanism. Three of these advances, the charrette, form-based codes and transect planning are particularly relevant. Many planners are already familiar with the two-fold improvement in efficiency that a good charrette process provides. Firstly, by shortening the plan making process through simultaneously interactive and iterative plan preparation and secondly by increasing the level of support for the plan across all stakeholders and concerned citizens, thereby shortening the approval process.

However, it is the combination of transect-based planning and form based codes that, in my opinion, gives the opportunity to develop the New Urbanism further towards a systemisation that simultaneously enables localisation, which is, perhaps, the core conundrum of urban planning across the ages. Success will enable automation of the approvals process with the possibility of greater than eighty percent of applications being approved, almost instantaneously, on-line. The development of current transect-based planning practice toward this end is discussed in detail later in this paper.

If it is feasible to shorten the plan making process and the development approvals process then perhaps we can, collectively as a profession, enable from now to the year 2050 an additional three billion people to live, learn, work and play in good, new cities and towns. Perhaps some of these cities will even stand the test of time and become the great cities of the Twenty-first Century!

Of course, "stand the test of time" is on old form of words, the modern equivalent is "to be sustainable". I will briefly address the strengths and failings of "sustainability' later, first it is important to consider the alternate case, unsustainability, particularly, in its worst case scenarios.

2.2. The Limits to Growth

Whether history will refer to our current era as the 4th Industrial Revolution, the Digital Revolution, the Information Age or something else is not the concern of urban planners. What is important is that there will continue to be a civilisation with historians and philosophers who have the time and the inclination to argue about such things, because the alternatives are most likely:

- Mutually assured destruction by nuclear weapons (Caldicott, 2017);
- Mismanagement of the environment, leading to a sixth great extinction that will eventually include homo sapiens sapiens (Kolbert, 2014; Ceballos, Erlich and Dirzo, 2017, p. 7); and/or
- Mass migration, revolution and war through inadequate responses to rapid, massive 3rd World urbanisation.

Collectively, we can refer to these as the “Limits to Growth” which have long been forecast to reach criticality in the middle of this century (Meadows *et al*, 1972), and which, if not overcome will lead to either no human civilization, no humans, or no planet at all. We are all, right now, part of an experiment in survival that is clearly not one that any sane person would want to see played out on their own species and on their own planet.

While the first two of humanity’s limits to growth are well understood, the third, rapid, massive third-world urbanisation (RAMTU), as outlined above, is probably only common knowledge amongst urban planners, and some staff of the United Nations and related agencies.

It is a sorry testimony to the accuracy of the analysis conducted by Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, and William W. Behrens III in *Limits to Growth* (Meadows *et al*, 1972), that 2050, when two-thirds of the people on this planet will live in towns and cities, is our collective date with destiny: the year of the demise of our civilisation that they warned us of almost half a century ago.

There are therefore now only two key questions for our profession:

1. Is it feasible to plan and construct the equivalent to two thousand new, million-person, sustainable cities, in countries with little to no capability for this task, by 2050; and, if the answer is yes,
2. Will we try?

In this paper I will answer the first question in the affirmative, but the second question requires a collective will that I have not previously seen demonstrated by our profession. Clearly, this is our last chance to discover it in ourselves.

3. Sustainability and the Revolution in Urban Planning

3.1. The Triple Bottom Line

Sustainability is usually illustrated by the three-circle 'Triple Bottom Line Model' Venn diagram, representing the three dimensions of sustainability (figure 3). It is a simple, but powerful model that has changed the paradigm and inspired people the world over to strive to create a more sustainable society.

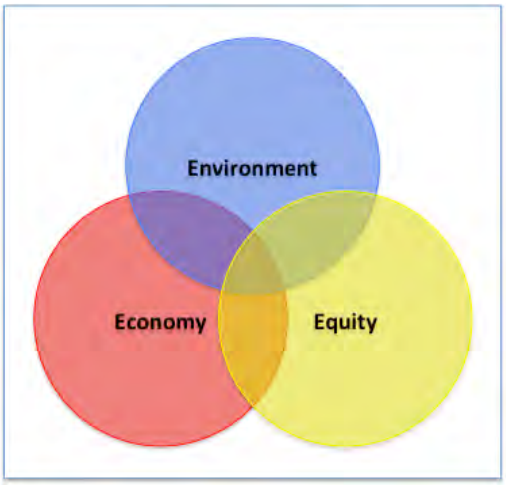


Figure 3: The Sustainability Diagram (Carter and Moir, 2012, p3; Wheeler, 2013).

While the concept of sustainability is vital if humanity is to survive past the middle of this century (Wheeler, 2013, p71) and its diagrammatic representation as three overlapping circles (a.k.a. the Sustainability Model) has been useful in promoting an understanding of what is required, the fact remains that of itself the diagram provides no immediate guidance decision making. In every case the decision maker, or his/er advisers, must analyse the detailed impacts of not only the proposal, but every facet of the proposal.

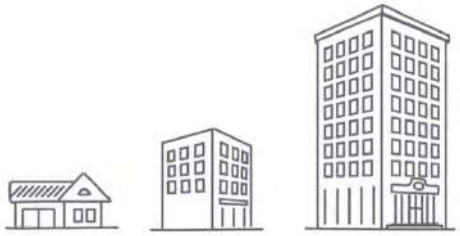


Figure 4: House, Apartment, or high-rise? ©Agatus: Image ID: 343732052

For example, how does the Sustainability Model guide a choice between the options shown in figure 4? The answer, of course is that of itself, it cannot. To make even a simple decision like this recourse must be had to a long list of interrelated factors requiring extensive study and consideration.

However, by mapping sustainability, not as a Venn diagram of concepts, but as real things (figure 5) and then expressing the relationships between these things in an interaction model (figure 6) the inherent tension between the natural and built environments is revealed: **the built environment exploits the natural environment in order to maintain the economy and improve equity for "the people".**

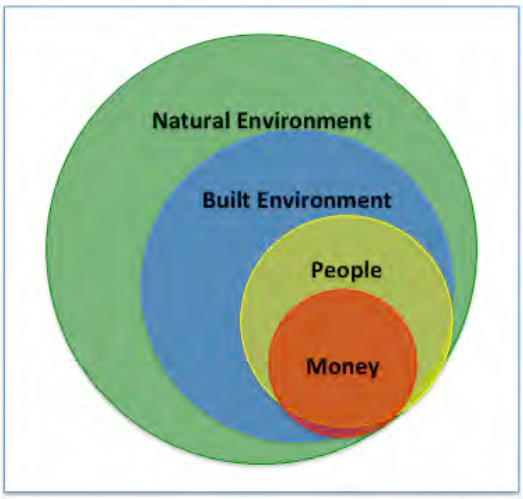


Figure 5: The four factors of sustainability as physical things.

This creates a 'tug of war' between two opposing 'goods' (i.e. it is good to protect the natural environment and it is good to provide for people by way of an economic and equitable built environment), but the difficulty of finding the sustainable middle ground has led to the development of two opposing camps, respectively pro and anti-development. Short term 'wins' for one side over the other encourages the feud to continue, resulting in long-term losses for society as a whole. We need to resolve this conflict, so that we can work together to resolve the existential crisis specified above.

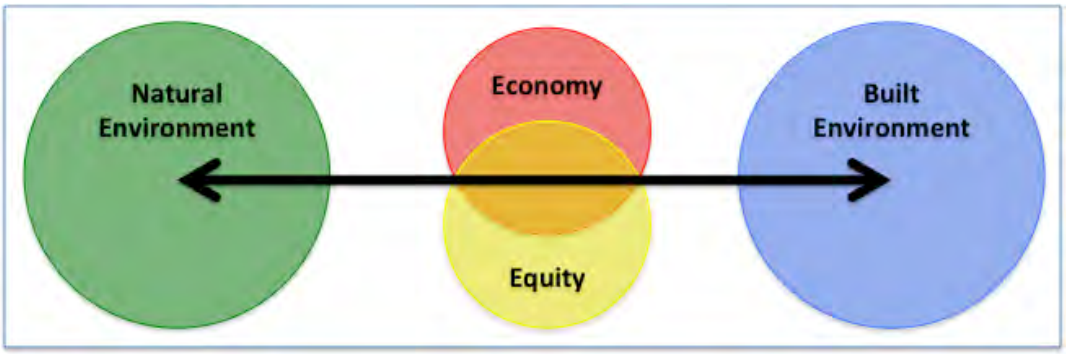


Figure 6: The four factors of sustainability in tension.

Figure 7: The natural and built environmental factors as a transect

The first step is to observe that figure 6 can also be mapped as a cartoon of a transect through an urban region, from watershed to waters' edge (figure 7), demonstrating that an understanding of the urban transect is fundamental to understanding urban sustainability.

3.2. Transect Planning

Many statutory planning systems use land use as their primary organising principle and then control built form by regulations specific to particular land uses. From the town of Seaside (1981, by Andre Duany and Elizabeth Plater-Zyberk of DPZ, Miami, USA for Robert Davis) onwards the New Urbanists have instead regulated built form first and then controlled land use, as necessary, by specific regulations (Katz, 1994).

The form-based code was further developed by adapting to it transect analysis from environmental science (Centre for Applied Transect Studies, 2016). This has resulted in a very useful body of knowledge and related planning and design techniques, including many images that are available on-line, such as figure 8 below, from the latest version of *The SmartCode – Version 9 and Manual* (Duany, Sorlein and Wright, 2008), which comprehensively details the use of transect-based plans and aligns them to the United States statutory planning system.

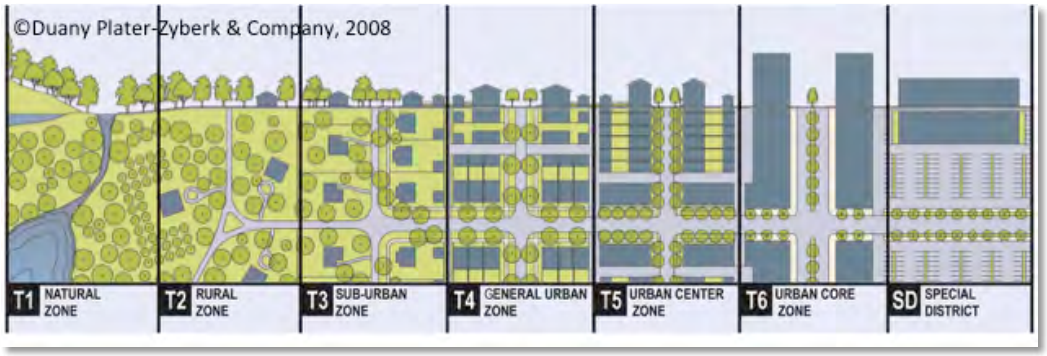


Figure 8: The current standard diagrammatic representation of the prototypical rural-to-urban transect.

It is also important to appreciate that the urban ecological zones designated as T1 to T6 are usually grouped into community units before areas are designed in detail (figure 9). Essentially, the urban structure is formed from these units and their supporting infrastructure.

The standard community units are usually:

- *Clustered Land Development* (CLD), e.g. a hamlet, typically contains T2, T3 & T4;
- *Traditional Neighbourhood Development* (TND), e.g. a village or a neighborhood, typically contains T3, T4 & T5;
- *Transit Oriented Development* (TOD) e.g. a neighborhood or district centre with good transit, it also typically contains T3, T4 & T5; and
- *Regional Centre Development* (RCD), e.g. a regional centre or the central buisiness district (CBD), which typically contains T4, T5 & T6 with good transit.

Notably, a Special District is neither an urban ecological zone, nor a community unit. It is a catch-all category for everything else: "Some types of uses are justified in not fitting neatly into a transect ecozone and therefore must be treated separately. First, it is necessary to include a category (or “district”) for land uses that are either exceedingly large, noxious, or for some other good reason do not fit automatically into an ecozone." (Duany and Talen, 2002, p.256). (Note that in this paper 'urban ecological zone' is preferred to 'ecozone'.)

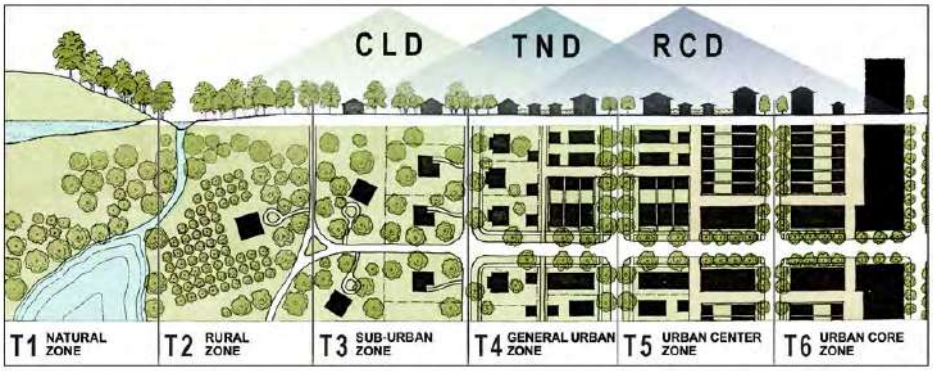


Figure 9: A variation on the transect diagram emphasising the prototypical relationship between transect elements and the community units: CLD, TND and RCD. (Sorlien, 2011)

This simple analysis clearly demonstrates that in urban planning the sustainability factors resolve into the application of a rural-to-urban transect that is already well understood, at least by leading practitioners and some academics. But is that all there is? Can every city plan be reduced to T1 to T6 plus the catch-all "Special Districts"? Clearly, as prototypical elements, T1 to T6 are almost unchallengeable, but perhaps Special Districts requires further examination.

4. What's So Special About Special Districts?

4.1. Boundary Conditions

Surveys of existing conditions and similar planning studies rarely pay attention to the boundary conditions of large areas devoted to a single purpose, but it is key to how such areas relate to the rest of the urban fabric.

Figure 10: A fortified boundary, approx. 250 x 150 metres or 820' x 490', protects the Acropolis

The Acropolis, rising majestically above the central area of Athens, Greece (figure 10) is possibly the archetype of all special districts. It is about the size of three city blocks, so it is not

as large an element as it seems. Clearly, the defining feature is its fortified boundary, a wall designed to add to the natural defensive qualities of the hill on which it sits, while also increasing the area within which people could shelter in time of attack. Over the centuries, defenders of the Acropolis have never been defeated by direct assault, only by encirclement and the threat of starvation.

Figure 11: A secured boundary surrounds Buckingham Palace, part of an irregularly shaped complex approx. 520 x 610 metres or 1,700' x 2,000'

Buckingham Palace in London (figure 11) occupies a much larger area. The site is irregular in shape, but perhaps it could contain around fifteen city blocks. Unlike the Acropolis it has a secured boundary, one designed to be guarded, but not to withstand a heavily armed assault.

Figure 12: A fenced boundary (or in this case, a hedge) demarcating the front garden of this ΣΑΕ Fraternity House's 420' x 200' plot (approximately 130 x 60 metres)

In contrast to the two preceding examples, a fenced boundary is very common. The term 'fence' is used here to indicate a demarcated boundary, as in the magnificent hedge around the ΣAE Fraternity House in figure 12. 'Fenced' also includes ha-has and the wide expanses of 'free-fire zone' lawn and shrubbery used to discourage unregulated pedestrian access to campus style developments, such as a business park. In this context then a "fence" is any form of physical demarcation that is more than a line on a map but less than the sort of fence or wall intended to deter a purposeful intruder.

To complete the set, we need only to add the case where the only demarcation of a boundary is by a few surveyor's pegs or marks. This gives us the simple, but very useful symbols proposed at figure 13, in which the symbols for surveyed and fenced boundaries are standard drawing practice and the symbols for secured and fortified boundaries are standard NATO map-marking practice (respectively a barbed wire fence and a trench line). Finally, when a fenced, secured or fortified boundary encloses an area greater than four hectares (ten acres) drawing these symbols in red will highlight them as potential special districts.

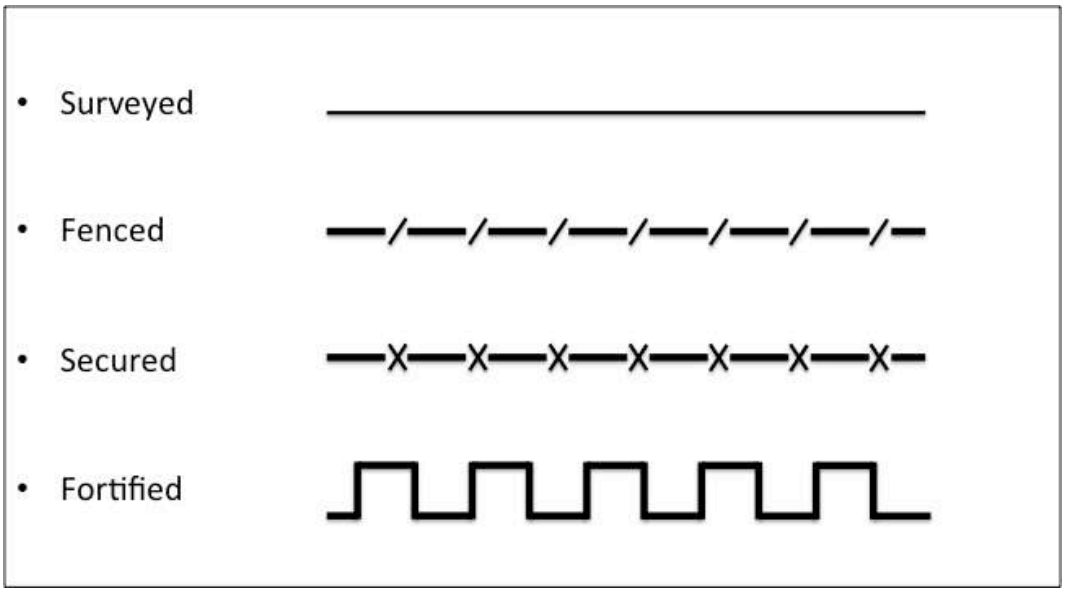


Figure 13: Graphics for boundary conditions

The key point is that physically defined (i.e. fenced, secured or fortified) boundaries constrain movement. The areas outside and inside might be walkable, but the community is prevented or discouraged from walking from one to the other. When these areas are smaller in size than a large city block (say 200 metres or 660 feet square) there is usually little impact on walkability, but when they cover even slightly larger areas than this they have a major impact on the urban fabric. Obviously, the impact is situational, but generally the larger the area enclosed, the greater the impact. This factor allows us to distinguish true special districts from the missing urban-ecological zones and to complete our understanding of the elements of urbanism.

4.2. The Periodic Table of Urbanism

If the prototypical urban transect from watershed to the city centre is expanded to the water's edge, and if, within that transect any special districts, such as a jail, university, boarding school, etc. can be properly identified by a distinct boundary condition, then it is possible to arrange into one 'urban periodic table' (figure 14) the standard rural-to-urban transect extending from watershed to water's edge. This extended transect can now include all of the productive, transport and other uses in the city, the temporary and aberrant types of development, and an expanded range of community units, including special districts as now defined in the section following.

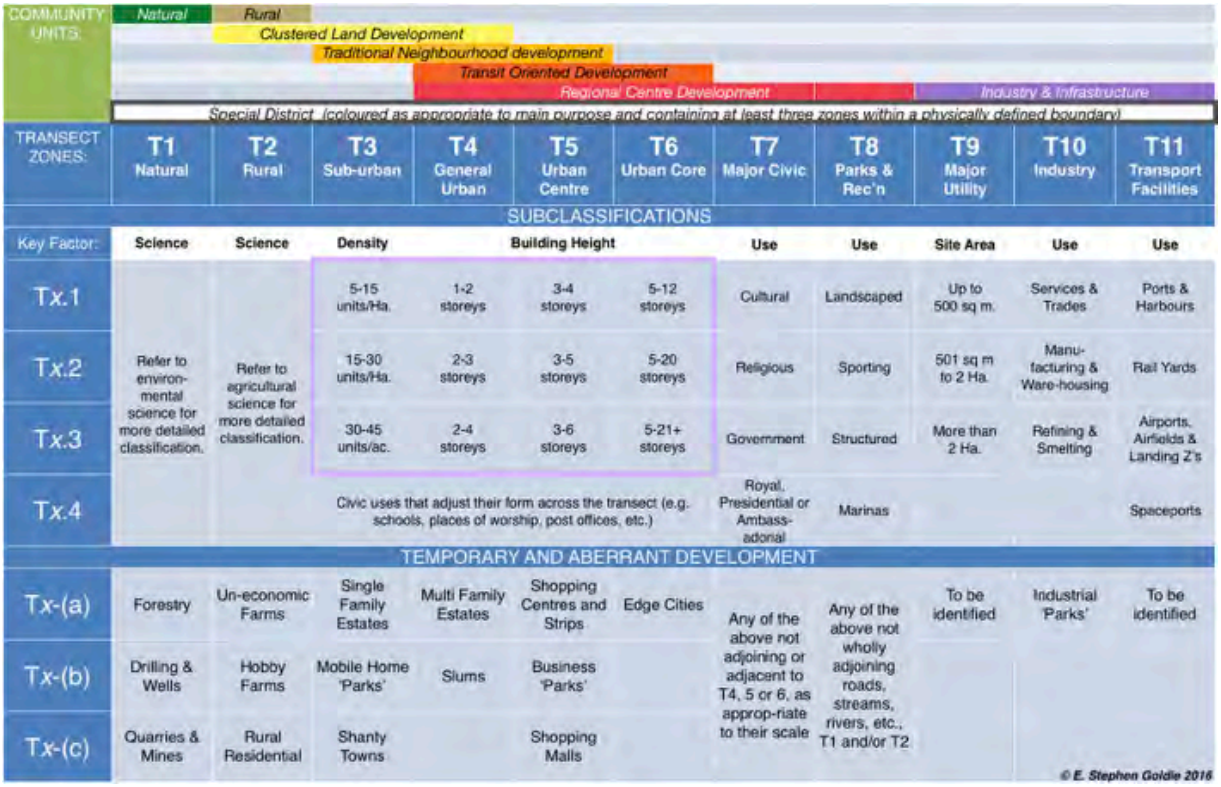


Figure 14: The Periodic Table of Urbanism

Note that within figure 14, in the left hand column, 'x' represents the relevant T-zone in the row headed 'Transect Zone', e.g. T1.1 and so on. Note also that the numerical values given for some transect zones are tentative and require ground-truthing through case studies.

The Periodic Table of the Elements is deliberately arranged to demonstrate the periodicity and grouping of the atoms. Similarly, the columns in the Periodic Table of Urbanism are all grouped by function, while the core box of twelve transect zones (outlined in lilac) demonstrate the urban equivalent of periodicity. These three rows across four columns (T3.1 to T6.3) are typical local transects identifying four distinct, but co-dependent arrangements of built form. For example, suburbs at 5 to 15 units per hectare (2 to 6 units per acre) are only going to support general urban development one to two storeys in height and so on.

Studies and research to identify the mathematical relationships between each transect element, stable and unstable, are currently underway and should form the subject of a future paper.

The simultaneous complexity and simplicity of the Periodic Table of Urbanism hint at a greater order of things, too big to be considered here, but perhaps:

> *This is pretty remarkable evidence that there is a mysterious unity about the patterns found throughout the whole of creation. From the smallest of molecules to the biggest of planetary 'particles;' revolving around the sun, everything depends for its stability upon an incredible simple, very elegant geometric patterning - the grammar of Harmony.* (HRH The Prince of Wales, Juniper and Skelly, 2010, p. 118)

Whether towns of thousands of people and cities of millions are more or less complex than the 118 chemical elements so far discovered is debatable, but as Professor Dmitri Mendeleev is quoted as saying:

> *It is the function of science to discover the existence of a general reign of order in nature and to find the causes governing this order. And this refers in equal measure to the relations of man - social and political - and to the entire universe as a whole.* (Posin, 1948, p. 167)

Just as the Periodic Table of Chemistry identifies the physical components of our universe and is able to predict the relationships between them, the Periodic Table of Urbanism provides a comprehensive framework for describing the "general reign of order" in our towns and cities. It also enables the development of an algorithmic framework for both understanding existing urbanism and for plan making, as a necessary step towards the positive application of artificial intelligence to urban planning.

4.3. Special Districts as a Community Unit

As explained at section 3.2. Transect Planning, the transect zones are usually grouped into community units and the urban structure is formed from these units and their supporting infrastructure. The preceding discussion has now made it clear that the term 'special district' is not required to describe or classify the elements of urban sprawl, nor is it required to provide for the missing transect zones that have been tentatively catalogued above; however, there is a need for a term to describe special groupings of transect elements in circumstances that meet the following proposed definition (see figures 10 to 13 regarding fenced, secured and fortified boundaries). Therefore, I propose that:

> **A Special District is a special purpose community unit containing at least three urban-ecological zones within a physically defined boundary.**

Typical examples include airports, boarding schools, citadels (a heritage feature in many European cities), colleges, convents, hospitals, military bases, monasteries and universities, and would be labelled 'special district—airport', 'special district—boarding school', etc. Along with a defined boundary, these urban elements will also have an internal transect structure, as the examples at figure 15 notionally demonstrate. They are almost cities within cities.

Special District - Jail/Gaol	Special District - Barracks/Fort
Secured boundary (–x–x–)	*Secured boundary (–x–x–)*
T5 Administration, classrooms and theatres	T3 Married quarters
T5 Cell blocks	T4 Town centre
T8 Sports fields	T5 Bachelor quarters & barracks
T10 Workshops & stores	T5 Administration, classrooms and theatres
	T10 Workshops & stores
	T8 Sports fields & firing ranges
	T1 Close training area
Special District - University Campus	**Special District - Hospital Complex**
Fenced boundary (–/–/–)*	*Fenced* boundary (–/–/–)*
T5 Dormitories	T4 Specialist treatment & support facilities
T5 Theatres, lecture halls & seminar rooms	T6 Wards, theatres and administration
T6 Administration & libraries	T8 Gardens
T8 Gardens & sports fields	T10 Workshops & stores
T10 Laboratories, workshops & stores	T9 Incinerator

* 'fenced' means anything intended to demarcate private land, but to a lesser degree than 'secured' or 'fortified'.

Figure 15: Likely transect zones across some typical special districts

Returning to the three examples of boundary conditions given above, the Acropolis (figure 10) can now be classified, in accordance with the Periodic Table of Urbanism at figure 14, as a Special District—Heritage with a fortified boundary and mostly containing the transect zone T7.1 Cultural; Buckingham Palace (figure 11) as Special District—Palace with a secured boundary and dominated by the transect zone T7.4 Royal; while the ΣAE Fraternity House (figure 12) is not a special district, just a very nice element within a T4 urban ecological zone.

So, the answer to the question posed earlier "can every city plan be reduced to T1 to T6 plus Special Districts?" is no, but every city plan can be reduced to T1 to T11, with up to seven sub-classifications, a grid of up to seventy-seven urban ecological zones. As proposed at figure 14 above, the grid currently contains fifty-four defined urban ecological zones, but no doubt some of the blanks will be filled in after practical experience of its application.

It should be clear to all planners and urban geographers that a rural-to-urban transect comprised of the urban ecological zones proposed in the Periodic Table of Urbanism can be mapped across all urban areas. Transect based plans are a subset of form based codes and:

> *As of June 2019, we've tracked 728 codes* [in the United States and Canada] *that meet criteria established by the Form-Based Codes Institute (FBCI), as well as an additional 17 form-based guidelines. 439 of these are adopted, with others in progress. Even though form-based codes are 38 years old, 91% have been adopted since 2001* (Borys, Talen and Lambert, 2019).

So, transect planning has utility as a planning tool, but can it be used in conjunction with some form of artificial intelligence to predictably guide the preparation of plans in at least a partially automated process?

5. Smart Planning for Smart Cities

5.1. Artificial Intelligence Supported Planning

Professor Michael Batty is the Bartlett Professor of Planning at University College London where he is Chair of the Centre for Advanced Spatial Analysis and is a leading researcher in this field. Over two decades ago he wrote that:

> *Computer models of cities either attempt to simulate existing urban form or provide procedures for the design of optimal forms, but rarely both. The mechanisms used to model actual cities usually embody local behavioural descriptions without explicit optimizing,' whereas those that produce idealized forms seek to optimize in a more global fashion, often mirroring the viewpoint of the designer.* (Batty, 1997)

More recently he published *The New Science of Cities* (Batty, 2013) in which he demonstrates a mathematical system where all actors (community, planner and politician) are replaced by algorithms. However, as in all situations involving the application of untested new technologies, it is appropriate to try many different approaches. Sometimes one or the other becomes the preferred standard, but more often than not each new approach encourages improvements in the others, leading to a convergence towards efficiency and effectiveness.

With this in mind, the approach that I propose aims to simultaneously "simulate existing urban form [and] provide procedures for the design of optimal forms", by mapping at the regional scale the following factors:

- Topography (shown by the thick white line in figure 16);
- Travel time to centre (shown as "ta" for travel time by automobile, "tb" for bus and "tt" for train in figure 16);
- Locational rent, in accordance with the work of Johann Heinrich von Thünen (1783–1850) who developed locational rent as a mathematically rigorous theory of marginal productivity (shown as "vr" for value of retail rents, "vm" for manufacturing rents and "vh" for housing rents in figure 16), (Wikipedia, 216a); and

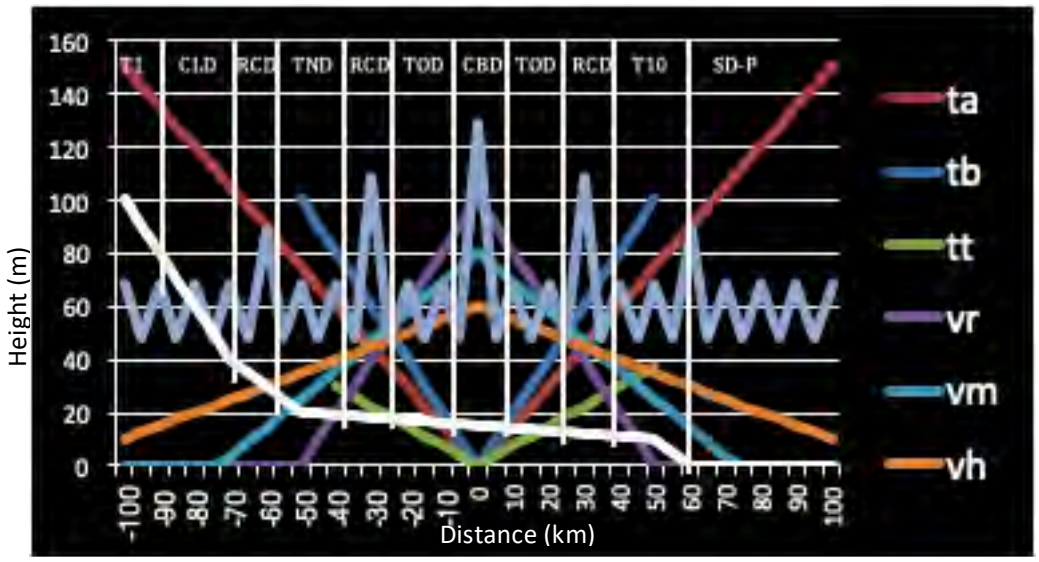


Figure 16: Analysis of urban structure by multiple factors along a theoretical transect.

- Total retail and commercial floor space, in accordance with Central Place Theory as proposed and utilised by the German geographer Walter Christaller (1893–1969), (shown as the light blue line in figure 16), (Wikipedia, 216b).

When these factors are combined into one graph (fig. 16) the results look slightly confusing (even in this fictional example) but when the transect-based planning community units are applied the urban structure is immediately clear: from left to right T1 (i.e. natural), then CLD (e.g. a hamlet), RCD (e.g. a small town on the edge of the urban area), TND (e.g. traditional fine-grained, mixed-use, walkable neighbourhoods), TOD (transit oriented development), CBD (central business district) and so on through to SD-P (e.g. a special district containing a port) on the coast.

Inclusion of additional operational theories of planning, such as the Chicago School models and Reticular Matrix (Ortiz, 2014) improves the reliability of the analysis, but for the purposes of this paper figure 16 is sufficient.

By repeating this exercise with parallel transects across the area to be planned, suitably designed prediction machines (Agrawal, Gans and Goldfarb, 2018) will produce an outline structure plan, as notionally illustrated at figure 17.

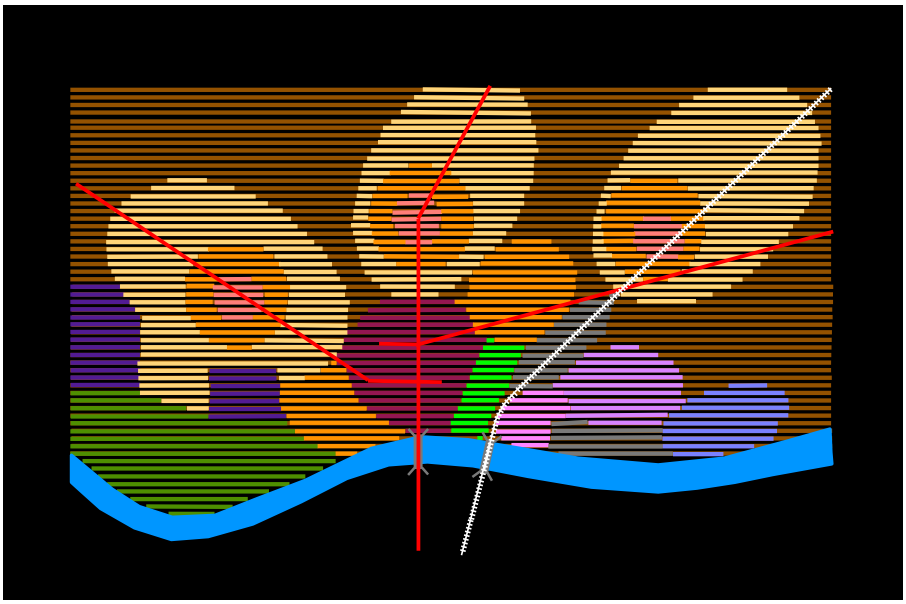


Figure 17: Illustration of how a first draft of a structure plan map might look when developed by an artificial intelligence analysing optimum urban structure along multiple parallel transects.

Applying this analysis to any urban area where the natural areas that are to be retained have been identified, and a transect-based synoptic survey and localising process has been completed, should very quickly produce a 'first-draft' urban structure plan. Refining this plan, checking infrastructure and traffic demand, etc. should follow expeditiously, because it is usually the process of preparing and testing the 'first-draft' many times that is the most time-consuming element. Note that the process of designing the community units in detail is still a professional design process, but this can be done in stages, as required, after the urban structure has been resolved and while the major infrastructure design is underway.

So, it has been demonstrated, using a hypothetical example, that standard urban metrics, applied using well understood theories can be combined with transect-based planning to automate the production of a 'first-draft' urban structure plan. With collective experience this process will become more rigorous and more reliable, producing the first draft of a metropolitan structure plan in hours instead of months and also vastly simplifying scenario testing

However, at the same time that the digital revolution is likely to accelerate urban planning processes, it is also likely to change at least one of the fundamentals of the city: employment. If there are no jobs, will cities cease to exist?

6. The Jobless City – Revolution or Paradise

It is highly likely that over the next two decades there will be a massive loss of industrial and service jobs in the western world, of the order of 80%, (Furman *et al*, 2016; CEDA, 2015) at exactly the same time as the mechanisation of agriculture in the global south is driving rapid, massive 3rd World urbanisation. Issues that humanity must deal with while also preventing nuclear war and avoiding biological annihilation.

Vivek Wadha, writing in the Washington Post[30] (Wadha, 2015) said that "We need a new version of capitalism for the jobless future". Perhaps a revival of co-operative ownership could be part of that model, an economy where:

- The citizens own the city;
- The city consists of all of the usual land uses (residential, schools, hospitals, etc.) renting these out, or operating them itself, as the citizens decide;
- The city owns the land of production (mining, agricultural and industrial);
- The city receives rents from the business owners or in-kind food and products;
- The city maintains itself and provides for the needs of its citizens in the form of food and clothing rations, access to education, health, recreation, entertainment, etc.; and
- The city distributes any surplus income to the citizens as a dividend and/or special purpose grants.

The Digital Revolution increases profits by decreasing labour, but there is no evidence yet that it decreases floor space. What will decrease is the need for worker transport, including parking. Therefore, robotised industrial land requirements might decrease by around 50% as parking areas are turned to more productive uses, but the roads and railways will probably be retained for the movement of raw materials and finished product. As the volume of production rises the value of the land rises and therefore rents can rise. There is no reason why a modern version of Ebenezer Howard's co-operatives could not capture that value (Howard, 1965, p. 58). Equally, urban and indoor agriculture reduces the agricultural hinterland required, thereby reducing land costs for a new city, and transport costs in bringing that produce to town. Areas of saving that could also be captured by a well-planned co-operative.

As explained earlier, "An additional 3 billion urban residents in forty years translates into a need to build a new city for a population of one million people, complete with hospitals, schools, workplaces, recreation and all the rest, at a rate of more than six a month" and clearly,

building one new city of any form will have no impact on a problem of this magnitude. So, perhaps multiple experimental cities are required on each continent, the successes being quickly replicated (in type, not in exact design, which should always be bespoke) and then replicated again, increasing exponentially, until all of humanity that wishes to live in cities can do so in to a satisfactory standard.

So, what are the options: scattered, idyllic rural villages, dense European urbanism or so far untested sci-fi archologies? Letchworth (population 35,000) near London, indicates that while the land ownership model may be relevant, the size is probably much too small, so that probably excludes idyllic rural village as an option, leaving archology, dense European city, or something in-between.

I have previously shown (Goldie, 2017) that both traditional European urbanism or a city-in-a-building archology could provide the physical models for the jobless cities that we should have started to build yesterday. Which of these will work best is likely to be determined by the degree to which each city's planning and design minimises environmental impact, maximises sustainability and, most critically, supports a functioning economic model that will "meet our needs as defined by the bottom two layers of Maslow's hierarchy of needs (physiological and safety) … thereby unleashing the next wave of human innovation and creativity in directions we can never imagine." (CEDA, 2015, p. 46)

7. Global Responses

There have been numerous high-level international meetings, forums and conferences at which the problem of rapid, massive, third-world urbanisation (RAMTU) is notionally addressed by goals, objectives and performance indicators (GOPI). These include the State of the Planet Declaration, the World Urban Forum, Habitat, the New Urban Agenda and the United Nation's sustainable development goals, as outlined below.

7.1. 2012 - The State of The Planet Declaration

The *Planet Under Pressure: New Knowledge Towards Solutions* conference (London, 26-29 March 2012) "... brought together nearly 3000 leading experts and decision-makers to discuss global challenges and offer new solutions." an additional 3000 people participated on-line. The first point in the State of the Planet Declaration is:

> *Research now demonstrates that the continued functioning of the Earth system, as it has supported the well-being of human civilization in recent centuries, is at risk. Without urgent action, we could face threats to water, food, biodiversity and other critical resources: these threats risk intensifying economic, ecological and social crises, creating the potential for a humanitarian emergency on a global scale.* (Brito and Smith, 2012, p. 1)

Unfortunately, the only actions proposed were to "fund and support capacity building in science and education globally ..." and related actions (Brito and Smith, 2012, p. 3).

7.2. 2001 - World Urban Forum

The World Urban Forum (WUF) is the world's premier conference on urban issues. It was established in 2001 by the United Nations to examine one of the most pressing issues facing

the world today: rapid urbanization and its impact on communities, cities, economies, climate change and policies.

Organized and convened by UN-Habitat, the Forum has become one of the most open gatherings on the international arena, for exchanging views and experiences on urban challenges. The inclusive nature of the Forum, combined with high-level participation, makes it a unique United Nations conference and the premier international gathering on urban issues.

The World Urban Forum has the following objectives:

- raise awareness of sustainable urbanization among stakeholders and constituencies, including the general public;
- improve the collective knowledge of sustainable urban development through inclusive open debates, sharing of lessons learned and the exchange of best practices and good policies; and
- increase coordination and cooperation between different stakeholders and constituencies for the advancement and implementation of sustainable urbanization.

The Ninth session of the World Urban Forum (WUF9), was held in Kuala Lumpur, Malaysia in February 2018, and has been recognized by the United Nations General Assembly (resolution 70/210) as the first session to have a thematic focus on the implementation of the New Urban Agenda adopted at the United Nations Conference on Housing and Sustainable Urban Development, Habitat III.

The Tenth session of the World Urban Forum (WUF10) will take place in Abu Dhabi, United Arab Emirates in 2020. It will be the first Forum to be held in the Arab region and it will be another opportunity to review the implementation of the New Urban Agenda.

7.3. 2015 - Sustainable Development Goals

The Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations. The broad goals are interrelated, though each has its own targets to achieve. The total number of targets is 169. The SDGs cover a broad range of social and economic development issues. These include poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, environment and social justice. The SDGs are also known as "Transforming our World: the 2030 Agenda for Sustainable Development" or Agenda 2030 in short. The goals were developed to replace the Millennium Development Goals (MDGs) which ended in 2015. Unlike the MDGs, the SDG framework does not distinguish between "developed" and "developing" nations. Instead, the goals apply to all countries.

Paragraph 54 of United Nations Resolution A/RES/70/1 of 25 September 2015 contains the goals and targets. The UN-led process involved its 193 Member States and global civil society. The resolution is a broad intergovernmental agreement that acts as the Post-2015 Development Agenda.

The SDGs build on the principles agreed upon in Resolution A/RES/66/288, entitled "The Future We Want". This was a non-binding document released as a result of Rio+20 Conference held in 2012. (United Nations, 1992, resolution 1, annex I)

The goal most relevant to this discussion is Goal 11: Sustainable Cities & Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

7.4. 2016 - Habitat III and the New Urban Agenda

The United Nations Conference on Housing and Sustainable Urban Development, known as Habitat III, concluded on 21 October 2016 in Quito, Ecuador, with delegations adopting the New Urban Agenda – a new framework that that lays out how cities should be planned and managed to best promote sustainable urbanization.

> *"We have analyzed and discussed the challenges that our cities are facing and have [agreed] on a common roadmap for the 20 years to come," Joan Clos, Secretary-General of the conference and Executive Director of the UN Human Settlements Programme (UN-Habitat), told participants at the closing session.* (UN News 2016)

The conference in Quito, lasted one week and drew around 36,000 people from 167 different countries, with a reported 50,000 also visiting the various associated exhibition areas.

Clos said that the document should be seen as an extension of the 2030 Agenda for Sustainable Development, agreed by 193 Member States of the UN in September 2015 (UN News 2016).

The Agenda for Sustainable Development's 17 Sustainable Development Goals (SDGs) recognized the power of cities and towns, which will constitute up to 70 per cent of the world population by 2050, to be the engine for sustainable growth in the future. The New Urban Agenda gives greater emphasis to this concept.

Implementation is covered by paragraphs 23 to 175 of The New Urban Agenda. (United Nations, 2017) Almost every paragraph starts with "We will ...", "We commit to ...", and so on. These statements include:

- "102. We will strive to improve capacity for urban planning and design and the provision of training for urban planners at national, subnational and local levels.",
- "109. We will consider increased allocations of financial and human resources, as appropriate, for the upgrading and, to the extent possible, prevention of slums and informal settlements, with strategies that go beyond physical and environmental improvements to ensure that slums and informal settlements are integrated into the social, economic, cultural and political dimensions of cities."; and
- "126. We recognize that the implementation of the New Urban Agenda requires an enabling environment and a wide range of means of implementation, including access to science, technology and innovation and enhanced knowledge-sharing on mutually agreed terms, as well as capacity development and mobilization of financial resources, taking into account the commitment of developed and developing countries and tapping into all available traditional and innovative sources at the global, regional, national, subnational and local levels, as well as enhanced international cooperation and partnerships among Governments at all levels, the private sector, civil society, the United Nations system and other actors, based on the principles of equality, non-discrimination, accountability, respect for human rights and solidarity, especially for those who are the poorest and most vulnerable."

In response to these points, or for other compelling reasons, there are programs designed to address such issues, for example:

> *From the Federal government's point of view, it is indeed essential to tackle the root causes for irregular migration. This includes improving living conditions and creating better perspectives in countries of origin, notably in Africa. The Federal government has already been very active in this field. This includes projects in education, vocational training, job creation, health, infrastructure or food security, to mention only a few. In the year of 2017, the German government has spent a total of 6.6 billion EUR to this end alone.* (Helmert, 2018)

The question is whether billions of Euros, dollars or dirhams directed piecemeal to education, vocational training, job creation, health, infrastructure, food security, etc. are sufficient to make a difference, or whether it would be better to direct all efforts to the one endeavour that is likely to provide a permanent solution: city building.

As the Germans say, *stadtluft macht frei* (the city makes you free).

7.5. Conclusions Regarding International Responses

While the goals, objectives and performance indicators developed and adopted at these various global meetings, forums and conferences are most worthy, it is notable that while there are many "we will's" there is no mention of 'how' or 'with'. Wars might happen by accident, but great cities do not. Even if they did, such good fortune is very unlikely in the great arc of growth stretching from West Africa through the Middle East, across Asia and into the Pacific, and most certainly not two thousand times in the next thirty years.

Figure 18: Residents line up to receive food in the besieged Palestinian camp of Yarmouk, Damascus, Syria 31 Jan 2014. ©AP/UNRWA

Notably, the most senior public official on the planet has warned that everything that humanity has done so far to address this challenge is not enough:

> *The UN Secretary-General has told a major climate change conference that the world faces a battle for its survival.*
>
> *António Guterres said despite the existential threat, not everyone was confronting the problem with due focus.*
>
> *Speaking in Abu Dhabi on Sunday, Mr Guterres also made an impassioned call for greater support to help develop the green economy.*
>
> *"The world is facing a grave climate emergency – disruption is happening now and faster than top scientists predict," he said.*
>
> *"Every week brings more devastation, floods, drought and…superstorms. All around the world, people are losing their homes and forced to migrate.*
>
> *"The situation only gets worse and we must act now with urgency. We have no time to lose."* (Dennehy, 2019)

Obviously, Franklin's Law is as true today as when the great man first coined it: "If the poor folks are happier at home than they can be abroad, they will not be lightly prevailed with to cross the ocean." (Benjamin Franklin, 1706-1790, from Zolberg, 2006, p. 46), So, not only are the goals discussed above sensible, they are based in long understood common sense, but the questions remain: how, when and where will these goals, objectives and performance indicators actually be implemented in sufficient scale to make a difference? How do we plan and build enough cities, or city expansions, well enough and quickly enough to solve a three-billion-person problem?

8. How to Plan and Build 2000 New, Million-Person Cities by 2050

8.1. Physical Resources – The Planning Staff

Whatever the technologies used to support the planning process they will not (at least not for a generation or two) replace the need for trained urban planners and designers.

At the local government level, such as the planning of a new town or city, the resources applied to planning depend upon many local factors, not least of which are the relevant laws and regulations of the state, but in my experience most of these factors can be subsumed into one constant, the size of community that one local government planer can manage if it is growing at 1% a year. Let us call this population the single planner population (SPP). For example, assume that this factor is constant within any particular state (i.e. emirate, province, nation, state, etc.), then the number of planning staff (S) will be given by the population (P) and the rate of growth, actual or desired, whichever is the greater, (R%) as follows:

$$S = \frac{P \times R}{SPP}$$

Finding the value of the single planner population (SPP) for any jurisdiction is simply a matter of auditing all planning organisations in that jurisdiction and taking the average (of course the audit has to normalise for consultant budgets and professional-to-support staff ratios in order to ensure an accurate comparison). As always there will be special cases and varying preferences for in-house teams over consultants, but in my experience this simple formula gives remarkably consistent results.

So if there is a town of 12,500 people growing at 1%, and the SPP for that state is 12,500 then the number of local government planners required to manage the plan making, plan implementation and administration for that town effectively and efficiently is one, because:

$$S = \frac{12{,}500 \times 1}{12{,}500}$$

$$S = 1$$

Scaling this up to a city of 1,000,000 growing at 1.5%, we get a staff requirement of one hundred and twenty, as follows:

$$S = (1{,}000{,}000 \times 1.5)/12{,}500$$

$$S = 120$$

Clearly, the same city, growing at twice the rate requires twice the staff, because:

$$S = (1{,}000{,}000 \times 3.0)/12{,}500$$

$$S = 240$$

Cities exist because they give economies of scale, but unfortunately, budget makers rarely recognise that in town planning increased size and/or rate of growth creates more problems, not fewer, because human interactions increase exponentially. The fact that this equation increases staff requirements geometrically, not exponentially, demonstrates that there are economies of scale in the planning of a city, but usually not to the degree desired by budget makers.

These same budget makers might also express a tendency to assume that technologies such as automated approvals will allow a reduction in staff. However, if this is done I am confident that the "garbage in, garbage out" rule will quickly assert itself and more planners, rather than fewer, will be required to sort out a mess that we do not have the time to deal with. It would be much more prudent to redeploy statutory planners to planning and urban design, or provide additional training in order to employ them as urban planning technologists, in order to ensure that the plans that are being converted into computer algorithms are sound, and that the outputs are audited for consistency with those plans.

If there is a short-term spare capacity in planning staff, then it would be wise for an agency (or group of agencies) to send them to undertake projects in less privileged jurisdictions. Revising Franklins Law slightly: "If poor people are able to move to nice towns and cities in their own countries, they will not be likely to seek refuge in ours." But, how many should they send? First, we require a likely rate of growth and initial population.

Given a proposed city of one million persons and assuming a density objective of 6,670 p/sq. km (e.g. Wikipedia, 2019 lists San Francisco at 6,226.3 p/sq. km in 2010), an average radius of 6.9 km giving an area of 150 square kilometres (sq. km) and an initial average density of 1 person/sq. km. Then, applying the standard formula for compound interest with A = 1,000,000 P = 150, and n = 30 years, the rate of growth (r) is calculated as follows:

$$r = n[(A/P)^{1/n} - 1]$$

$$r = 30[(1{,}000{,}000/150)^{1/30} - 1]$$

$$r = 30[6{,}666.7^{0.0333} - 1]$$

$$r = 30[1.3411 - 1]$$

$$r = 10.23 \quad \therefore R = 1023\%$$

Applying this growth rate to the staffing problem, and assuming an SPP of 12,500, gives:

$$S = (P \times R)/SPP$$

$$S = (150 \times 1023)/12{,}500$$

$$S = 153{,}450/12{,}500$$

$$S = 12.276$$

Therefore, an initial planning team of 12 full-time equivalent (FTE) urban planners, designers, other specialists (e.g. environmental scientists, urban geographers, surveyors, demographers, transport planners, planning engineers, social planners, planning technologists, etc.) and support staff (geographic information system operators, computer aided design (CAD) operators and administrative personnel) should be sufficient, on average, to produce a master plan for a city, or urban extension, of one million persons in three years. This calculation should be part of the annual budgeting process, because the staffing need will change as the city grows.

Twelve might seem to be a small number for a master plan for the equivalent of a city of one million people, but, counterintuitively perhaps, master planning a new city from scratch requires a smaller team than that required for the physical change management of an existing city with its myriad of issues, conflicts and individual applications for various consents.

In addition to confirming the site selection and preparing the master plan, this team will also be responsible for training the local team to implement the plan. Assuming that the local team have the relevant qualifications, then this should mostly be by on the job training (OJT), so they will be an additional resource, rather than a distraction from the main task.

Of course, the above assumes that the effective application of artificial intelligence to urban planning will not be available for some years, but every effort should be made to advance it, whether in the form described above, or by better approaches, because the task is very big and humanity needs to marshal to the task every resource available.

8.2. The Size of the Task

The next step is to confirm the size of the task

Year	Urban population ($x10^9$)	Total Population ($x10^9$)	%
1950	0.75	2.50	30%
2009	3.42	6.80	50%
2050	6.40	9.60	67%
Increase 2009-2050=	2.98	2.80	106%

Figure 19: Urban Population 1950-2050 (from figure 1 above).

Figure 19 shows the total population increase for all of humanity. Excluding the one billion additional urban population forecast for China, India and Nigeria leaves 1.98 B people to be housed in new urban settlements. If these new settlements are assumed to be, on average, cities, or city extensions of 1,000,000 then the demand is for 1,980 new one-million-person cities, or equivalent urban expansions. If a 1% failure rate is allowed for (i.e. 19.8 projects) then this target can be rounded to 2,000.

Year	Growth Factor	Commencements During the Year	Total Number of MP Commenced	Total Number of MP Completed	% of Target
2020		7	7	0	0%
2021	2	14	21	0	0%
2022	2	28	49	0	0%
2023	4	28	77	7	0%
2024	4	56	133	21	1%
2025	4	112	245	49	2%
2026	4	112	357	77	4%
2027	4	224	581	133	7%
2028	4	448	1029	245	12%
2029	4	448	1477	357	18%
2030	4	523	2000	581	29%
2031				1029	52%
2032				1477	75%
2033				2000	101%

Figure 20: Masterplans required by year

Figure 20 shows that if we assume that, on average, each master plan can be completed within three years, and set up a program to commence seven masterplans in 2020 and grow the number of masterplan commencements by doubling the number of teams in the first two years and quadrupling them annually after that then, 2000 masterplans can be completed by 2033. Assuming twenty years for design and construction then 2000 new cities by 2053 is achievable. If new technologies and lessons learned on the first cities can be applied to speed up the process in later cities then possibly the whole task can be achieved by 2050, or earlier. So, the task is enormous, but feasible. The next question is cost.

8.3. The Cost of Planners and Plans

To estimate the cost, first of planning and then of design and construction of the infrastructure and key buildings, it is assumed that a level of commercial investment, owner-building or citizen labour will provide the majority of the lesser buildings.

As demonstrated at section 8.1 above, a planning team of twelve full-time equivalent (FTE) staff members at any one time should be capable, on average, of site selection and masterplan preparation for a new city for one million people within three years.

No of MP in progress	FTE per Team	Head Office	Total FTE	Wages Growth	Average Cost per FTE per Year	Total Salary Cost ($x10^6)	On costs, operating expenses etc.	Total Cost per Year ($x10^6)
7	12	13	97	1%	$100,000	10	100%	19
21	12	13	265	1%	$101,000	27	100%	54
49	12	13	601	1%	$102,010	61	100%	123
70	12	14	854	1%	$103,030	88	100%	176
112	12	15	1,359	1%	$104,060	141	100%	283
196	12	16	2,368	1%	$105,101	249	100%	498
280	12	18	3,378	1%	$106,152	359	100%	717
448	12	21	5,397	1%	$107,214	579	100%	1,157
784	12	28	9,436	1%	$108,286	1,022	100%	2,044
1120	12	35	13,475	1%	$109,369	1,474	100%	2,947
1419	12	41	17,069	1%	$110,462	1,885	100%	3,771
971	12	32	11,684	1%	$111,567	1,304	100%	2,607
523	12	23	6,299	1%	$112,683	710	100%	1,420
							Total Cost	15,815
							Program Length (Years)	13
							Averaged Yearly Cost	1,217

Figure 21: Planning Costs

At this point some assumptions are required. These are:

- That the definition of precisely what a master plan is in such circumstances is a matter for much discussion, so here "masterplan" is used in a very generic sense.
- That the planning teams require a "head office" team of twelve plus an additional person for every fifty teams, or part thereof.
- That the average salary per FTE is US$100,000.
- That the average employment on-costs (leave, allowances, insurance, training, etc.) plus the operating expenses (office space, furniture, equipment, materials, utilities, etc.) total to an equivalent of 100% of salary cost per FTE.
- That wages and on costs increase due to inflation at 1% per annum for the duration of the project.

If these assumptions are correct, then figure 21 shows that the total cost of the planning program would be US$15.8 T over 13 years, giving an average yearly cost of US$1.2 B, including inflation. Obviously this estimate should be rigorously re-examined before an actual program is initiated, but it is reasonable to expect that a formal actuarial estimate would not differ from this quick estimate by more than plus or minus 15% from the estimate above, giving a range of between US$1.0 B and US$1.4 B.

Project	Country	Designer/ Builder	Projected Population	Estimated Cost (US$M)	Duration (years)	Cost/Year/M Pers (US$M/yr)	Notes
Bahria Town Karachi	Pakistan	Bahria Town (Private)	1,000,000	1000	20	50	Assumed duration
Masdar	UAE	Foster + Partners	47,500	20,000	20	21,053	
Ramciel	South Sudan	Korea Land and Housing Corporation	250,000	940	5	752	Assumed population
New Songdo City	South Korea	Kohn Pedersen Fox	232,000	30,000	20	6,466	
					Average =	7,080	

Figure 22: Construction Cost Examples (from various websites)

Figure 22 shows that the construction cost of a sample of four new cities. Unfortunately, the available data is difficult to find and incomplete. Another complicating factor is that the range is very wide, from a cost per year per million persons of US$50 M for Bahria, a gated community outside of Karachi, to US$21 B for Masdar City, the sustainability demonstration project next to Abu Dhabi International Airport. Considering each of these in turn:

- Bahria is a large project, but it does benefit from proximity to Karachi, a major city with significant (if reportedly inadequate) infrastructure, therefore the total projected cost could be artificially low;
- Masdar has not grown at anything like the initially projected rate and was designed to a very high construction standard, so this cost is probably unrealistically high;
- Ramciel is a totally new city in a remote area in a country typical of the great arc of growth discussed above, but a master plan has not been finalised and the estimate shown is from 2012, so it is possibly a little low; and

- New Songdo City is a high-rise city with a lot of new "smart city" technology and which has reportedly achieved only about one third of its projected occupancy (private site visit, 2018), and is therefore also probably unrealistically high for the type of project discussed here.

Year	Number of MP Completed (cumulative)	Number of Cities In Detailed Design & Construction	Cost/Year (US$M/yr)
2020	0	0	$0
2021	0	0	$0
2022	0	0	$0
2023	7	7	$7,000
2024	21	21	$21,000
2025	49	49	$49,000
2026	77	77	$77,000
2027	133	133	$133,000
2028	245	245	$245,000
2029	357	357	$357,000
2030	581	581	$581,000
2031	1029	1029	$1,029,000
2032	1477	1477	$1,477,000
2033	2000	2000	$2,000,000
2034		2000	$2,000,000
2035		2000	$2,000,000
2036		2000	$2,000,000
2037		2000	$2,000,000
2038		2000	$2,000,000
2039		2000	$2,000,000
2040		2000	$2,000,000
2041		2000	$2,000,000
2042		2000	$2,000,000
2043		1993	$1,993,000
2044		1979	$1,979,000
2045		1951	$1,951,000
2046		1923	$1,923,000
2047		1867	$1,867,000
2048		1755	$1,755,000
2049		1643	$1,643,000
2050		1419	$1,419,000
2051		971	$971,000
2052		523	$523,000
2053		0	$0
30		Total	$40,000,000
		Average	$1,333,333

Figure 23: Construction Cost Calculator based on cost estimates for Ramciel, South Sudan

Considering the above it is proposed that a cost per year per million persons of US$752 M for Ramciel be taken as starting point. Adding 30% as a worst case margin of error gives a tentative US$1 B per year per million persons for the proposed 2000 new cities.

The data on the projected time for detailed design and construction is more reliable, with all but Ramciel proposing a twenty-year program, so this time frame will be adopted for this study.

Given the dearth of reliable, published data on these and other new city projects, a much more extensive and thorough audit by a team that has the resources to visit a much larger sample of new city projects would be necessary before deciding upon an overall project estimate. While a wide margin of error should always be allowed for early estimates of individual project costs (because a completed master plan is required before reliable construction cost estimating is possible), averaging over 2000 projects should be reasonably accurate.

Table 5 shows that, assuming US$1 B per year per million persons, construction costs start in the third year (2023), on completion of the first seven masterplans, at US$7B a year, rising to US$2 T a year in 2032, but deceasing from 2043 as the twenty-year initial city building phase is completed and each city become self-funding.

As anyone familiar with city building would expect, the estimated average planning cost of US$1.4 B p.a. for thirteen years is miniscule compared to the estimated average detailed design and construction cost of US$1.333 T p.a. for thirty years. Combined the total is US$1.3344 T p.a. for thirty years, but this still rounds to US$1.3 T p.a.

8.4. Feasibility

A preliminary cost of US$1.3 T p.a. for thirty years demonstrates that the costs of planning and building 2000 new cities in the great arc of growth from West Africa through the Middle East, across Asia and into the Western Pacific is not beyond the G20 countries and their combined gross domestic product (GDP) of US$78.4 T p.a. (in 2014), as illustrated in figure 24.

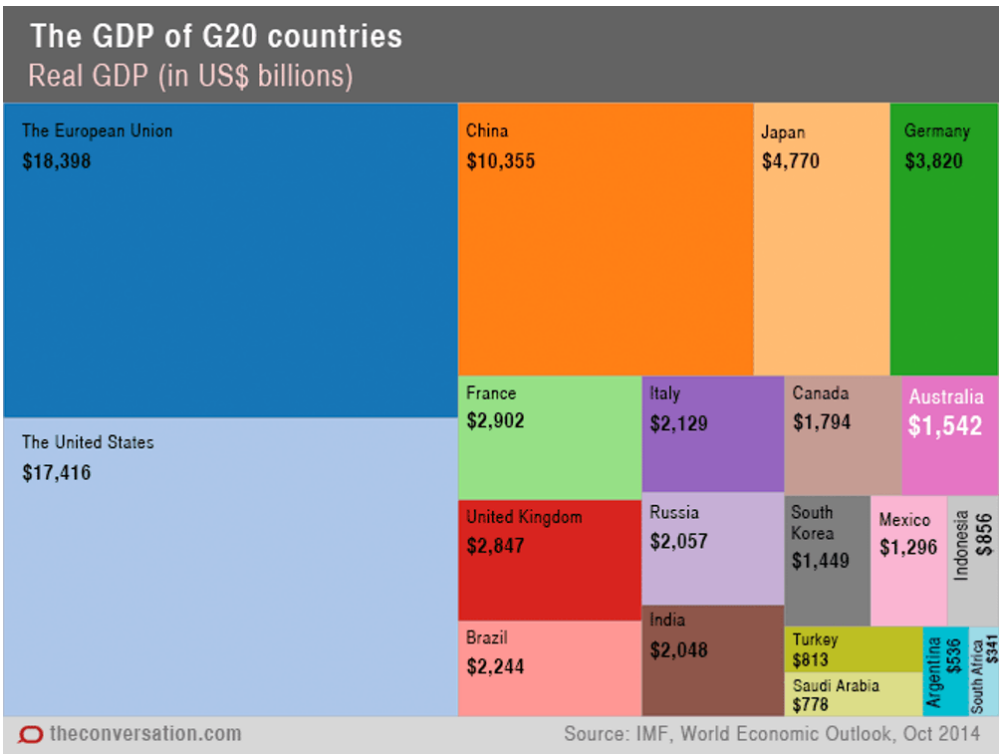


Figure 24: Gross Domestic Product (GDP) of the G20 countries in 2013-14

However, while it is economically feasible for the G20 countries to allocate 1.7% (US$1.3 T out of US$78.4 T) to solving rapid massive third-world urbanisation, it must be recognised that there is little likelihood of a political consensus to deliver that proportion of these countries' wealth in any one year, never mind a consistent policy over more than thirty years. Therefore, some other scenarios should be explored.

For example, if the design and construction costs of Bahria Town are accurate, and can be replicated across the Third World, then the average annual cost reduces to $67 B p.a., which is only 0.085% of the G20's GDP. This is more realistic, but would still require the leadership of a Winston Churchill or Harry Truman to deliver a G20 wide consensus. A further difficulty is that the Bahria development model is premised on the purchase of properties by those with a middle-class income in that market, it will therefore not result in the emptying of dark satanic slums and impoverished shanty towns for a better future in master planned cities "dense with skyscrapers gleaming like the nylon bristles of a brand-new toothbrush". (Blake, 1804; Calvino, 2002, p. 308)

An alternate, free-market plan would require a private consortium to fund the planning effort (US$1.4 B p.a. for thirteen years) and a single donation per city (spread over, say five years) of one billion US dollars (see Bahria Town Karachi in figure 22 above) to provide the initial infrastructure, possibly in return for naming rights. Perhaps the time will come when no self-respecting multi-billionaire would be able to resist the attraction of having a city named after them! The cities would need to be charter cities, meaning that citizens purchase their citizenship with cash or labour. This requires that the master plans provide for the sort of urbanism that is sufficiently dense to create an economically sustainable city, but able to be built with basic building skills and materials, for example the sort of dense urbanism of the older European cities discussed above at section 6.

Of course, all options would benefit from the fact that the economy of cities is strongly circular, meaning that the initial cash injection generates jobs that pay wages that are spent on rent and goods within the city, which then generate profits that fund developments that generate jobs, etc. However, this requires good governance, a planning consideration that must also be addressed if the full benefits of planning, designing and building 2000 cities in the Third World are to be enjoyed by the citizens of those cities. This consideration could possibly benefit the charter cities option, provided that the internal governance of the city is strong enough to resist the interference of a corrupt national government.

Whichever model is adopted (and it could be a combination of one or more approaches) it is absolutely vital that these 2000 new cities provide very high-level triple-bottom-line outcomes. With good master planning they should start with good environmental outcomes and, as they should end migrations of desperation away from home countries, they have a head start in good social outcomes. However, there is little doubt that economic sustainability will require significant advances in the quality of governance in some of the countries in which these cities will be built. The issues raised in this simple statement are well beyond the scope of this paper, but must be addressed as part of this project. Given the time imperative it is necessary that such studies and proposals be conducted concurrently with the initial master planning phase and monitoring of the effectiveness of improvements in governance will, necessarily, last for many decades.

9. Conclusion

Urban planners and designers are faced with the task of housing an additional three billion people in towns and cities by the year 2050. This is the equivalent of building six one million-person cities every month for forty years. If climate change displaces another 200 million people the task will be that much greater. It is truly one of Alejandro Arevena's "3S Problems": a problem that is simultaneously large scale, requires a speedy response and must be dealt with by individuals or teams suffering a scarcity of means.

Compounding this problem, but also demonstrating that it might be part of the solution, the developing economies are generating large scale employment in their urban areas, some 900 million jobs in the thirty years from 1980 to 2010, but most of these jobs require the level of education that only a well-designed and managed large town or a city can provide.

China, since the 1980's, and India more recently have recognised this issue and responded with massive city building or urban improvement programs, but only one-third of the additional three billion new urban dwellers are expected to be in China, India and Nigeria, the remaining two-thirds will be in the countries around those countries: a massive arc stretching from West Africa, through the Middle East, across Asia and into the Pacific.

Clearly, if massive new urban areas are required very quickly, the planning process must be fast and reliable, and conducted within, or for, efficient, well-managed planning agencies. This requires not only the adoption of all that the new technologies have to offer, but also the development of a plan making paradigm that optimises the application of that technology in a way that produces good urbanism. In short a planning paradigm that avoids the possibility of "garbage in, garbage out".

The most significant advances in the understanding of urban areas and in the practice of producing good urban planning, and built outcomes, has been by the movement known as the New Urbanism. Three of these advances, the charrette, form based codes and transect planning are particularly relevant. In particular, the combination of transect-based planning and form based codes gives the opportunity to develop the New Urbanism further towards a systemisation that simultaneously enables localisation (perhaps, the core conundrum of urban planning across the ages). Success will enable automation of the approvals process with the possibility of some eighty percent of applications being approved, on-line, almost in an instant.

However, there is no time to lose waiting for such technological improvements, we need to start right now. The paper has demonstrated that if the funds and resources can be marshalled and fewer than one hundred planners and related professionals and support staff are deployed on seven new city projects within twelve months, then we can plan and build, from now to the year 2050, new urbanism sufficient to enable an additional three billion people to live, learn, work and play in good, new cities and towns.

10.References

Agrawal, A., Gans, J. and Goldfarb, A. (2018) *Prediction Machines: The Simple Economics of Artificial Intelligence*, Harvard Business Review Press.

Arevena, A. (2014) "My architectural philosophy? Bring the community into the process", *TED Talk*, posted November 2014.

Batty, M. (1997) "Cellular Automata and Urban Form: A Primer", *Journal of the American Planning Association*, 63:2, 266 — 274)

Batty, M. (2013) *The New Science of Cities,* Cambridge, MA: MIT Press.

Blake, W. (1804) *Milton, a Poem in 2* Books, London: W. Blake.

Borys, H., Talen, E., and Lambert, M. "The Codes Study" accessed at the website *PlaceMakers* (How We Teach> Form-Based Codes?> You're not alone).

Brito, L. and Smith, M. S. (2012) "State of the Planet Declaration", a communique issued following the *Planet Under Pressure* conference, London, 26-29 March 2012.

Brown, O. (2008) "Migration and Climate Change", *International Organization for Migration: Research Series No. 31*. Geneva: International Organization for Migration.

Caldicott, H. (2017) *Sleepwalking to Armageddon - The Threat of Nuclear Annihilation*, New York: The New Press.

Calvino, I. (1972) *The Complete Cosmicomics,* translated from the Italian by Martin McLaughlin, Tim Parks and William Weaver, Boston & New York: Houghton Mifflin Harcourt, 2014.

Carter, K & Moir, S (2012) "Diagrammatic Representations of Sustainability – a Review and Synthesis" at pp. 1479–89 of Smith, S D (ed.), *Proceedings 28th Annual Association of Researchers in Construction Management (ARCOM) Conference*, Edinburgh, UK, 3-5 September 2012.

Ceballos, G., Ehrlich, P. R. and Dirzo, R. (2017) "Biological annihilation via the ongoing sixth mass extinction signalled by vertebrate population loses and declines", *PNAS Plus*, 10 July 2017.

CEDA (2015) "Australia's Future Workforce", Committee for Economic Development of Australia (CEDA), 16 June 2015.

Centre for Applied Transect Studies (2016). Accessed at http://transect.org/index.html, June 2016.

Dennehy, J (2019) "UN chief says world faces fight for its life over climate change", *The National*, 30 June 2019 (Accessed at https://www.thenational.ae/uae/environment/un-chief-says-world-faces-fight-for-its-life-over-climate-change-1.880863 on 19 July 2019).

Dobbs, R., Madgavkar, A., Barton, D., Labaye, E., Manyika, J., Roxburgh, C., Lund, S., Madhav, S. (2012) *The World at Work: Jobs, pay and skills for 3.5 Billion people,* for *McKinsey Global Institute*, June 2012.

Duany, A and Talen, A (2002) 'Transect Planning', *Journal of the American Planning Association*, 68:3, 245-266.

Duany, A., Sorlien, S. and Wright, W. (2008), *The SmartCode – Version 9 and Manual*, Miami: Centre for Applied Transect Studies.

Furman, J., Holdren, J. P., Muñoz, C., Smith, M. and Zients, J. (2016) "Artificial Intelligence, Automation, and the Economy", Washington: Executive Office of the President, December 2016.

Gans, H. J. (1968) *People and Plans: Essays on Urban Problems and Solutions*, Basic Books.

Goldie, E. S. (2017) "The Jobless City – Revolution or Paradise?", 53rd ISOCARP Joint Congress, Portland, OR, USA, 24-27 October 2017

Goodman, R. (1972) *After the Planners*, Simon & Schuster.

Helmert, V. (2018) personal correspondence from Dr Volker Helmert of the Coordination Staff for Refugee Policy at the Federal Chancellery, Germany, 22 Oct 2018.

Howard, E. (1965) *Garden Cities of To-Morrow*, Faber & Faber.

Jacobs, J. (1961) *The Death and Life of Great American Cities*, Random House.

Katz, P. (1994) *The New Urbanism – Towards an Architecture of Community*, McGraw Hill.

Kolbert, E. (2014) *The Sixth Extinction - An Unnatural History*, Bloomsbury, London.

Kunstler, J. H. (1993) *The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape*, Simon & Schuster.

Meadows, D. H., Meadows, D. L., Randers, J. and Behrens III, W. W. (1972) *Limits to Growth*, Universe Books.

Ortiz, Pedro B. (2014) *The Art of Shaping the Metropolis*, McGraw Hill Education.

Posin, D.Q. (1948) Mendeleev, The Story of a Great Chemist, New York: McGraw-Hill.

Prince of Wales, HRH The, Juniper, T. and Skelly, I. (2010) *Harmony: A New Way of Looking at Our World*, London: Blue Door.

Sorlien, S., image accessed from the website of the Centre for Applied Transect Studies (image library> rural-urban transects).

Stueteville, R. (2004) "CNU XII brings New Urbanism home to a city of urban innovation" *A Public Square*, Congress for the New Urbanism.

Talen, E. (2013) *Charter of the New Urbanism*, 2nd Edition, Congress for the New Urbanism.

UN News (2016) 'HABITAT III: UN conference agrees new urban development agenda creating sustainable, equitable cities for all'. Available at https://news.un.org/en/story/2016/10/543392-habitat-iii-un-conference-agrees-new-urban-development-agenda-creating (Accessed 19 July 2019).

United Nations (2014) "World Urbanization Prospects: The 2014 Revision", Department of Economic and Social Affairs, Population Division, United Nations (custom data available at http://www.un.org/en/development/desa/population/, (Accessed July 2015).

United Nations (2017) *New Urban Agenda* (English) 2017. (Adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador, on 20 October 2016.)

United Nations (1992) *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3 14 June 1992* (vol. I, Resolutions Adopted by the Conference), New York: United Nations.

Vikram, K. (2014) "Modi's vision of 'smart cities' takes shape as government commits to delivering first three hubs by 2019", *Mail Online India*, 29 August 2014.

Wadha, V. (2015) "We need a new version of Capitalism for the jobless future" *The Washington Post*, July 20th, 2015.

Wheeler, S M (2013) *Planning for Sustainability* (2nd edition), Routledge.

Wikipedia (2016a). Available at https://en.wikipedia.org/wiki/Johann_Heinrich_von_Thünen (Accessed on 25 June 2016).

Wikipedia (2016b). Available at https://en.wikipedia.org/wiki/Central_place_theory (Accessed on 25 June 2016).

Wikipedia (2019). Available at https://en.wikipedia.org/wiki/List_of_United_States_cities_by_population_density (Accessed on 20 July 2019).

World Bank, (2014) "Urban China - Toward Efficient, Inclusive, and Sustainable Urbanization", World Bank.

Zolberg, A. R. (2006) *A Nation by Design: Immigration Policy in the Fashioning of America*, New York: Russell Sage Foundation.

Research Paper

A 21ST CENTURY NATIONAL ORDINANCE

Planning the physical disposition and use distribution of a Nation

David Green, Perkins&Will and Doug Allen Institute; Unites States
Sulaiman Al Rashad, Kuwait Municipal Authority; Kuwait
Paul Knight, Doug Allen Institute; United States
Nicolò Cammelli, Perkins&Will; Italy

Abstract

This paper outlines the implementation of a National Ordinance across the country of Kuwait. The ordinance is a platform that is based on a seximal system of measurement for spatial and data driven planning. This system simultaneously provides a spatial framework for optimized connectivity as well as an analytical platform for projecting and tracking development across an entire nation.

The national master plan for the country of Kuwait, the Fourth Kuwait Master Plan 2040, utilizes a National Ordinance that serves as the planning and development platform for the country. The ordinance is based on the Land Ordinance of 1785, Jefferson's plan for most of the United States, however, it is restructured to address changes in context, technology and operation. In this case the Ordinance provides parallel Geographic Information Systems for both spatial implementation and data analytics. The intention is to use the Ordinance to address the difficulty in planning for the future of a complex system such as an entire country.

This paper provides 1) a brief introduction to the idea of an Ordinance, 2) the historical context for the idea of a national planning platform, or ordinance, 3) historic examples and analyses, 4) the underlying concepts and methodology for the proposed ordinance, and 5) a detailed analysis of the proposed Kuwait National Ordinance.

Keywords

Land Subdivision, National Ordinance, Master Plan, Smart Planning, Resilience

1. National Ordinance

1.1. Introduction to the National Ordinance

In the scales of human development, the largest scale tends to have the largest impact. A Nation's constitution affects everyone, while a local ordinance is limited in scope. It is the built-in tenacity at the largest scales that make the influence of broad efforts worthy of more intense study. As such, this paper begins at the scale of the country of Kuwait with the proposed National Ordinance.

In general, a National Ordinance is a regulatory and guiding document to facilitate the distribution of land across an entire country. It is comprehensive by necessity. It comprises methodologies, maps, principles, and policies for subdividing vast territories. While it is prescriptive in its methods, it can materialize incrementally and is typically flexible and adaptable. It has broad impact on the country, but it can also provide guidance and direction for finer details that are to be applied later. Thus, it has the potential to impact everything from the general distribution of uses across a large area to the character of the local

areas that emerge in the development of the country. From a planning perspective, it is a document and methodology that breaks down vast dimensions into manageable and workable units.

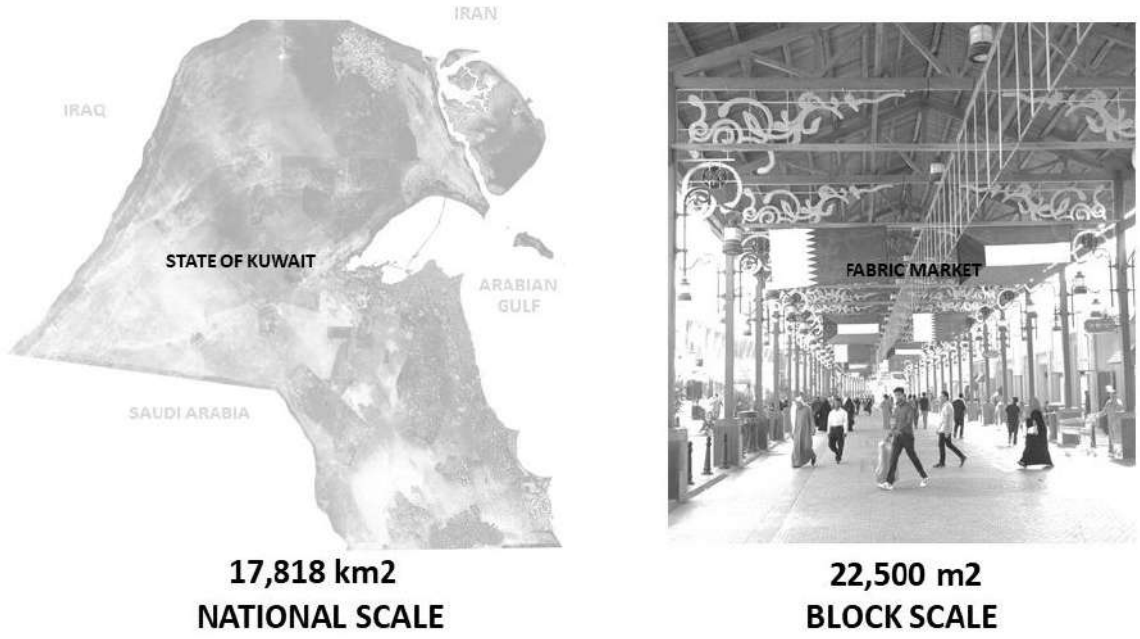


Figure 1 Scales comparison (©Fourth Kuwait Masterplan)

1.2. Introduction to the Kuwait National Ordinance

The national master plan for the country of Kuwait, the Fourth Kuwait Master Plan 2040 (4KMP), utilizes a National Ordinance that serves as the planning and development platform for the country. The ordinance is loosely based on the concepts and applications underpinning the Land Ordinance of 1785, Jefferson's plan for most of the United States, however, it is restructured to address changes in context, technology and operation. In this case, the Ordinance provides two parallel Geographic Information System (GIS) platforms based on a grid system. The first platform is for physical spatial implementation and is structured around a dimensional system that facilitates particular outcomes relative to connectivity and the physical disposition of the public and private realms. The second platform is for the collection, organization and analysis of data to facilitate timely and relevant management of the development and monitoring process. The intention is to use the Ordinance to address the difficulty in planning for the future of a complex system such as an entire country.

Figure 2 demonstrates the parallel platforms, with the grid providing a physical, dimensional structure that precipitates future development that is connected and adaptable, while simultaneously providing an updatable and analytical platform for the distribution of uses and supporting resources for the expanding city and new cities and towns that will emerge in the coming decades.

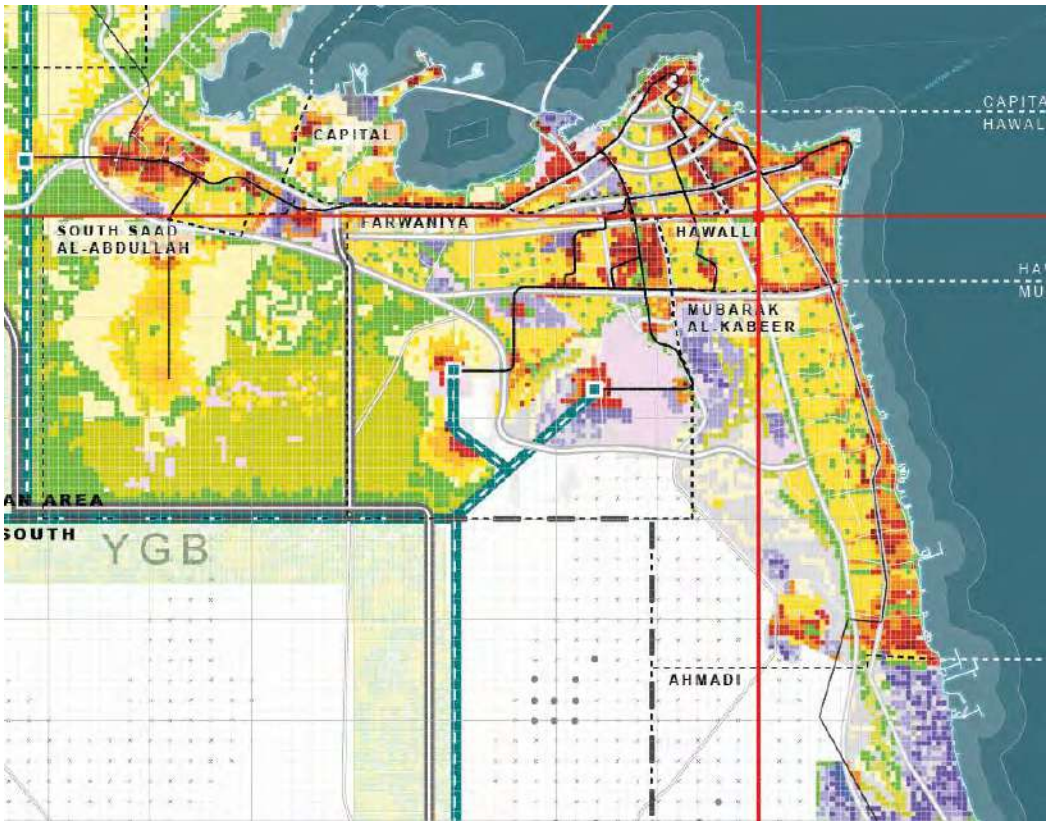


Figure 2 4KMP National Plan (©Fourth Kuwait Masterplan)

2. Historical Context for a National Ordinance

2.1. The evolution towards the 21th Century National Ordinance

A National Ordinance is fundamentally a subdivision program for an entire country. It is a way of organizing the patterns of settlement and development in a growing and changing city, town or other inhabitation. The context and history of these efforts are critical to understanding the opportunities a contemporary national ordinance afford. They are also critical to our understanding of how these efforts evolved over time, and how they were, or were not, successful.

In the process of examining past examples, two scales are discussed, the national (or large-scale) and the city (or small-scale). There is a relationship between the two that is critical to the operation of the Kuwait National Ordinance, and as such, both should be clearly explained.

The examples include, from the ancient world, Miletus (small-scale) and the Roman Centuriation (large-scale), and from the Colonial world, Philadelphia (small-scale) and the U.S. Land Ordinance of 1785 (large-scale).

2.2. The Ancient World

A very early urban planner, Hippodamus of Miletus, was charged with laying out a new Greek settlement along the Aegean Sea in what is today Turkey. To do this, he utilized a grid structure that projected a future city comprised of streets at regular intervals, organized perpendicular to each other. The result was a regular grid pattern that showed public streets and the resulting blocks. In addition, he indicated where specific public buildings and places would be located in the city.

The city plan is shown in Figure 3. It is strikingly simple for a city plan in relation of the complex, multi-volume planning documents that are used to plan cities today, however, it is an early representation of the general way cities would be planned from its inception to the early 20th century. The planning of cities remained little changed for 2500 years, and this simple system produced some of the most liveable, adaptable, sustainable and resilient settlements that we still know and enjoy today.

Miletus is not an example of a successful city, rather an early example of the process of planning cities as simple projections of the public and private realms, devoid of uses, other than the critical public buildings and places that supported the cities. It demonstrates the lasting process more than the lasting city itself. It also represents a structure that provided a backdrop for the emergence of civilization over the past two and a half millennia.

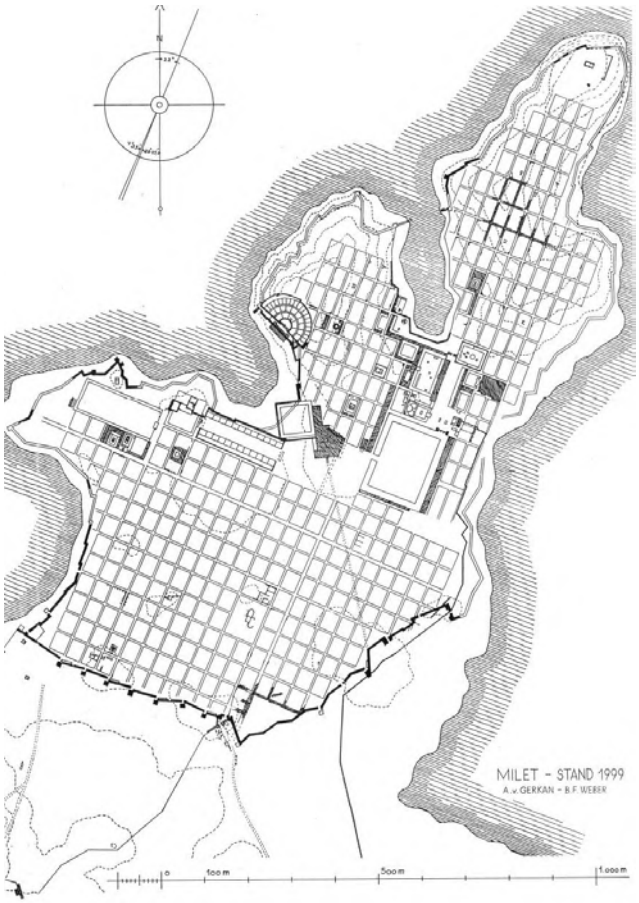


Figure 3 Plan of Miletus around 470 BC (Magli, 2007)

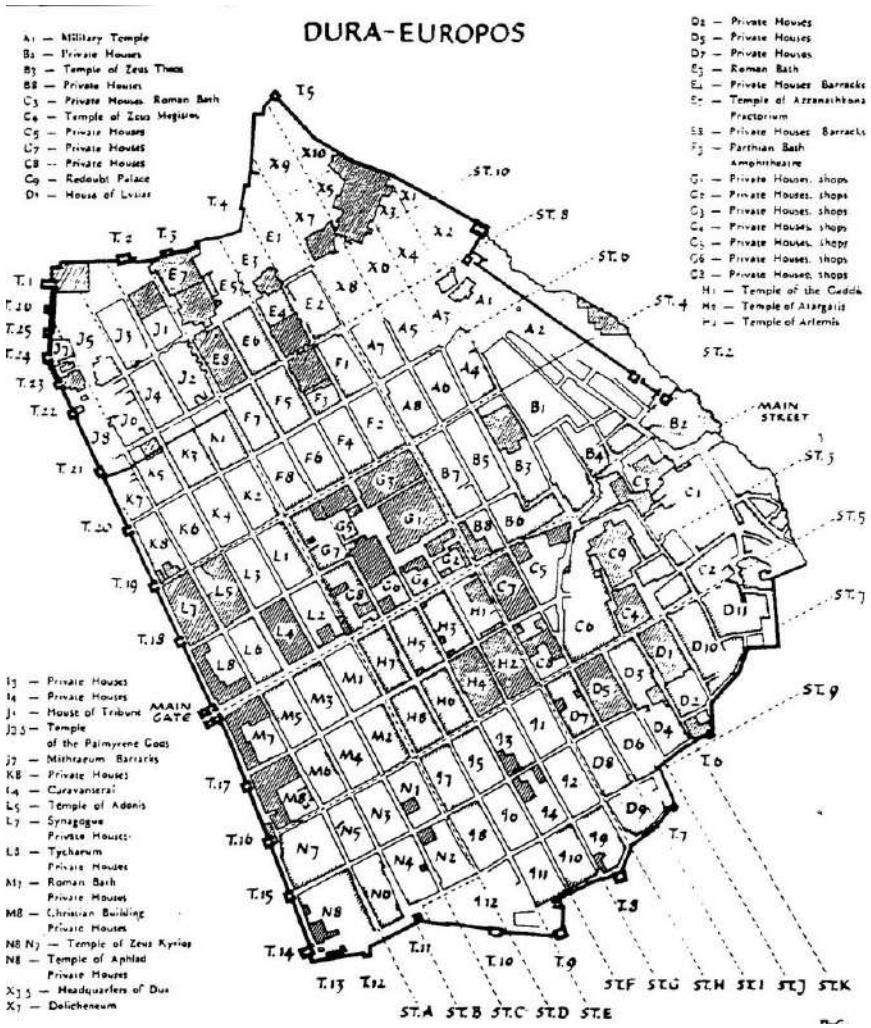


Figure 4 Plan of Dura-Europos (Quadralectic Architecture, 2016)

From Greece, such methodology for city planning and land organisation was taken up by the Romans and their emerging conventions for planning new cities, as evidenced by the diagram below in Figure 5. The city is conceived of with a sacred point of departure, the Axis Mundi, at the intersection of the *cardo* and the *decumanus*, but the execution of the plan is essentially the same as that of Hippodemus at Miletus, a projection of the public realm as streets and the resulting blocks, some of which are identified as important public buildings and places.

The Romans, however, were expanding into an empire, and this necessitated a broader, larger-scale effort to organize land that was both captured and restructured according to Roman principles, but also land that was to be developed as everything from farmland to new urban centers. The key element in this effort was the Roman Centuriation, a system that supported the initial laying out of the two main streets.

Figure 5 Plan of Timgad (Finley, 1977)

The specific process began with the surveyor identifying a central viewpoint, the Umbilicus Agri, through the gates of the city into expansion territory. Two main perpendicular roads, the *cardo maximus* and the *decumanus maximus* were laid out at the designated intersection to form the backbone of the emerging series of streets and roads. In many cases these roads still exist as primary roads linking local villages to main towns, illustrating the lasting presence of public rights of way once they are put in place. The territory would then be subdivided to create a system of parallel and perpendicular streets, *limites quitarii*, dividing the territory into square resultant plots, called saltus and further subdivided into *centuria*. At the most local, granular level, the subdivision process resulted in *heredia*, and further *jugera*. In all this system provided a method for organizing land on a large scale, creating connections between settlements and resulting in highly connected, dense networks of streets and blocks.

As with Miletus, the Roman Grid provided a system of dimensional organization that resulted in boundaries and street centerlines that projected what was public (the streets) and what was private (the resulting parcels of land).

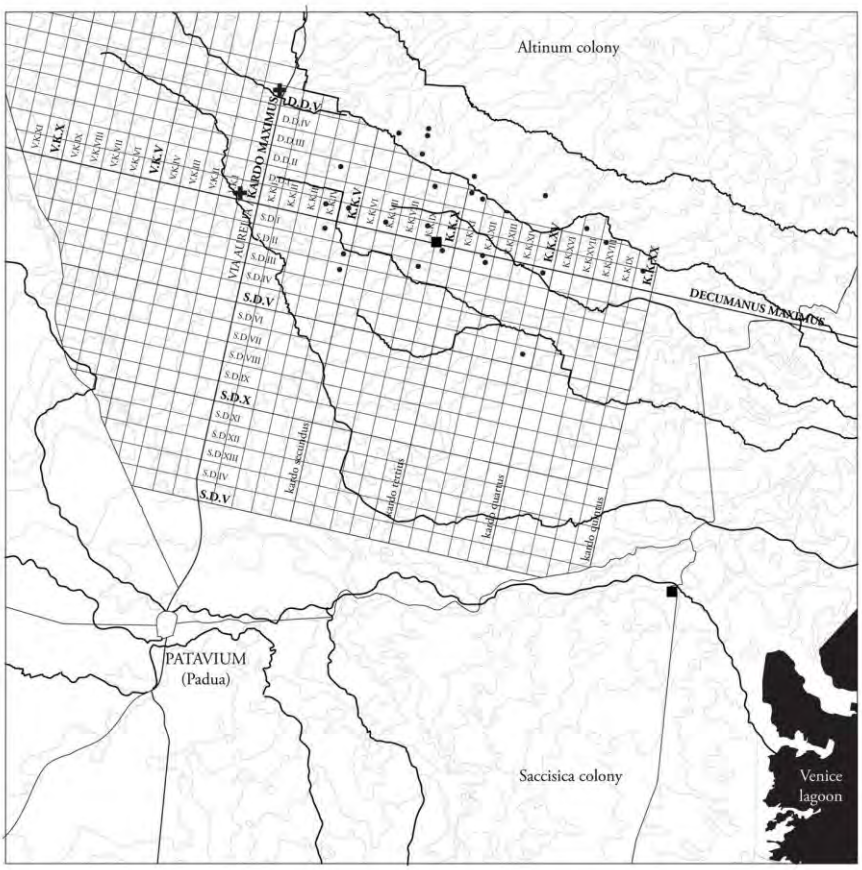


Figure 6 The Roman centuriation between Padua and Venice (Tavone, 2018)

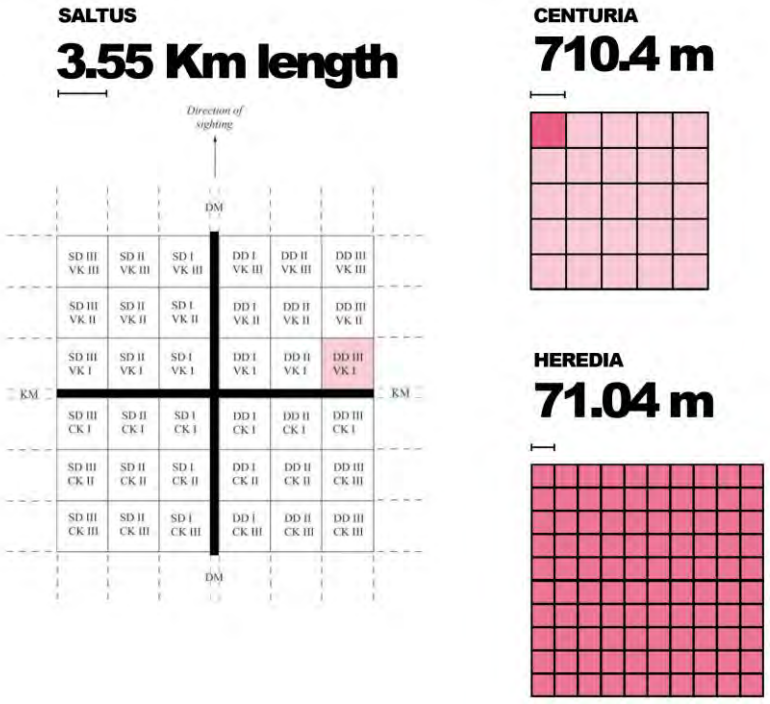


Figure 7 The Roman centuriation between Padua and Venice (Pasquinucci, 2014)

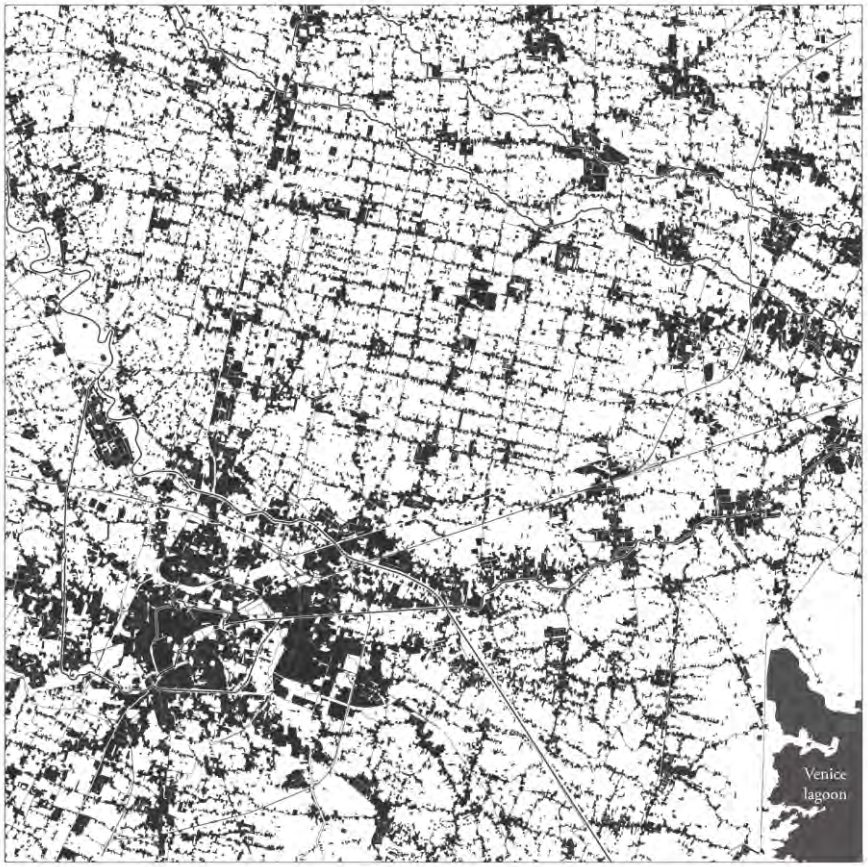


Figure 8 The territory of the Roman Centuriation between Padua and Venice today (Tavone, 2018)

The two preceding examples describe the underlying logic embedded in the subdivision process and the scalar impact of the system. Miletus describes the beginnings of the planned city and the intentional construction of a physical settlement based on the political structure that, spatially at least, balances the obligations of the collective and the rights of the individual. Roman expansion builds on this logic to enact a system that organizes not only the local distribution of land but also the organization of a nation, or an empire.

This methodology continued as the foundation of the subdivision of land throughout the first and second millennia, to a greater or lesser extent, including as it was adopted by the colonies in North America, and then the emerging nation, the United States. These are exemplified by Penn's plan for Philadelphia and the Land Ordinance of 1785, outlined in the following section.

2.3. The Colonial World

While Miletus and the Roman planning process exemplified a logical systemization of land subdivision, the remoteness in time of both belies the impact of the systems. It is difficult to see what the future held for Miletus, or for the Roman systems, because much of the ancient world has been lost. However, through more recent efforts, primarily in the Colonial World, it is possible to track and understand the additional value these systems had on the development of human settlements.

In the case of William Penn's plan for Philadelphia, the underlying logic of Miletus is clear. Penn lays out a very simple plan for the founding of the colonial town, straddling the land between the two rivers. In it, he places a central square, that was originally intended to remain an open space, and is, at least spatially and hierarchically, reminiscent of the Axis Mundi of ancient Rome. It locates a point of departure for the survey and subdivision of land into two distinct categories, public streets and squares, and private blocks and a parcel system for private development.

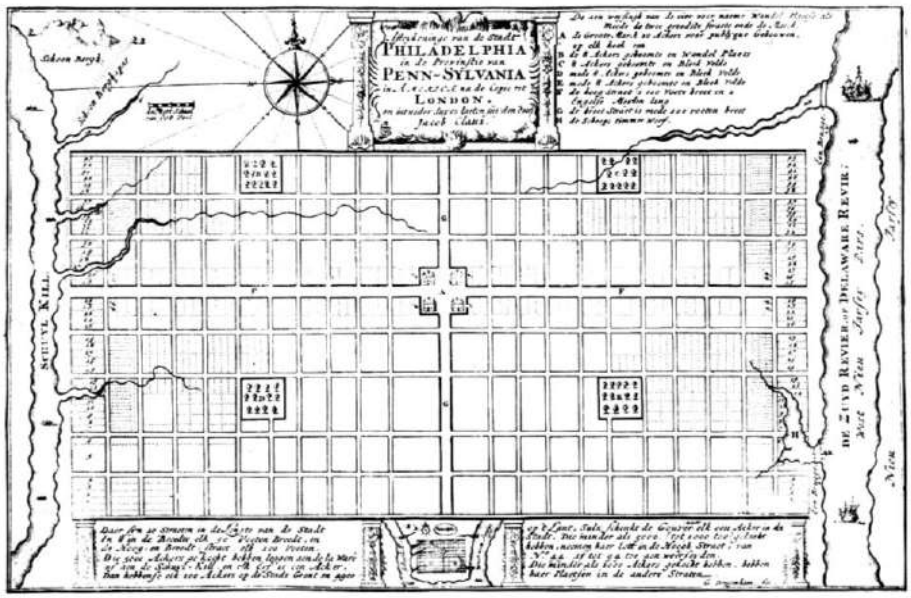


Figure 9 A Portraiture of the city of Philadelphia in the Province of Pennsylvania in America (Penn and Holme, 1684)

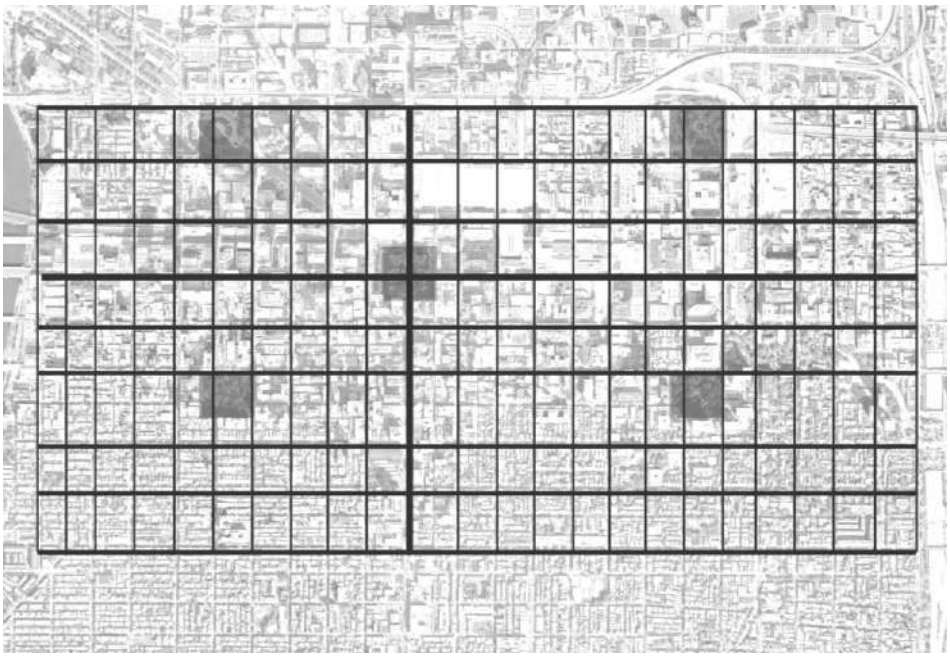


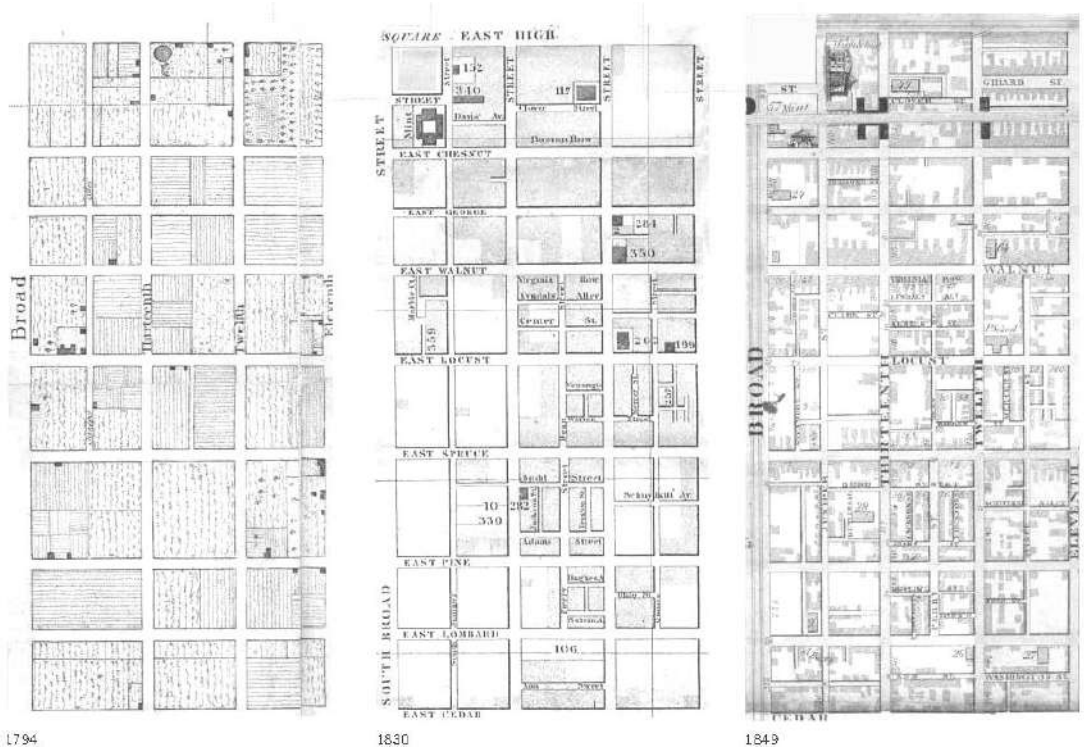
Figure 10 Penn's plan still visible in Philadelphia today (Google Earth, 2019)

Unlike Miletus and the ancient Roman world, we don't have to speculate to understand the outcome of this planning platform over time. It exists today, in a form that could never have been conceived by Penn at the time of its original implementation. The series of public rights-of-way that his plan laid out are still in existence today; not as excavated ruins but as thriving streets in a large, dense city.

Figure 10 demonstrates the resilience of the simple subdivision plan, and its ability to accommodate, or adapt to, a future that could not have been contemplated at its outset. However, the basic characteristics of the plan remain. The city is a dense network of public rights-of-way that provide an environment that facilitates diversity of projects, walkability and efficiency of resource distribution. The same streets that once carried horse and buggy are now carrying automobiles and, beneath the surface, power, water and other utilities that keep the city running.

Understanding the city as it exists today, and the significant difference in uses and development from its original time is a clear demonstration of the adaptability of the system, but even more demonstrative is the tracking and analysis of the development process over time, understood at intervals, and clearly illustrating not just the ability to adapt to the 21st century, but to adapt to all changes across the more than 330 years since the plan was put to paper.

Figure 11 indicates a series of plans that identify development at different stages of the city's existence. From this, it is possible to understand how the system of subdivision (highly connected streets and small blocks) could originally be occupied as agricultural plots, then move through a series of continued redevelopment from small residential buildings to more dense, more diverse buildings and projects, finally ending up, today, as an extremely dense, high-rise laden city, accommodating far more people, activities and technological advances than could have ever been conceived of at its inception.



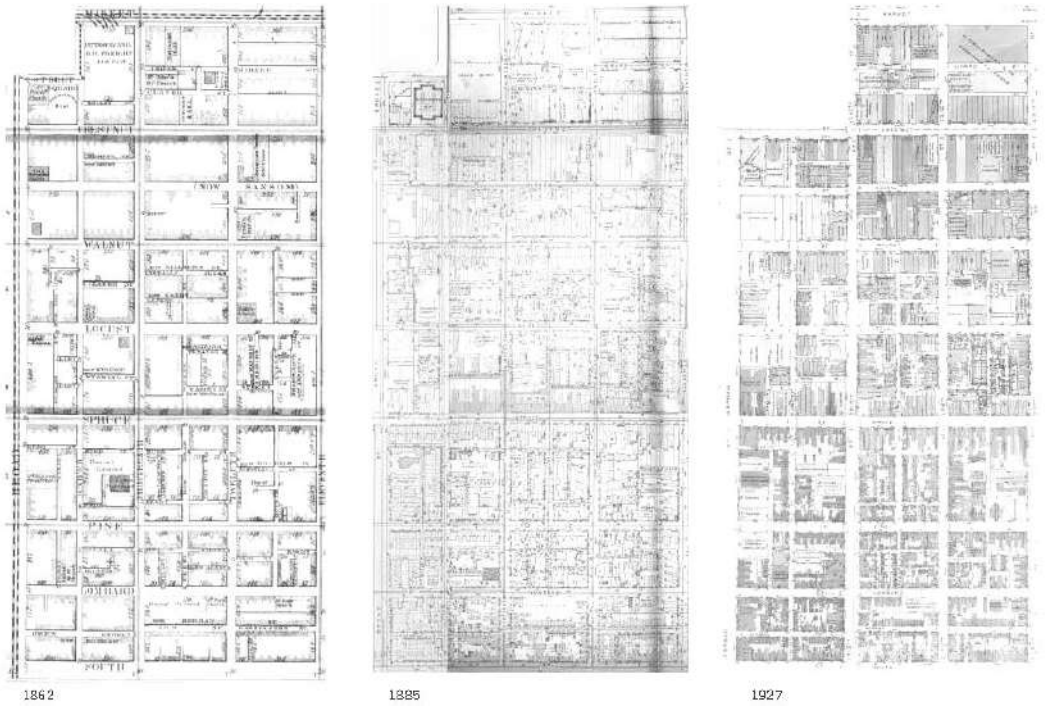


Figure 11 Philadelphia's evolution 1794-1927 (Allen, D., Green, D., Knight, P. 2013)

This series demonstrates the adaptability of the system of subdivision that was the bedrock of city organization and planning for more than two-thousand years. In forms more or less the same, cities such as New York, Buenos Aires, Delhi, Sydney, and Alexandria, Egypt have carried these basic characteristics in their initial conception and execution. But it is the Land Ordinance of 1785 that recaptures the larger-scale intention of the Romans and reconceives of it as a method for large-scale organization and subdivision of land at the national level.

Prior to the Revolutionary War between the United States and England, land in the colonies was allocated through the process of surveying parcels, staking a claim to those parcels, and then working or developing the land. Cities in the colonies, as with other cities at the time, were planned, but the general larger-scale surveying was performed by companies engaged in the speculative selling of staked claims.

After the war however, it was necessary for the nascent federal government to raise money to pay the debts of war, particularly to the soldiers who had fought in it. This resulted in a conceptual leap in terms of the subdivision of land in the country's expansion. Instead of requiring land to be surveyed prior to identification and sale, the Land Ordinance of 1785 and the Northwest Ordinance provided a method for projecting a system of subdivision and organization into territories that had yet to be surveyed. This system was derived from the ancient Roman system discussed above, however the system itself was structured to provide for the particulars of post-colonial America.

The challenge was simple at the time; how does one organize and manage land that had yet to be mapped or occupied. The specific solution was innovative and provided a surveying and organizational method that resulted in a geometric grid to guide the future growth of the nation, which continues today as the major organizational structure for the country.

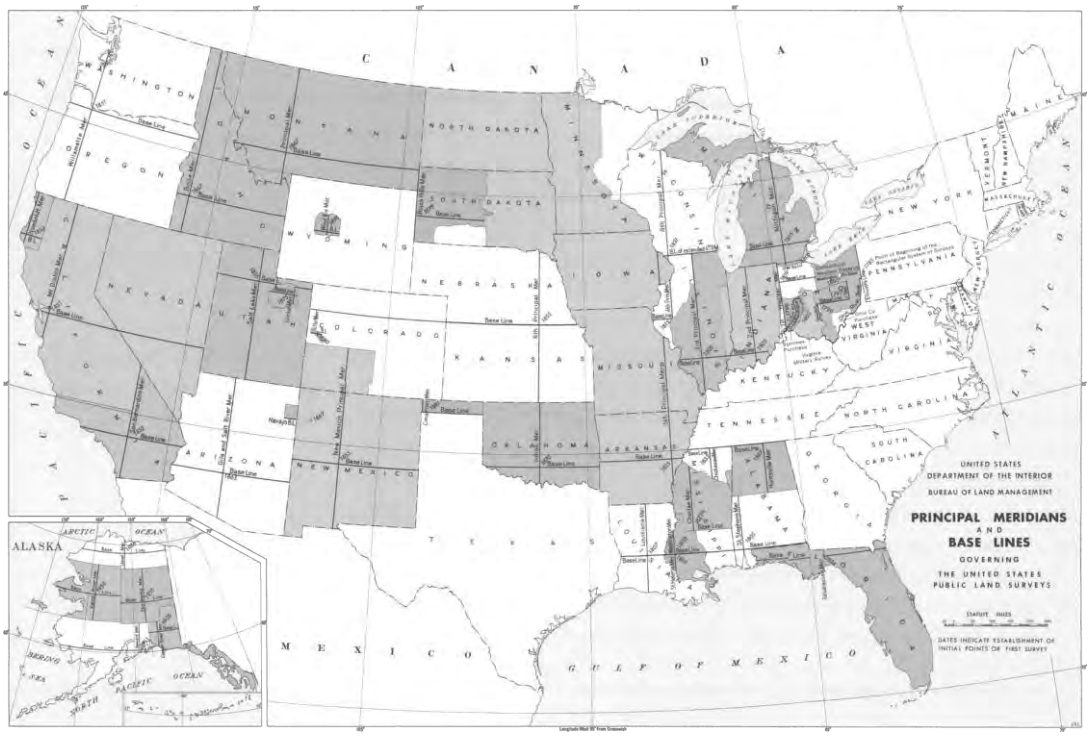


Figure 12 Principal Meridians and Base Lines governing the United States Public Land Survey System (United States Geological Survey, 1988)

One of the primary outcomes from the 1785 Ordinance is its capacity to divide the scale of the country into manageable units. By linking a system of measure with a system of survey, occupation, and development, the Ordinance provided a highly adaptable system for future growth. This resulted in the Public Land Survey System, a system that provided a national framework, the Principal Meridians and Base Lines, townships, sections and subdivisions of land to 2.5 acres.

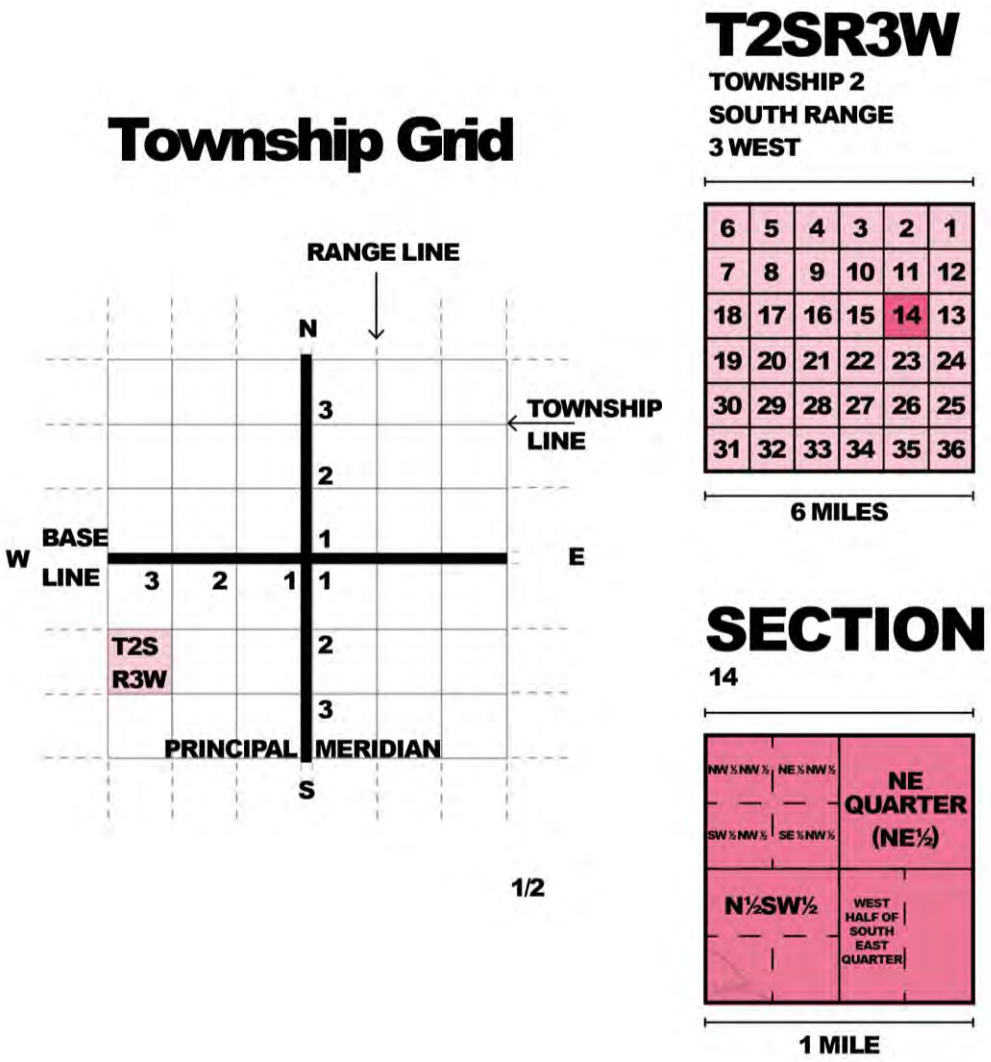


Figure 13 The Public Land Survey System (United States Geological Survey, 1988)

The United States has changed dramatically over the intervening 232 years since, yet the Ordinance still provides an adequate framework. Because its divisions were based on a set of dimensions that have proven to be flexible and useful over time (within the Imperial measurement system), any development that has occurred since the first survey has been successfully accommodated into the framework.

As with Philadelphia, the US Land Ordinances are still present in the development and operation of the nation. And as with Philadelphia, the system can be analysed and understood based on its ability to accommodate change across over more than two hundred years, and its impact can be evaluated based on its implementation.

The system has accommodated and impacted everything from agricultural uses to the form of cities across the country. However, it is important to note that, as with the Roman Grid, the Ordinance had limited discussion of land uses and instead focused on land subdivision. In fact, the only designations of use were tied to the requirement for certain sections of new townships to provide for public places, such as schools and a courthouse, much as Miletus restricted its designation of land uses to those public facilities required for the proper functioning of the city.

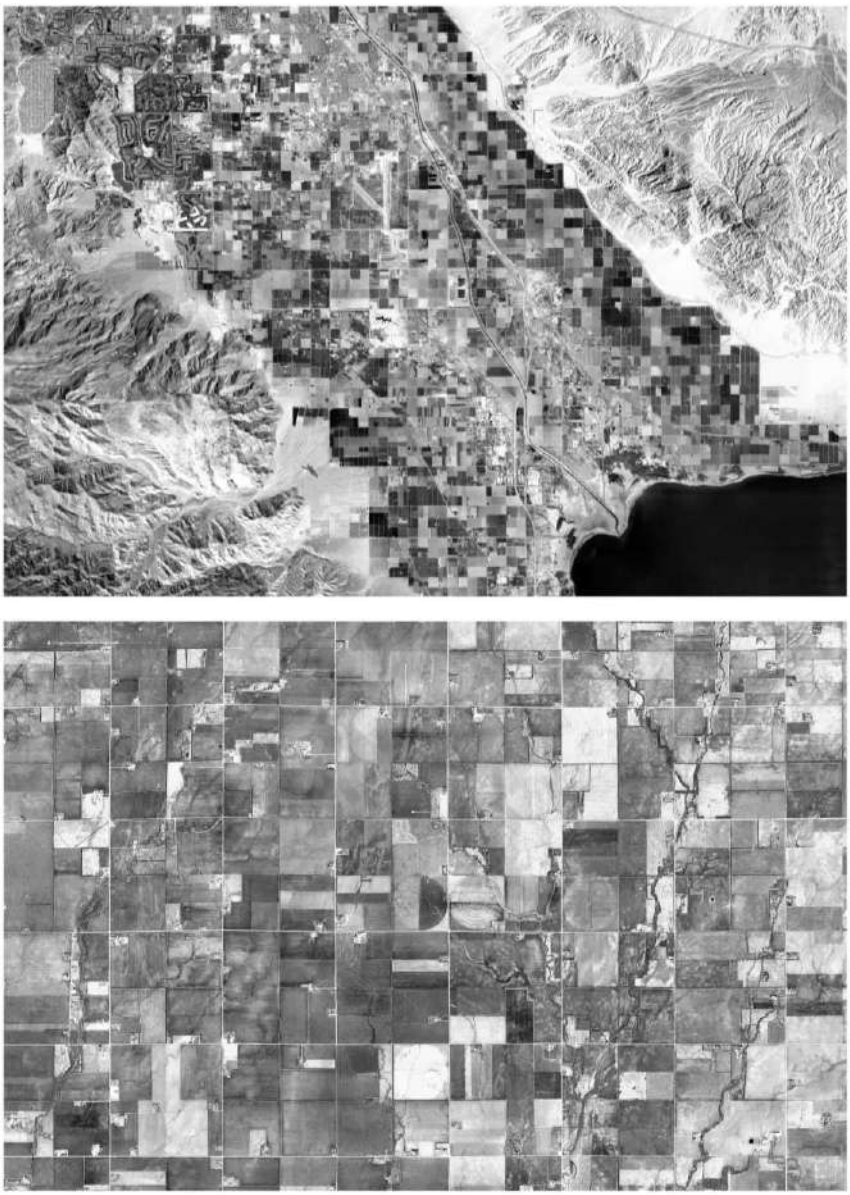


Figure 14 Results of PLSS today (Google Earth, 2019)

In practice, as the Ordinance informed land development and use, the quarter section emerged as the primary dimensional unit, a square a half mile on each side. This had the consequence of providing a development pattern that was connected at least at this scale, from agricultural use to the suburban expansion of cities. This proved beneficial in areas developed within the context of the Ordinance because it reduced the probability of extremely large, disconnected patterns of development that led to the suburbs of the east coast that weren't under the dimensional constraints of the Ordinance.

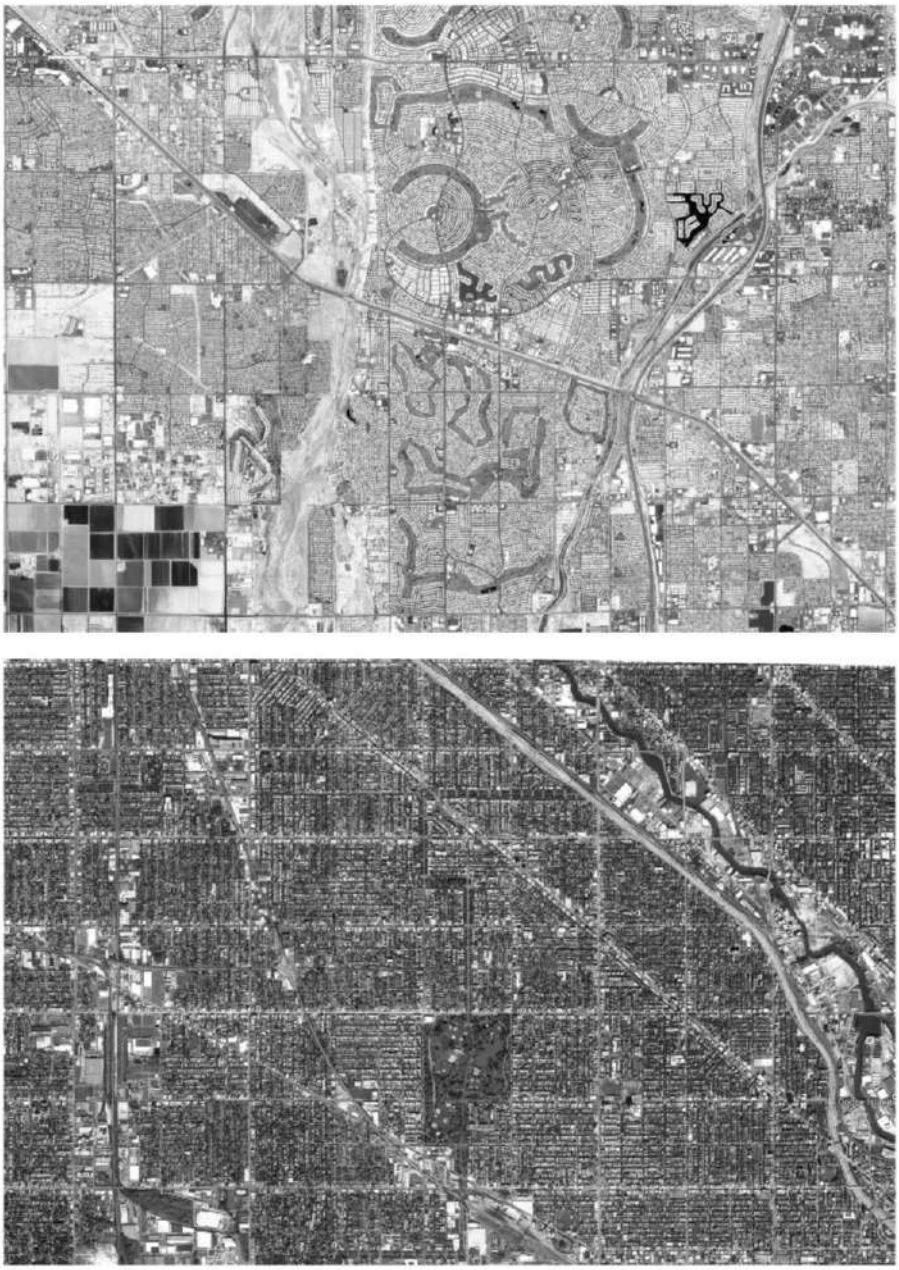


Figure 15 Results of PLSS today (Google Earth, 2019)

Figures 14 and 15 above demonstrate the impact the Ordinance had on development patterns. While the developments internal to the quarter sections are in many cases disconnected developments that follow the twentieth century model of dendritic suburbs, the strength of the section subdivision provides a level of connectivity that would have otherwise been compromised even further, as evidenced in Figure 16.

Figure 16 Suburbs in Georgia today (Google Earth, 2019)

Both Penn's plan for Philadelphia and the Land Ordinance of 1785 had practical applications and benefits to the planning and settlement process. However, they also provide a basic conceptual framework for understanding the methodology and impact of the process, and this is illustrated below.

3. Concept and Methodology for a National Ordinance

3.1. The Concept of Constitutional and Economic Orders

While the notion of a national ordinance seems to pertain to primarily large-scale planning actions it also has its roots in the physical planning of cities. Because of this relationship it is necessary to address the fundamental structure of cities to be able to more fully understand the underlying logic and application of the National Ordinance.

As evidenced in both Miletus and Philadelphia, cities that were planned, prior to the twentieth century were constituted through a simple projection of the streets and blocks that would define the physical attributes of the emerging city. At its core this action provided direction in determining the areas of the city that were to be public (streets, parks, public buildings and other parts of the city that are held by the collective) and those that were to be private (blocks and parcels for houses, offices, shops and other parts of the city that are held by the individual).

In this structure there is further identification of the two orders of land areas that are created with the constitution of a city, town or settlement. The first, aligned with the public realm, is the Constitutional Order, which is political in nature. The second, aligned with the private realm, is the Economic Order.

Every city has this a Constitutional Order and an Economic Order. They are each comprised of certain elements of the city. The Constitutional Order includes boundaries, streets, public gathering places, monuments and other collectively held, public elements of the city. The Economic Order includes development parcels, houses, farms, offices, restaurants, heavy industry, and other privately held elements of the city.

The Constitutional Order brings the collective structure of cities into being with elements that connect the past and future of the city and its inhabitants. These elements are permanent and last through time and through the changes in the city. In most parts of the developed world, the Constitutional Order is controlled by Subdivision Regulation, or some similar regulatory framework.

The Economic Order brings the individual structure of cities into being with elements that provide the operations of the city. These elements are much more transitory and tend to follow market and other external fluctuations. These elements are generally referred to as uses and are controlled by Zoning Regulations, or some similar regulatory framework charged with use allocation and distribution.

This is a series of important distinctions that illustrate the difference between these two basic elements of human settlement.

The figure below describes a diagrammatic interpretation of the two Orders and their relationship. It also demonstrates the need for the Constitutional Order, that which is made up of the permanent elements of the city, to precede the Economic Order.

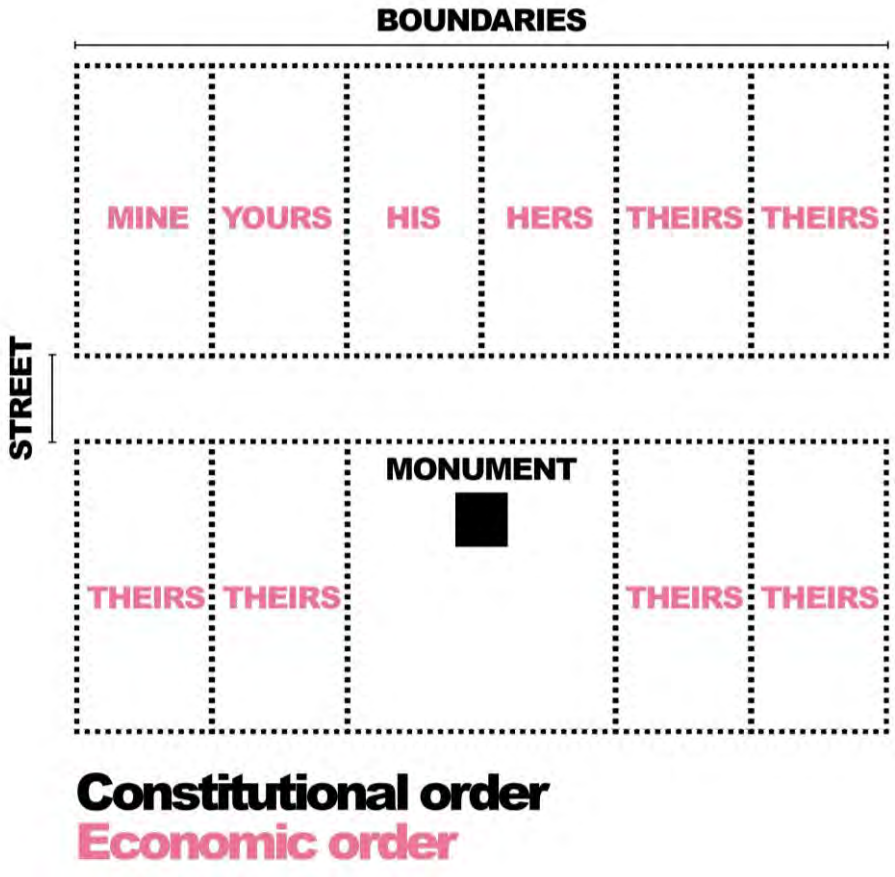


Figure 17 Constitutional and Economic Order of the city (Allen, D., Green, D., Knight, P. 2013)

3.2. Subdivision Dimensional Methodology

The dimensional construct and mathematical logic of a system of subdivision have significant impact on the functionality and efficacy of the system. This is evidenced by the adoption of the Gunther's Chain as the primary tool for surveying from the late sixteenth Century through to the early twentieth century. This simple tool with the parallel 10-based and 4-based measurement system set a course for much of the United States to be subdivided on a 66-foot module (which gives us the dimensional basis for everything from the Public Land Survey System to the Commissioners Plan of 1811 for the city of New York.

As a precursor to adoption of the dimensional construct for the Kuwait National Ordinance, two base numbers were analysed to determine the value of each as the foundation for the Ordinance. Both a 6-base system and a 10-base system were analysed to determine the most highly composite numbers.

Firstly, the number '10' is not as flexible or as fungible as '12'. '10' has four divisors and can only be divided wholly by 1, 2, 5, and 10. Any and all other divisions will result in a remainder. '12', on the other hand, has six divisors and can be divided wholly by 1, 2, 3, 4, 6, and 12. Because of these additional divisors, '12' is a more workable and fungible number than '10'; '12' has more utility than '10'. More divisors result in a number that is able to adapt to more situations, making it easier to respond to a range of needs.

Figure 18 below outlines the spatial implications of the analysis.

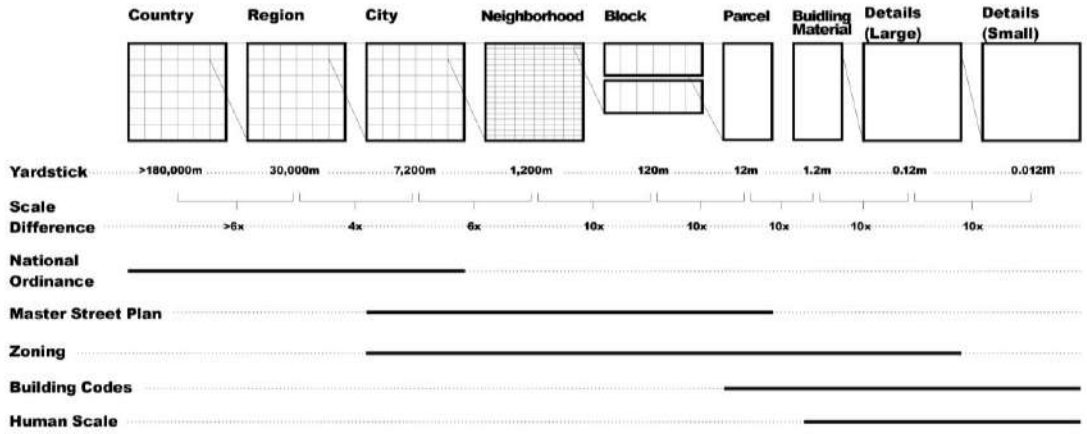


Figure 18 Theoretical subdivision based on the logic of 12 (©Knight, P.)

Numbers are repeatedly subjected to multiple subdivisions. Halving, for example, is perhaps most common; in fact, it is embedded in our own DNA. Twelve-hundred and its resultants can be halved four times before encountering fractions (1200 to 600 to 300 to 150 and finally to 75) while 1000 can be halved only three times (1000 to 500 to 250 to 125). But halving is not the only common method of subdivision. Thirds and fourths make frequent appearances throughout our daily lives. With this in mind, the numbers have been analyzed to determine their behavior when subjected to successive iterations of subdivisions by quarters, thirds, and halves. That exercise is shown in the two diagrams below (note that the "censor bars" are covering fractional numbers; only whole numbers are counted in this exercise).

COMMON DIVISIONS	1/4	1/3	1/2	2/3	3/4
1,000	250	-	500	-	750
750	-	250	375	500	-
500	125	-	250	-	375
375	-	125	-	250	-
250	-	-	125	-	-
125	-	-	-	-	-

COMMON DIVISIONS	1/4	1/3	1/2	2/3	3/4
1,200	300	400	600	800	900
900	225	300	450	600	675
800	200	-	400	-	600
675	-	225	-	450	-
600	150	200	300	400	450
450	-	150	225	300	-
400	100	-	200	-	300
300	75	100	150	200	225
225	-	75	-	150	-
200	50	-	100	-	150
150	-	50	75	100	-
100	25	-	50	-	75
75	-	25	-	50	-
50	-	-	25	-	-
25	-	-	-	-	-

Figure 19 Generational subdivision (Allen, D., Green, D., Knight, P. 2013)

Generational subdivision is defined here as subsequent divisions of both a number and its resultant "offspring" (e.g., 600 is an offspring of 1,200, being half of 1200; 600 itself can then be subdivided further). The diagrams above reveal the superiority of 1200 over that of 1000: 1000 only has 5 generations of subdivisions, while 1200 has 14 (i.e., 1200 is almost three times more flexible than 1000). Additionally, the "offspring" of 1200 are themselves superior to the "offspring" of 1000. The numerical fungibility of "twelveness" passes from generation to generation. This is a simple observation and characteristic of mathematics and nothing more; however, it can be readily utilized in planning.

4. The 21st Century Kuwait National Ordinance

4.1. The Vision for Kuwait

Livable places are those where people want to live, work, visit and are attractive for development. The most livable countries in the world are ones that people are drawn to because of economic opportunity

and the high quality of the living environment. Livable cities are vibrant and diverse and they have evolved over time to create complex and compelling environments rich with economic and cultural interactions and expansion. Livable places are more prosperous and their populations happier.

To deliver the vision for Kuwait's future, creating livable places in Kuwait is fundamental and the challenge is to move away from a lifestyle that has become internalized and embrace the external spaces between the buildings.

In order to realize the full potential of the country, the urban areas must be more livable using the rich cultural and urban history, diverse and complex population, strong economic foundation, and collective desire to foster transformation. Kuwait as a country has a strong foundation upon which to build this future vision. The metropolitan area of Kuwait is already a diverse and vibrant place, and by 2040 it will have a higher quality built environment with a human-focused public realm and improved connectivity.

Locating jobs close to where people live is an important part of the 4KMP vision for a livable Kuwait. To this end new settlements outside of the KMA are planned to have economic activities and drivers to support local populations and to give each area an identity and individual character.

To create livable places, the Plan will promote a higher mix of activities in our urban areas generating higher levels of street activity and increase development density around transport nodes. More optimal use of the land will occur, with the many undeveloped plots within the metropolitan area being prioritized for development. As we grow outwards from the metropolitan area into new settlements in the north and south there will be a greater emphasis on placemaking – that is, creating places where people want to live and work.

The National Ordinance is a critical component to the 4KMP2040 because it is the mechanism through which the State can ensure that future development is highly connected and adaptable, as well as to ensure that resources and efforts are being directed in the most efficient and beneficial way possible. In order to do this, it must operate within two parallel constructs. The first is the spatial construct which is concerned with the physical disposition of the subdivision of land while the second is the analytical construct, which is concerned with the management and analysis of data across the country as it develops and redevelops.

4.2. The Spatial Construct

From a spatial perspective, the entire country has been organized around a GIS-based grid set on a 6-kilometer square pattern. This specific dimensional pattern allows for subdivision to 1.2 x 1.2, .6 x .6, .3 x .3 and .15 x .15 kilometer cells that provide a spatial construct down to the scale of the individual block.

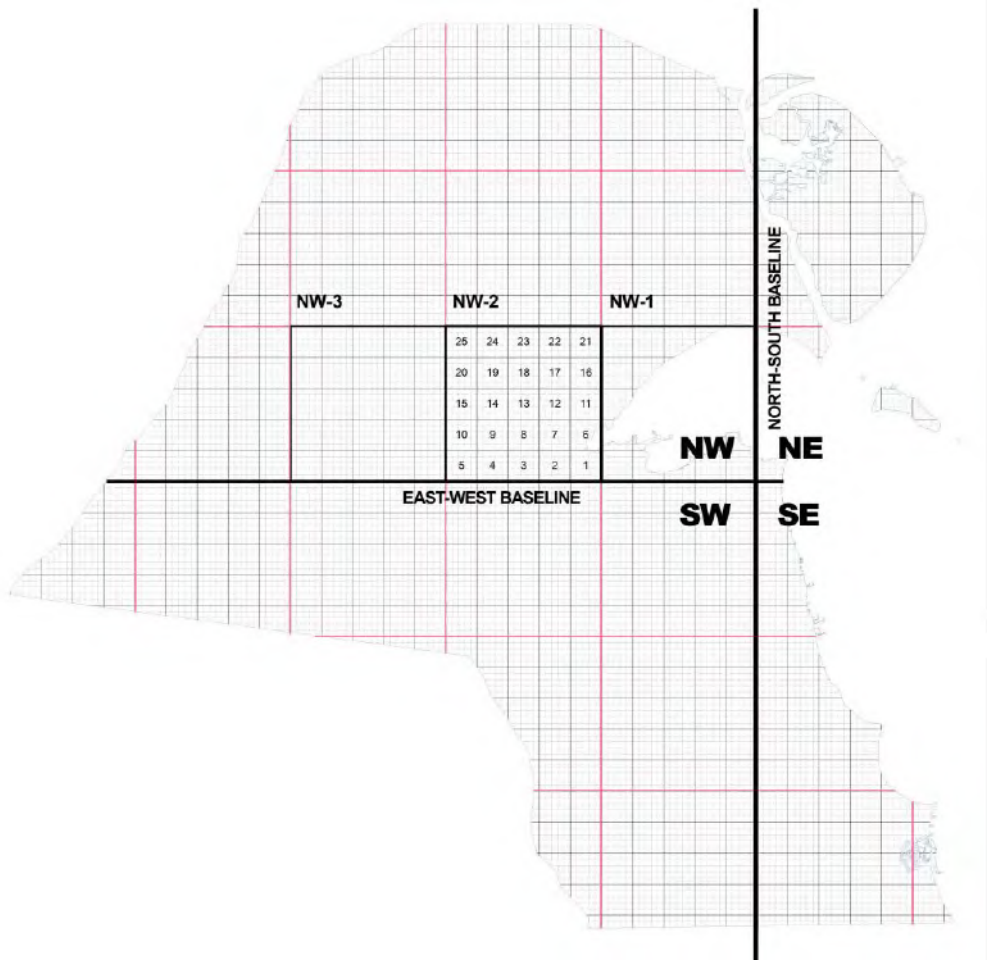


Figure 20 Kuwait National Ordinance and Coordinate System (©Fourth Kuwait Master Plan)

Figure 21 Kuwait National Ordinance – Planning Scales (©Fourth Kuwait Master Plan)

In terms of the spatial structuring of future development, the National Ordinance projects a grid across the entire land area of the country, with the smallest cells in the grid structure set at 150 meters square. The notion behind this is that the grid is a projection of future street centrelines that, when implemented in this fashion, result in development patterns that are highly connected and produce block sizes that are dictated by the Zoning Code. It is not the intention that all new planning and development follow this specific spatial pattern, rather that the logic with which the spatial pattern is structured should be incorporated into all new development. And, to the greatest extent possible, new development should follow the grid pattern, without compromising the quality of the places resulting from future planning processes.

It is incumbent upon future planners and designers to make the case for breaking the logic of the National Ordinance, and this should only be done when it can be shown to more successfully support the Principles upon which this Plan is based, primarily connectivity and adaptability. It is also necessary that future plans support the National Ordinance as the vehicle through which a consistent development pattern across the entirety of the country will emerge.

The series of diagrams below explain the planning structure in terms of its scalar implications and the resultant physical disposition in the planned areas.

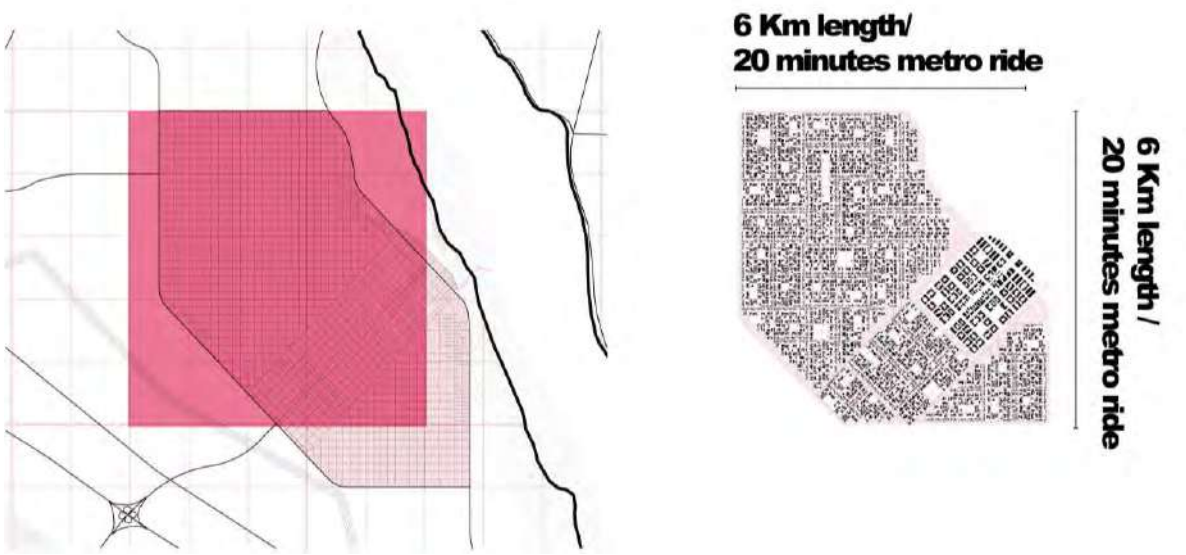


Figure 22 6Km x 6Km grid (©Fourth Kuwait Master Plan)

Figure 22 demonstrates the six-kilometer scale that is used to plan larger areas such as new towns and cities and larger areas of agricultural or other broad uses. The plan indicates a general conformance to the underlying grid, while also providing an example of discontinuity to foreground a contextual issue, in this case alignment with the coast.

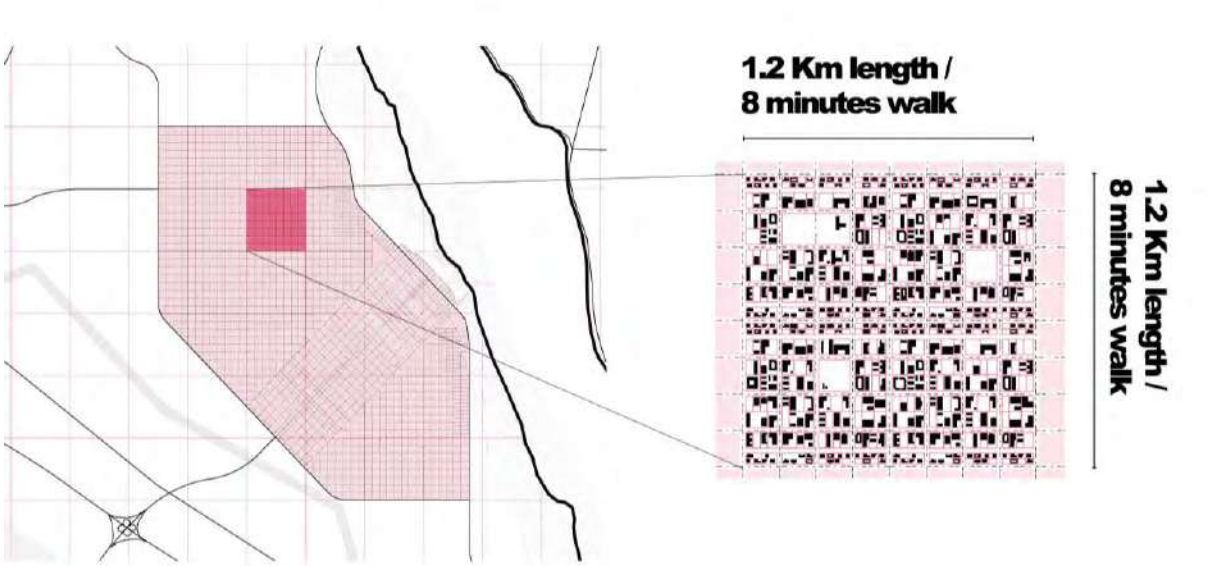


Figure 23 1.2Km x 1.2Km grid (©Fourth Kuwait Master Plan)

Figure 23 demonstrates the district level planning framework at the 1.2 x 1.2 kilometer scale. This scale is generally aligned with the maximum walkable distances to perform daily tasks as well as reaching the limits of walkability to a transport stop.

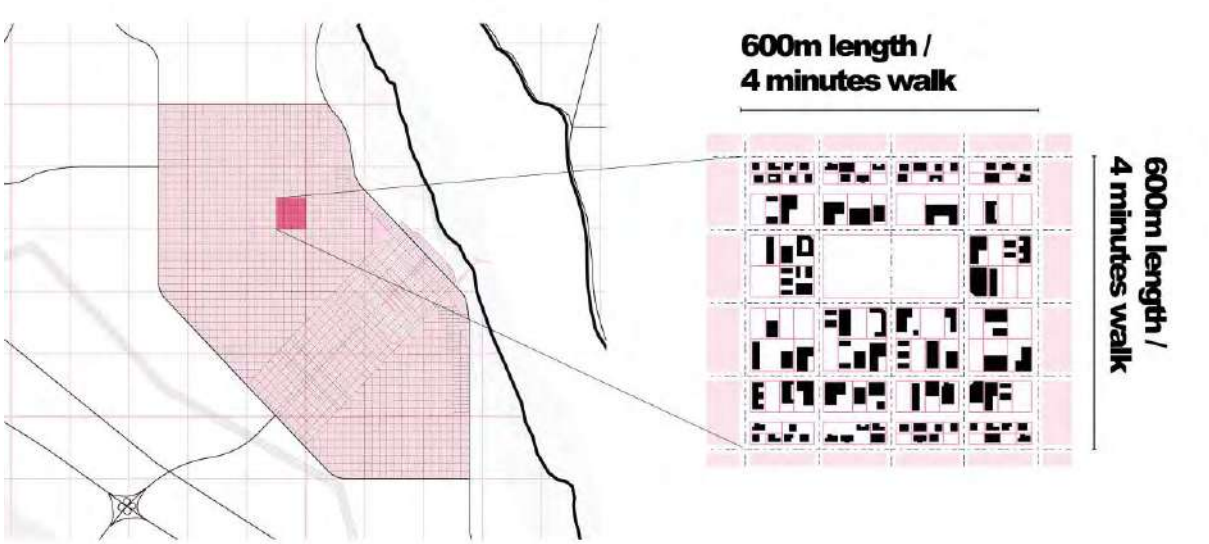


Figure 24 1.2Km x 1.2Km grid (©Fourth Kuwait Master Plan)

Figure 24 demonstrates the small neighbourhood level planning framework at the 600 x 600 meter scale. This scale is generally aligned with comfortable and convenient walking throughout the neighbourhood and to reach transport stops.

Figure 25 150m x 150m grid (©Fourth Kuwait Master Plan)

Figure 25 demonstrates the most granular scale, 150 x 150 meter cell size, which also correlates directly to city blocks. It provides an opportunity to follow the dimensional criteria of the Ordinance, utilizing the cell lines as centrelines of projected future streets. The resulting block size has a perimeter that is generally in the range of +/- 480 meters, or 120 meters on each side. This block size is adaptable, walkable and in line with benchmark cities that are described in section 2.

The series above clearly demonstrates the nested dimensional logic of the system. Whether working from a broad regional strategy at the 6 kilometer scale planning for a small neighbourhood, or even the individual block, the system facilitates consistent planning to ensure that decisions made at one scale do not adversely affect the planning structure at either larger or smaller scales.

4.3. The Analytical Structure

In terms of data analytics and management, the National Ordinance provides a neutral platform to objectively evaluate characteristics and indicators across various scales throughout Kuwait. The scalar structure is parallel to the structure of the spatial planning construct.

For analytical purposes, the same grid that is superimposed over the country for spatial subdivision is also used for data management. All accessible data is incorporated into the GIS database and grid platform upon which the National Ordinance is structured. The data is aggregated and disaggregated at scales from 6 kilometer square cells to 150 meter square cells. The data is then used for analysis and management of development according to the information and outputs required in the processes. This process allows for a much more rigorous analysis of decisions regarding all aspects of the planning and development process, ensuring appropriateness of planning actions.

It is also critical to the parallel system outlined in sections 3.1 and 3.2 that provide a platform for both spatial distribution as well as analytical analysis; management of assets across the country and projections and tracking of future development. Figure 26 below is a projection of the future development in a new town in the northern part of the country (Subiyah). The cells represent both the projected physical structure of the new town as well as the use types and intensity distribution in the initial projections. In this scenario the entire new town is highly connected, but the distribution of

residential, commercial, green spaces and industrial uses are spread throughout the area, indicating nodes of highly intense development and areas of less intense development.

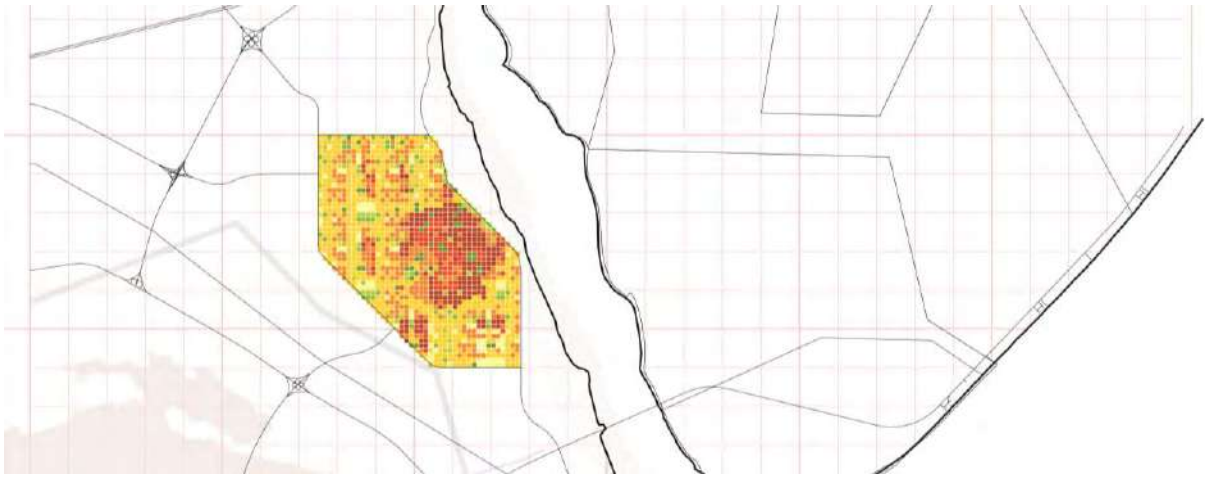


Figure 26 Example of Data Aggregation at Block Scale 150m x 150m (©Fourth Kuwait Master Plan)

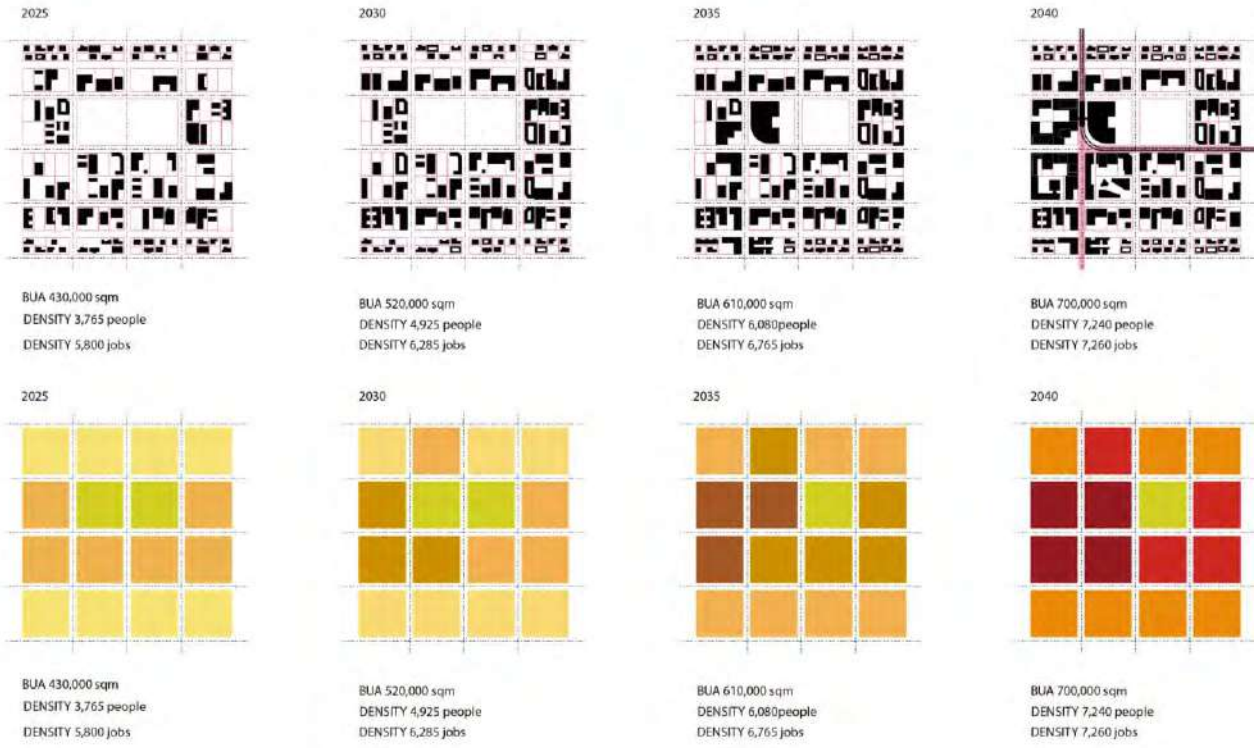
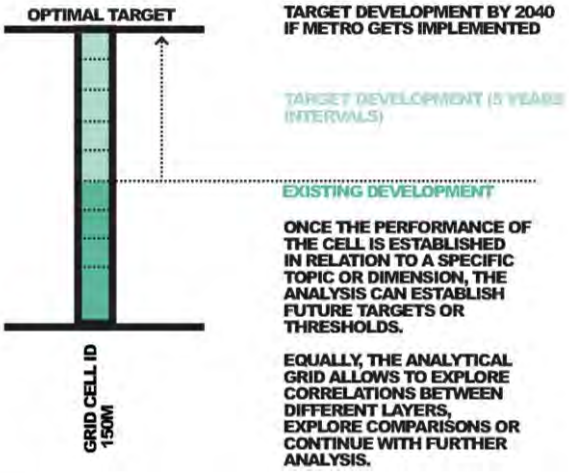


Figure 27 Example of neighbourhood performance and trackability, 5 years interval targets (©Fourth Kuwait Master Plan)

Figure 28 below introduces the format for communicating data around the key indicators for connectivity, although there are also similar formats for economic activity, place development and supporting systems (utilities, legal, resources). The charts provide specific data around modes of transportation, including auto, metro, bus, cycle and pedestrian trips. These data are derived from an existing conditions analysis that sets the current gross number and percentage of trips that can be attributed to each mode. The lower charts show the same information, in matrix format, for each 600 meter x 600 meter cell, or portion of cell that is included within the area boundary. In each cell the current quantum is indicated as a percentage of overall projected, targeted quantum at year 2040.

This demonstrates both the quantum needed to fulfil the projections as well as the relative percent increase across all cells. The intent is to identify those modes of transport, in this case, that require the highest level of additional investment, or those that have otherwise increased in the baseline indicator data. This system works as both a detailed projecting and tracking platform for indicators across all sectors as well as a graphic representation to clarity intensity of existing and projected conditions. It further allows for analysis at both the study area scale as well as across larger municipal or metropolitan areas.

Finally, it provides a system to balance the relative successes and failures to attain targets across sectors and draw correlations between sector projects and initiatives that are tending to drive change consistent with the overall master plan and those that are performing counter to the projections.



2040		NW-25-15-2	NW-25-15-1	NW-26-6-3	NW-25-10-4	NW-25-10-3	NW-25-9-4
MODAL SPLIT	Walking Trips	70	135	28	697	972	34
	Bus Trips	187	361	73	1,857	2,592	92
	Cycle Trips	47	90	18	464	648	23
	Metro Trips	234	451	92	2,322	3,240	115
	Vehicular Trips	1,804	3,474	707	17,877	24,951	883
TOTAL	Total Trips	2,343	4,511	918	23,217	32,404	1,147

NW-25-9-2	NW-25-10-1	NW-25-10-2	NW-26-6-1	NW-26-1-3	NW-25-5-4	NW-25-5-3
111	639	1,058	99	16	7	28
295	1,704	2,821	264	44	20	75
74	426	705	66	11	5	19
369	2,130	3,526	330	55	25	94
2,844	16,401	27,149	2,538	421	190	725
3,694	21,300	35,259	3,296	547	247	941

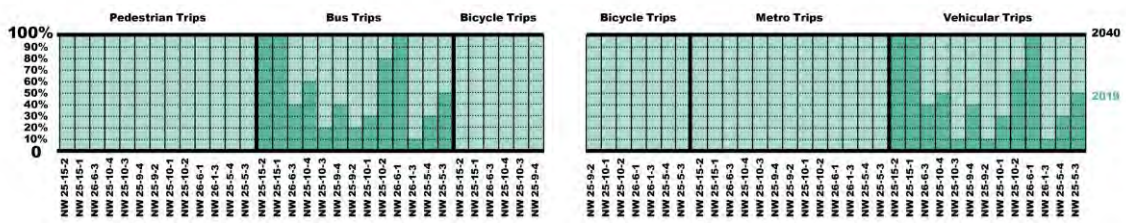
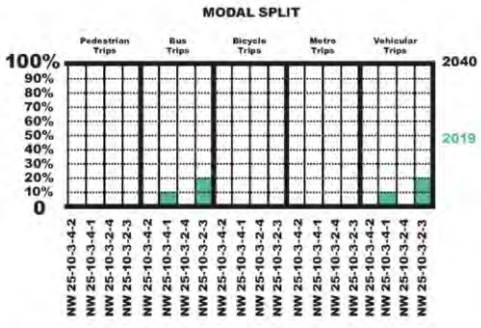


Figure 28 Data and Graphic Indication at 600 meter scale (©Fourth Kuwait Master Plan)

Figures 29-31 below increases the scale of analysis to 150 x 150 meters. The specific area is selected due to the projection of a future metro station which is critical to the overall performance of area and is set up as the key trigger for development in the area. In this scenario, a specific connectivity methodology for identifying metro catchment areas was used to determine the area of impact due to construction of the metro station. This area will have a significantly higher level of both gross trips as well as percentage of metro trips due to its proximity to the station. While the remainder of the Action Area can be evaluated at the broader, 600 meter x 600 meter scale, it is critical to understand a more granular distribution of trips and movements to more accurately plan for the future metro and to manage development in the catchment area to ensure it positively supports the performance of the metro station and broader public transportation system. This area will have the biggest impact and as such should have the highest level of accuracy in analysis. This also demonstrates the capacity of the system to operate at the national and extremely local levels simultaneously.



2019		NW-25-10-3-4-2	NW-25-10-3-4-1	NW-25-10-3-2-4	NW-25-10-3-2-3
MODAL SPLIT	Pedestrian Trips	0	0	0	0
	Bus Trips	24	77	84	71
	Bicycle Trips	0	0	0	0
	Metro Trips	0	0	0	0
	Vehicular Trips	216	696	573	640
TOTAL		240	773	636	711

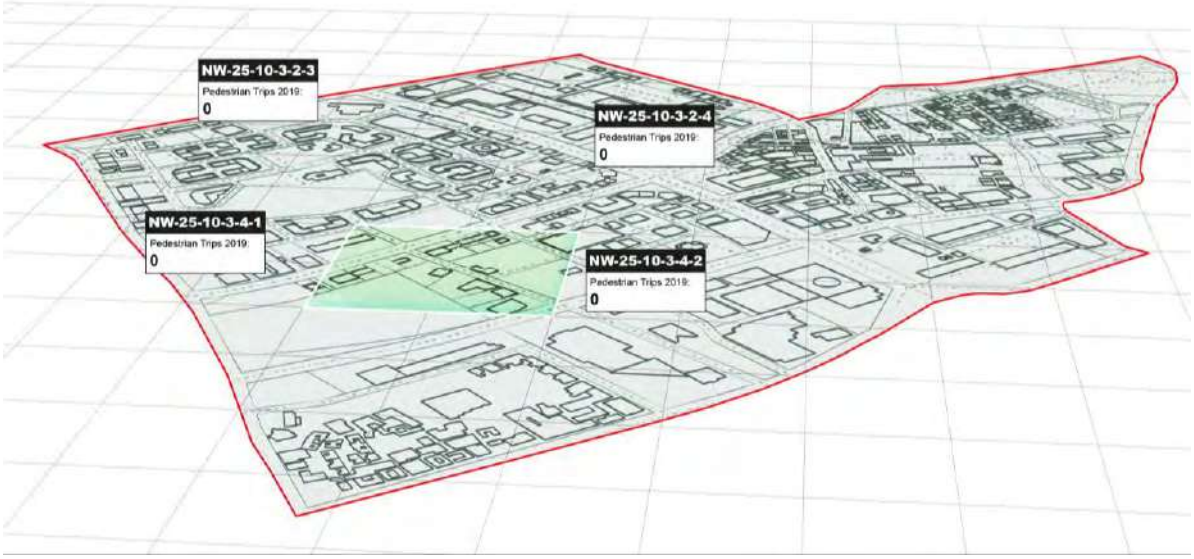
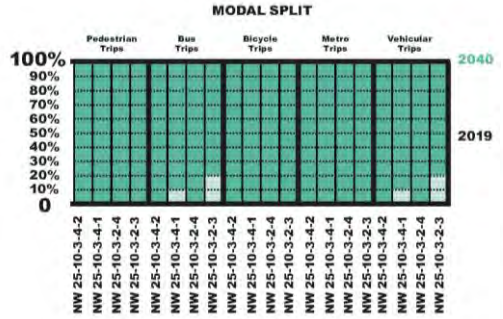


Figure 29 Data and Graphic Indication of Existing Conditions at 150 meter scale (©Fourth Kuwait Master Plan)



2040		NW-25-10-3-4-2	NW-25-10-3-4-1	NW-25-10-3-2-4	NW-25-10-3-2-3
MODAL SPLIT	Pedestrian Trips	100	195	291	93
	Bus Trips	266	519	776	247
	Bicycle Trips	67	130	194	62
	Metro Trips	333	649	969	309
	Vehicular Trips	2,563	4,994	7,464	2,382
TOTAL		3,329	6,486	9,694	3,093

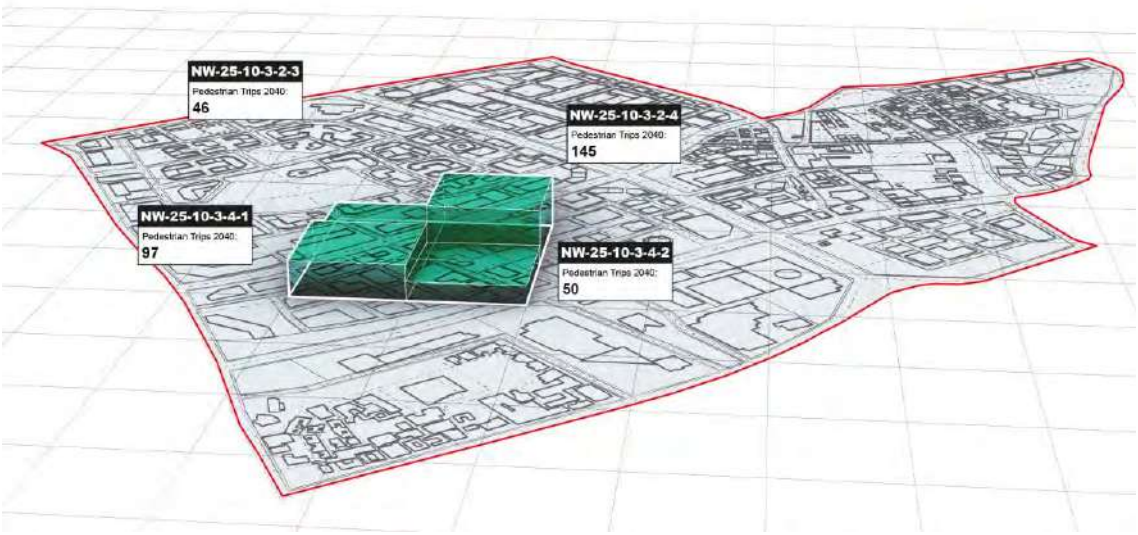


Figure 30 Data and Graphic Indication of Projected Conditions at 150 meter scale (©Fourth Kuwait Master Plan)

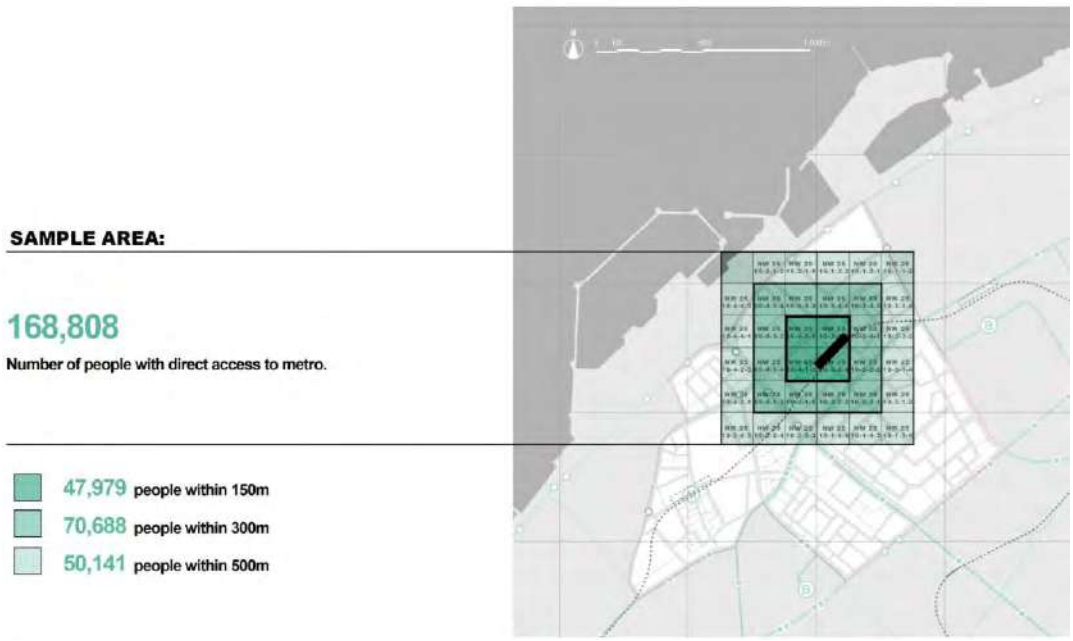


Figure 31 Cellular Distribution Evaluating Increased Development Spread Resulting from Metro Trigger (©Fourth Kuwait Master Plan)

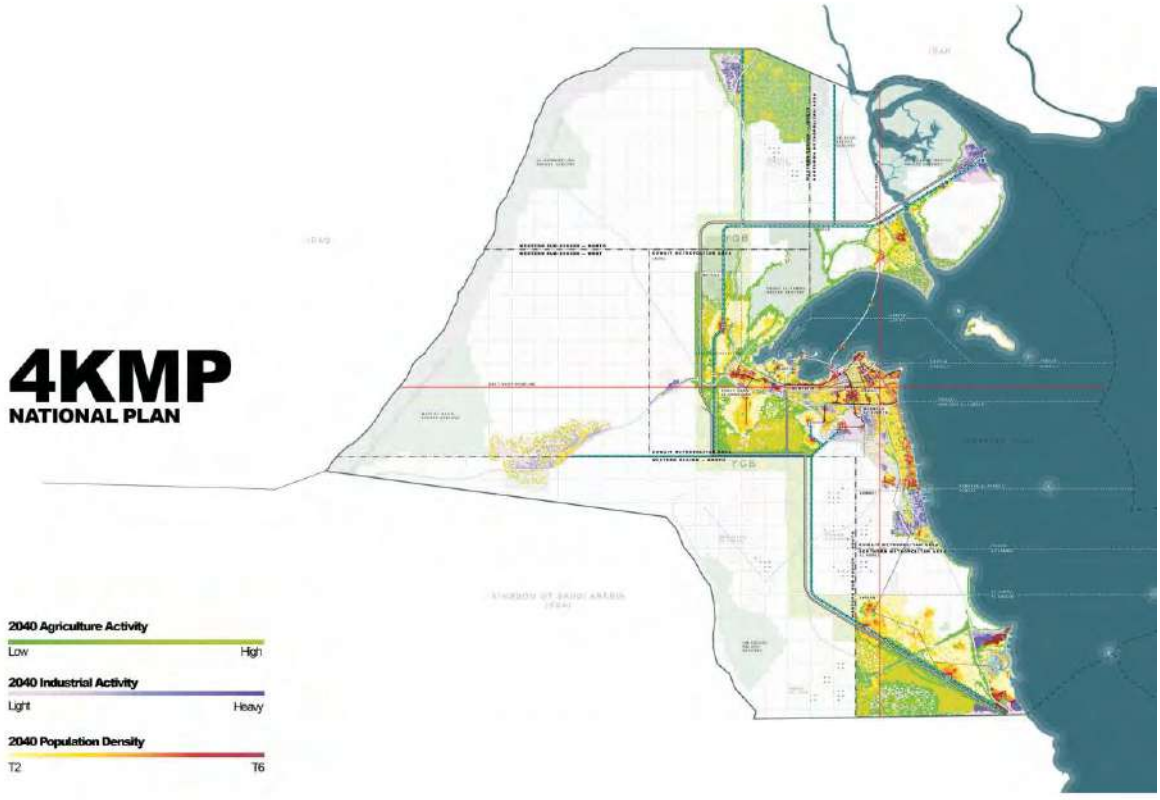


Figure 32 National Plan indicating Geographic location and intensity of uses distributed across the Country (©Fourth Kuwait Master Plan)

5. Conclusion and Next Steps

The world is currently facing challenges that are significantly more complex than at any time in its history. The impact of the decisions that the planning and affiliated professions make in the coming decade have the potential fundamentally alter for the better the current course the planet is following. However, this can only succeed with a shift to a more objective and cross-sectoral planning and analysis process. Effects of these decisions on climate change, public health, resource management, and myriad other elements of human inhabitation must be considered within a balanced and interrelated platform. Planning must move closer to the dispassionate practices of the scientific community.

The research and work demonstrated above is represents a significant move in this direction. The underlying analytical and spatial platforms are agnostic towards outcomes and supportive of a rigorous methodology in determining existing conditions and resultant projections stemming from future targets, themselves derived through a deep analytical process.

Further, the platform provides an opportunity to move beyond static regulatory practices and implement a much more progressive, adaptable and updatable system that is highly responsive to changes occurring across all sectors. The notion that a master plan, or more accurately, a comprehensive plan, should be a static document and set of regulations is no longer tenable. Looking to guidance from twenty or thirty

years, or even longer, ago will not provide planners today with the information required to make necessary and accurate decisions.

Figure 32 above represents the balanced spatial and analytical information and projections for an entire country, as is most beneficial at the current time. However, built into this plan is the necessity for modifying the projections as new information emerges.

As we plan for the future of the planet, and the cities we inhabit, one thing is certain. In the coming decades much of the information we have, and the decisions based on that information, will be found to be inaccurate. The Fourth Kuwait Master Plan demonstrates a clear path to addressing this circumstance and providing direction for future planning and development.

6. References

Allen, D., Green, D., Knight, P. (2013). 'Restoring Master Street Plans: A Blueprint for Future Development'. *2013 APA National Conference*, Chicago, 17th April.

Linklater, A. (2003). *Measuring America*. New York: Plume.

Google Earth (2019). *Google Earth*. [online] Available at: https://earth.google.com/web/ [Accessed 08/07/2019].

Pasquinucci, M. (2014). Centuriation and Roman Land Surveying (Republic Through Empire). In: C. Smith (ed.), *Encyclopedia of Global Archaeology*. New York: Springer

Penn, W. and Holme, T. (1684). *Dutch edition of the first plan for Philadelphia*. [online] Available at: http://libwww.freelibrary.org/diglib/SearchItem.cfm?ItemID=75A0158 [Accessed 09/07/2019]

Quadralectic Architecture (2016). 4.1.3.4.2. *The Greek grid towns*. [online] Available at: https://quadralectics.wordpress.com/4-representation/4-1-form/4-1-3-design-in-city-building/4-1-3-4-the-grid-model/4-1-3-4-2-the-greek-grid-towns/ [Accessed 1/07/2019].

Tavone, M. (2018). *HOMEWORKS* [online] Available at: https://oncities.eu/homeworks [Accessed 08/07/2019].

United States Geological Survey (1988). *The Public Land Survey System*. [online] Available at: https://nationalmap.gov/small_scale/a_plss.html [Accessed 08/07/2019].

Case Study / Project

From one-way to interactivity - difficulties and strategies in the planning of adjacent areas of metropolis

Liang HE

Abstract

The Yangtze River Delta metropolitan region is one of the six largest urban agglomerations in the world. Its regional integration development is a key point of the Chinese government's regional coordination strategy. And also, establishing the Yangtze River Delta integration model zone has become a national strategy. There are a high degree of urbanization, huge population and large economy by nominal GDP in this area. The core area of the Yangtze River Delta is headed to the north and south with Shanghai as the leader. The two regions have been unbalanced for a long time. Among them, the urban agglomeration represented by southern Jiangsu in the north wing region is a traditional rich land in the south of the Yangtze River. The development level and scale are much higher than those in the south wing region, especially the Kunshan Huaqiao. Under the guidance of Rail Transit Line, The level of development is relatively high, and it is closely related to the central city of Shanghai, and it plays the function of the residence of the employed population in Shanghai. In contrast, in the south wing area, the development is relatively slow. From the perspective of the scale and level of urban construction, compared with Jiading and Huaqiao in the north wing, Songjiang, Jinshan and Zhejiang Jiashan in the south wing are currently less connected, and there is no rail transit and other great luck. The amount of commuter transportation is only traditional railway transportation, such as railways and highways. Achieving high-degree coordination between different cities, especially in cross-administrative regions, is the focus of planning and related academic research.

Based on a practical project, this study focuses on the adjacent area of Shanghai. According to the history, culture, ecological space and urban development of Fengjing Town of Shanghai and Jiashan County of Zhejiang Province, the study-from a micro-perspective-analyzed the functional coordination, infrastructure connectivity,conservation of ecosystem and administrative barrier in the process of regional coordination and proposed the following planning strategies: first, preserving Fengjing Ancient Town cooperatively to promote the image of both cities-jointly protect ecological resources such as the water environment; then, building international schools, hospitals, high-quality residential areas and some other projects to enhance the area's vitality , and attract working-age population from Shanghai; finally, replanning the regional traffic, connecting the impasses and improving the infrastructure and service of transit transfer ,such as the intercity railway transfer. Based on the project, this study summarized three major difficulties in a regional cross-border coordination planning: First, a cross-administrative planning involves multiple administrative subjects and usually causes huge costs due to poor communication; secondly, there are conflicts of interest between the two administrative subjects in adjacent areas, increasing the difficulty of planning implementation; thirdly - it is difficult to do a cross-border management and the technical standards are also different.How to solve these problems, the future needs to be further explored and coordinated by multi-participation including urban managers, planners and the public.

Case Study / Project

Rural Revolution

leveraging emerging infrastructures

Jason HILGEFORT

Abstract

There has been a global issue facing the rural, from Italy, USA, to now SEAsia, that has left them behind their rapidly expanding urban centers. Within South East Asia a new model is emerging. In key rural areas, new infrastructures are being leveraged to allow for new opportunities for countryside places within the larger constellation networks of cities. Within China a new model 'Taobao Villages' have emerged. Perhaps the original model is Shaji in Jiangsu Province, China. The origin story of Shaji had a humble beginning. A few local entrepreneurs that learned from production models in urban coastal China and Ikea started their own taoboa shop. Working with local carpenters, they made the first version of the hacked furniture, photographed it and put it on their Taobao shop. They sold a few in the first week and continued to get more demand and business was booming. Very soon, they were fixing up their houses and getting new cars and the whole village was curious about how they made money. As business expanded, they recruit villagers to join their operations and the knowledge of the e-commerce and the business of flat pack furniture spread. Their employees and relatives started to open up their own e-commerce shops. With the low barrier of entry to e-commerce and simple furniture, the village flourished with rapid multiplications of shops and factories making flat pack furniture to be distributed all across China.

The taoboa village model was initiated in a bottom up manner, but in many ways has been supported by the Chinese government. Initially the Chinese government developed a 'how to guide' for rural villages to learn from the model in Shaji. Now, the government is using this mature model to link outside of China. Recently the Chinese government has been working with the Thailand government and locally based on entrepreneurs to evolve this model abroad. Later, in Ningde, Fujian Province, China, an technology entrepreneur from Shanghai has used his patents for high spectral technology [satellite/drone imagery systems for observing plants/soils] to develop a new form of High Tech food villages. The private company worked in association with the local government to identify a few key areas for new villages in a valley outside of Ningde. The villages have been developed to both allow for food production, visitors, and office researchers to reside within.

These 'factories for food' were designed to allow for a mix of living, working and recreation. The developer, thanks to China's current plans to link to eastern Europe and Africa, has plans to repeat this model in other locations. In all of these cases, new technologies [e-commerce, satellite imagery, drones, 4 axis cnc machines] are being used to offer new opportunities to rural communities. Instead of focusing on the nostalgia for the development of rural areas, new systems are being deployed. These focus not on traditional forms of urban planning, but on new technologies to provide new employment models. Some argue they represent the 'industrialization of the rural'. Others point to them more as an embracing of a global reality. Both are true. The rural is no longer 'the other' to the city. In order to survive, they need to use their existing characters to provide and gain from the global network.

Research Paper

Whole-region Tourism Greenway Network Organization Mechanism Based on Gravity Model Flow Measurement

Xue JIANG, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Tianyu ZHAO; School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Abstract

The structure and organization of greenway network is the core stone of greenway planning. Generally, the relevant between point elements and line elements in the network is taken as the focus of quantitative structure evaluation. In this study, the evaluation and organization method of greenway network is based on gravity model flow measurement. Ningan city is taken as an example because of its rich tourism resources and ecological resources. The cost distance formula has been improved in the process. Network flow is allocated to each path in the gravitational model to enhance the scientific evaluation. Firstly, the existing greenway network structure is sorted out and summarized. Minimum cost path method is used to form potential greenway network structure. This structure is divided into two parts, one is based on comprehensive elements and the other is based on general elements. The existing structure and potential structure are combined to form a preliminary abstract network structure. Gravity model is used to measure and classify the traffic among abstract network nodes. Two kinds of greenway network structures are compared and analyzed. On this basis, the greenway network is optimized and verified through field research. It provides a basis for the further planning and implementation of the actual greenway network in small towns

Keywords

small town planning, greenway network, Whole-region tourism, gravity model, flow measurement

1. Introduction

Greenway construction and development has entered a relatively rapid stage of development in China since 2010. It is an inevitable trend for the networking of greenways. In the rapid construction of Greenway network, more attention should be paid to the construction of greenway network structure. The quantification of greenway network planning and construction is of great significance to the scientific construction of greenway system.

At present, the organization methods of greenway network are mostly based on graph theory, Euclidean distance, connectivity and probability theory. It is neglected for the bearing capacity of the elements themselves and the flow rate of the line elements. Meanwhile, China's Whole-region tourism has developed rapidly since 2016. For the greenway of small tourism towns, the carrying capacity of greenway needs to be further considered the impact of leisure tourism. Taking the above factors into account, the view of flow and demand is put forward as the function synthesis in the construction of greenway structure, so as to meet the planning and development of greenway network in small tourism towns.

2. Analysis of existing greenway network structure in Ningan

2.1. Research Background

Located in the southeast of Heilongjiang Province, Ningan is famous for Jingbo Lake Tourism Scenic Area (Fig.1). From 2012, the rapid development of tourism industry has also led to the development of tertiary industry. By 2017, a total of 1.77 million visitors were received, with an annual increase of 26.1%.

Figure 1 Distribution of major resources in Ningan City

Figure sources: drawn by author

There are abundant resources and various land use types in Ningan. The types of tourism resources are comprehensive, covering eight categories in the Classified Investigation and Evaluation of Tourism Resources (GBT18972-2003). There are 3 nature reserves, 4 ecological townships and 25 Provincial Ecological Villages in the city. The main ecological resources include characteristic water resources such as Jingbo Lake and Mudanjiang River, abundant mountain forest resources and various agricultural resources. They have all kinds of resource bases for developing greenway network from the perspective of Whole-region tourism.

2.2. Element Screening of Greenway Network

Taking the Whole-region tourism service value as the evaluation index, combining with national standards, provincial and municipal standards, village and town standards, Ningan's Whole-region resources of ecology, humanities, industry and recreation were screened through field research.

A total of 24 green paths and 23 important resource nodes were screened out (Fig.2).

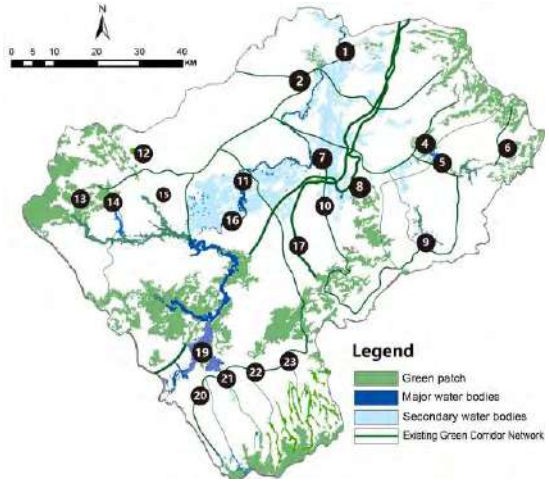


Figure 2 Green path and node distribution

Figure sources: drawn by author

(1) Green corridor: From the spatial distribution, most of the corridors are distributed along major rivers, large lakes and mountains, especially along the vertical green corridor along the Mudan River and Jingbo Lake, as well as the horizontal green corridor along the Mudan River and Xiaobeihu Lake, which constitute the main framework of the existing green corridor in Ningan City. On the west side of the city, a small-scale greenway network with Jingbo Lake Scenic Area as the core has been formed, which combines the surrounding woodland, park green space and so on. In the southeast of the city, large areas of woodland, cultivated land and types of green space are relatively dense. The main roads and railways with vertical distribution in the city are regarded as the main axle belts for the development of green industry. It forms a green channel for industry, and there are many alternative paths in the process of connecting and spreading with other patches in the city. Due to the dispersed distribution of green patches and the absence of a system of existing greenways, the tourism greenway network is divided into five parts scattered in the city. The network connection is not close enough to activate the overall greenway network to play the role of sustaining the benefits of leisure economy and ecological vitality.

(2) Important resource nodes: Important resource nodes are mainly divided into recreational resource nodes, humanistic resource nodes, ecological and industrial resource nodes. Important resource nodes are distributed along the north-south axis and east-west axis of the city as a whole. Because urban settlements play an important role in the Whole-region tourism development of the greenway network, in order to make the formed greenway network benefit more urban residents, strengthen the participation and utilization of the greenway network, urban settlements are listed as the secondary nodes of the network and the important priority choice of network intersection nodes. In addition, the distribution of forestry resources in Ningan has formed its ecological environment matrix, and forestry resources can be used as node resources in the development of tourism to analyse its role in promoting Whole-region tourism. With the further development of forestry resources combined with leisure trails and eco-tourism, a large area of forestry green patches will become the basis of the development of the tertiary industry. Therefore, important forest farm resources are extracted in the form of node resources, so as to facilitate the pertinence and implementation of subsequent planning.

2.3. Existing abstract structure of Greenway Network

(1) Abstraction and analysis of current network corridors

In order to analyse the present situation and future structure of greenway network more clearly and clearly, the existing elements are abstracted to form the abstract structure of Greenway network. The network corridor between resource nodes is connected according to the degree of close connection between traffic function, landscape function and ecological function.

Through the abstract results, there are 109 corridors in the existing greenway network, connecting 81 nodes (Fig.3).

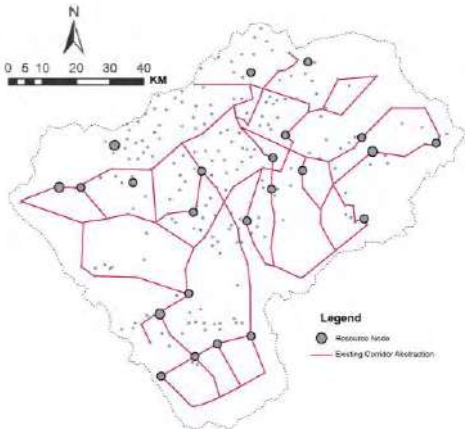


Figure 3 Analysis of network node factor domination area

Figure sources: drawn by author

At present, four key resource points are not connected into the network by corridors. The αindex of existing networks is 0.18. It shows that the number of loops in the corridor network is relatively small, which makes the greenway network show the characteristics of higher linear connection and lower replacement connection. The β index of network corridor is 1.35. It shows a lower level. It shows that the existing greenway network nodes have the problems of relative isolation, punctuation and smoothness. The network corridor γ index is 0.46. It shows that the network connectivity of the whole network structure is not strong. It does not form a relatively effective connection channel. The main reason for the characteristics of the network corridor is the lack of overall planning for the greenway network in the development of the county and municipality. Urban landscape fragmentation has been aggravated. The effective connections of Greenway nodes are gradually reduced.

(2) Streamlining and analysis of current network structure

Through actual investigation, the corridor structure is simplified and reorganized according to the logical relationship (Fig. 4). The current network structure includes 23 network nodes and 30 network corridors. According to the importance of resources, it can be divided into primary network, secondary network and tertiary network. Among them, the primary network structure is used as the basis of network construction. Ningan city's important tourism resources and ecological resources are connected by the first-level network. It is the main network skeleton at present. Major residential areas, industrial parks and Jingbo Lake scenic spots are connected in the North-South direction. It extends to the west to connect the Xiaobeihu scenic area and to the east to connect the birch River Scenic area. The

secondary network structure is regarded as the connectivity and perfection of the primary network. The three-level network mainly reflects the contact line at the site level. At present, it is not perfect, and cannot play a good role in expanding the network. It needs to be further optimized and upgraded.

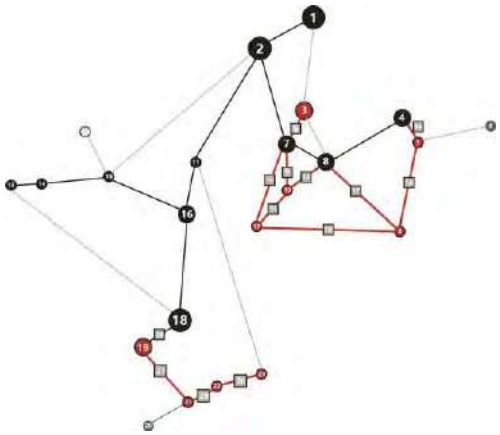


Figure 4 Existing abstract network structure

Figure sources: drawn by author

3. Network traffic measurement based on Gravity Model

3.1. Factor Resistance Value Assignment

In the measurement of network traffic, the interaction force between the elements of each node is determined by gravitational model. Firstly, the resistance value assignment of each factor needs to be determined in the flow measurement [6] [9]. In order to compare and analyse the differences of Whole-region tourism greenway network schemes, two comparative structures were proposed based on the differences of comparative corridors when Whole-region tourism integration was included or not accepted.

Firstly, each factor is assigned according to the influence degree of Whole-region tourism resistance（Fig.5）. It integrates three factors to be judged and calculated, including resource type, vegetation coverage and tourism sensitivity. Because of the emphasis of this study on the Whole-region tourism impact, the proportion of resource types is 0.35, the vegetation coverage is 0.20, and the tourism sensitivity is 0.45. The comprehensive resistance of Whole-region tourism reflects the difficulty of energy flowing between different node units, including "ecology, production and life". In the greenway network organization based on general basic elements, only resource type resistance and vegetation coverage resistance are considered. In this case, the proportion of resource types is 0.64 and the vegetation coverage is 0.36.

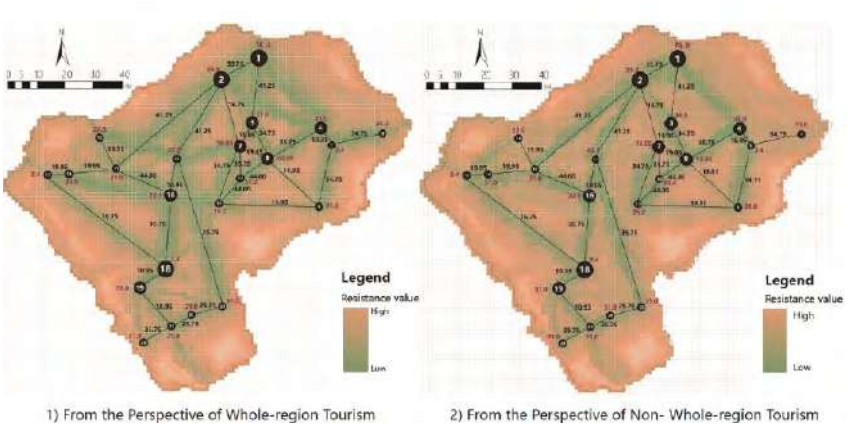


Figure 5 Comparison of two cumulative cost surface

Figure sources: drawn by author

3.2. Flow Measurement

The flow measurement formula is improved according to the gravitational formula. Generally, the distance cost between node i and node j is expressed as $D_{ij} = L_{ij} / L_{max}$. L_{ij} is the cumulative cost of functions between nodes I and j, and the maximum cost of all functions in the L_{max} research area. In this study, cumulative function cost is regarded as the inverse ratio of the mutual attractiveness between two nodes, that is, the greater the mutual attractiveness between two nodes, the smaller the cumulative function cost (Table 1). Therefore, gravity formula can be defined as $L_{ij} = 1/(r^2/ L_iL_j) = r2/ L_iL_j$, which L_i and L_j are the element resistance values of node i and node j respectively, and R is the minimum distance between node i and node j. Therefore, the flow matrix can be generated based on the nodal mutual attractiveness of the comprehensive resistance value of Greenway elements and the resistance value of general elements. Based on the calculation of mutual attractiveness, the traffic among the greenway network nodes is further calculated. Inter-source corridors with high interaction intensity were extracted as main corridors and other potential corridors were supplemented.

Table 1 Cost matrix of attractiveness of abstract greenway network nodes

Data Source: Surveyed and calculated by the author

1	2	3	4	…	21	22	23	
0	0.13	0.22	0.46	…	5.91	5.71	4.59	1
0.13	0	0.53	2.04	…	13.16	14.67	9.77	2
0.22	0.22	0	0.88	…	11.52	12.84	14.49	3
0.46	2.04	0.88	0	…	11.65	13.05	14.46	4
…	…	…	…	…	…	…	…	…
5.91	13.16	11.52	11.65	…	0	0.07	0.41	21
5.71	14.67	12.84	13.05	…	0.07	0	0.14	22
4.59	9.77	14.49	14.46	…	0.41	0.14	0	23

3.3. Measure Result

The difference of mutual attractiveness among different resource points is taken as an important judgment basis in the extraction of potential greenway structure. However, the resistance value of the Whole-region tourism greenway network is different from that of the general greenway network. In both cases, nodes with mutual attractiveness greater than

70% are structurally connected. It generates two kinds of network structures respectively. The Cumulative Cost Surface is shown in Fig.5. The network structure based on the measured results of network flow can be seen from Fig.6. A-type network structure is extracted from the cumulative cost surface formed from the perspective of Whole-region tourism. The B-type network structure is formed on the basis of the cumulative cost surface from the perspective of non-Whole-region tourism.

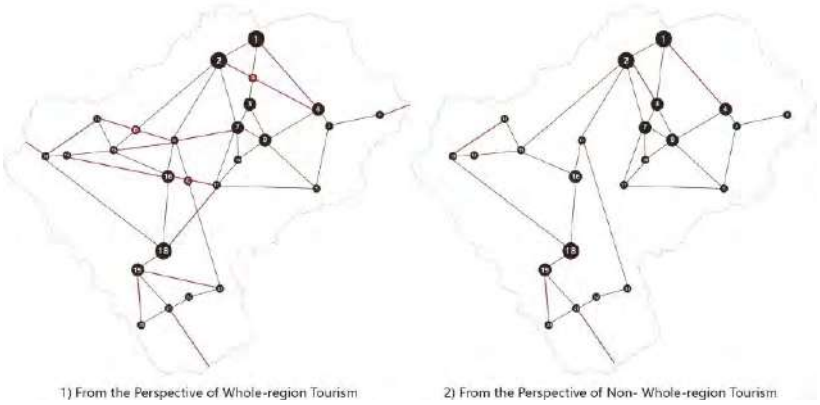


Figure 6 Comparison of two measurement results

Figure sources: drawn by author

From the result of generation, the potential greenway composition in the network structure based on the resistance value of comprehensive greenway elements is more abundant. More nodes have the possibility of connecting. Nodes related to tourism resources play a more important role, making the construction of the whole greenway network more prominent. The overall structure also has more possibilities to expand to the periphery of the city. The B-type structure lacks certain extensibility. It is weakly connected with the outside of the city. At the same time, its internal potential greenway and the current greenway have a strong consistency. If only the network structure based on general natural ecological factors can not satisfy the further optimization of its network development.

4. Evaluation and revision of abstract greenway network

4.1. Grading calculation of Greenway based on structural optimization

The greater the attraction between the nodes in the greenway network, the greater the flow between them and the stronger the function of the corridor. For the corridors in this study, there are corridors that can be reused [10]. Therefore, the final cumulative frequency flow of a single corridor is obtained and calculated by superposition of the functional flow of the corridor.、

The function flow matrix can be obtained by superimposing the function flow of Greenway connected by different nodes. The higher the flow rate, the higher the frequency of corridors used. In order to make the evaluation results clearer, the functional flow corridors of the greenway network are also divided into three levels in this analysis (Fig. 7).

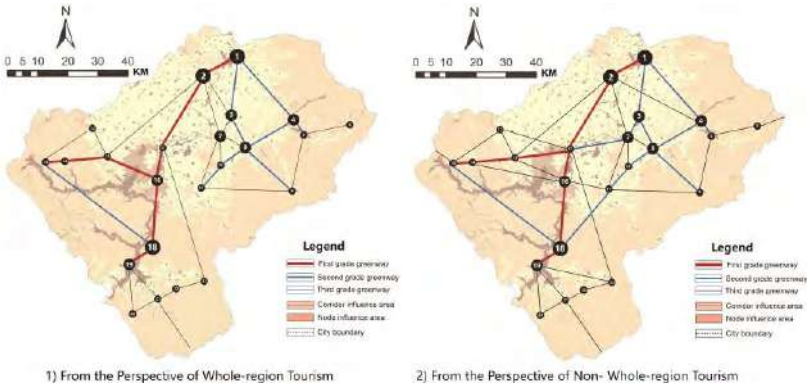


Figure 7 Evaluation chart of corridor comprehensive function flow

Figure sources: drawn by author

Compared with the existing corridor system, the first-class corridor of A-type structure and B-type structure lays more emphasis on the main line running through the north and south, and the two lines of tourism from the central to the western Jingpo Lake natural scenic spot. Because of the slow development of the eastern part, the functional flow is less. At the same time, more three-level network corridors are formed through the concept of functional flow to avoid the deterioration of the ecological patch island effect in the original network.

Compared with B-type corridor, A-type corridor brings about the improvement of secondary corridor structure based on the integration of forest farms, reservoirs and farms with the development of Whole-region tourism. Secondary function flow is no longer only concentrated in the eastern and central part of Ningan, but based on the eastern and central part of Ningan. It runs through the whole network framework and plays a transitional role of better connection between the first-level corridor and the third-level corridor. In the east-central part, the radiation structure is formed with Huashuchuan Reservoir Nature Reserve as the core. In the west, the secondary functional flow corridor connects Xiaobeihu Nature Reserve and Jingbo Lake Nature Reserve, which makes all the important tourism, production and living nodes in Ningan City connect in an orderly way. Therefore, the structure of the Whole-region tourism function corridor has certain operability and structure optimization ability.

4.2. Greenway Network Certification Based on Field Research

The revision of the greenway network structure mainly considers two aspects: the coverage of the network and the possibility of the actual formation of the network. First, the greenway network should basically cover all existing residential areas and tourist areas, so as to promote the development of Whole-region tourism more efficiently. Secondly, the construction of greenway network is closely related to the production and life of citizens. After the construction and evaluation based on theory, the possibility of network formation is determined through field research, and some of its structures are renovated to ensure the reliability and validity of the greenway network architecture.

The influence area of the greenway is generally buffered by 15 minutes' walking, cycling and driving distance outside the corridor and nodes [1]. This buffer is a more convenient and frequently used area for its node and corridor accessibility. From the perspective of Whole-region tourism, the influence scope of Greenway should be expanded correspondingly because of the scale benefit brought by tourism. According to the relevant requirements of

the National Garden City standard, the service radius of general park green space is 500 meters. However, due to the large spacing of urban resource points and the lower degree of resource concentration compared with cities, the service and impact capacity of patches in the greenway network in this study are affected by many factors. According to the field survey results of 500 residents in the city, residents within 10 kilometres from the resource point are all positively affected by the resource point (Fig.8). Therefore, combined with relevant research, the influence range of primary corridor is 10 km, secondary corridor is 5 km and the tertiary corridor is 2.5 km.

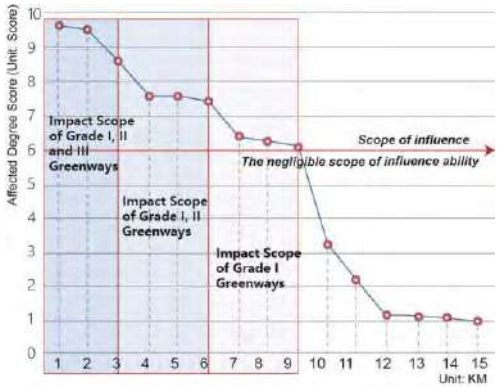


Figure 8 Resource point impact scope survey

Figure sources: drawn by author

According to the overall situation of the current greenway network structure coverage (Fig.9), type A based on the Whole-region tourism perspective has certain structural advantages. Firstly, compared with the current situation, the greenway network structure has more balanced coverage for the whole city. It breaks the current situation of relying on the western side of the city mirror Lake Scenic Area of the single focus of development. Two new development cores have been formed on the East and south sides of the city area, and the multi-level structure has been expanded outward depending on the original trend of the first-level network. Secondly, compared with B-type network structure, the density of secondary corridor and tertiary corridor of A-type network is higher, the influence scope of the whole network is wider and the connection between different levels of network is smoother.

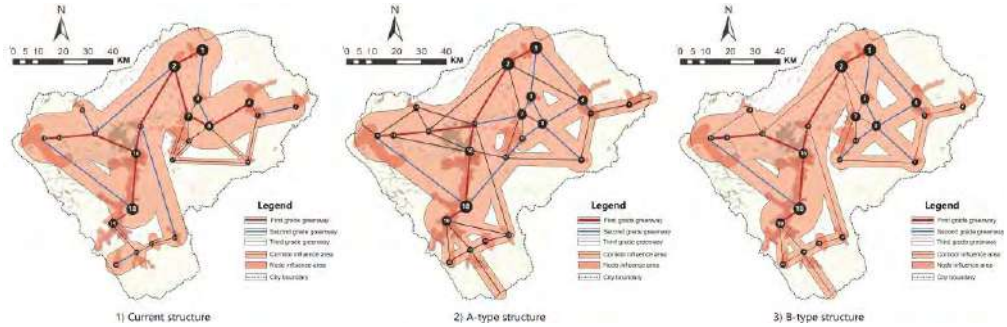


Figure 9 Greenway network structure coverage area

Figure sources: drawn by author

However, as far as the structure of the current A-type network itself is concerned, there is still room for further optimization. First of all, the third level corridor structure can still

further cover the southwest side of the city. The network structure makes insufficient use of forest farms on the southern side of the city. According to the field investigation, the three-level corridors on the southeast side of the city can be further improved, mainly the possibility of connection between 6, 9 and 23 corridors, and the possibility of connection between 1 and 6 corridors on the northeast side of the city. Secondly, the primary corridor composed of nodes 1, 2, 7, 8 and 4 is not reflected in the A-type structure, mainly because the mutual attraction between patches is relatively weak from the perspective of Whole-region development. However, according to the field investigation, the possibility of the formation of the first-class corridor in the west can be further explored, so as to improve the first-class corridor structure in the A-type structure.

Important nodes in primary and secondary networks are mainly investigated. A questionnaire survey and interviews were conducted among 500 citizens and tourists (Table 2). The network certification work was carried out in combination with the opinions of six planning experts. Questionnaire is mainly about the way of scoring between two nodes in the existing structure and corridors with certain possibilities in the above analysis.

Table 2 Survey Scores for the possibility of corridor formation in type A structure

Data Source: Surveyed and calculated by the author

classification	number	Resident Score	Tourist Score	Expert Score	Comprehensive score	Grade	Modification
A-type structure corridor	L1-2	8.5	7.5	8.5	8.17	first	×
	L1-3	7.5	7.5	9.0	8.00	first	√
	L1-4	6.5	7.5	7.0	7.00	Second	×
	L2-4	6.0	7.0	6.5	6.50	Third	×
	L2-7	5.5	7.5	7.0	6.67	Third	×
	L2-11	9.5	7.5	8.5	8.50	first	×
	L2-15	6.5	7.5	6.5	6.83	Third	×
	L3-7	8.5	6.5	7.5	7.50	Second	×
	L3-8	9.0	8.5	8.5	8.67	first	√
	L4-5	8.5	6.5	8.5	7.83	Second	×
	L4-8	8.5	7.5	8.0	8.00	first	√
	L5-6	5.5	6.5	6.5	6.17	Third	×
	L5-9	7.5	6.5	6.5	6.83	Third	×
	L7-8	6.5	7.5	6.5	6.83	Third	×
	L7-10	7.5	6.5	6.0	6.67	Third	×
	L7-11	7.5	6.5	7.5	7.17	Second	×
	L7-17	7.5	6.0	6.5	6.67	Third	×
	L8-9	7.0	7.5	8.5	7.67	Second	×
	L8-10	6.5	8.0	7.5	7.33	Second	×
	L9-17	5.5	6.5	6.5	6.17	Third	×
	L10-17	7.5	6.5	7.5	7.17	Second	×
	L11-12	6.5	6.5	7.0	6.67	Third	×
	L11-15	6.5	8.5	9.0	8.00	first	×
	L11-16	7.5	8.5	8.5	8.17	first	×
	L12-13	6.5	6.5	7.5	6.83	Third	×
	L12-15	6.0	6.5	6.5	6.33	Third	×
	L13-14	8.5	7.5	8.5	8.17	first	×
	L13-18	6.5	7.5	7.5	7.17	Second	×

	L14-15	7.0	8.5	8.5	8.00	first	×
	L14-16	6.5	6.5	7.5	6.83	Third	×
	L15-16	6.5	7.5	7.5	7.17	Second	√
	L16-17	7.0	7.0	7.0	7.00	Second	√
	L16-18	7.5	9.0	8.5	8.33	first	×
	L17-18	7.0	8.0	7.0	7.33	Second	×
	L18-19	8.5	8.5	8	8.33	first	×
	L19-20	5.5	6.5	7.0	6.33	Third	×
	L19-21	6.0	6.5	7.5	6.67	Third	×
	L19-23	5.5	6.0	6.5	6.00	Third	×
	L20-21	6.5	6.5	6.5	6.50	Third	×
	L21-22	6.5	6.5	7.0	6.67	Third	×
	L22-23	6.5	6.5	7.0	6.67	Third	×
Other Potential Structural Corridors	L1-6	5.5	6.5	7.0	6.33	Third	√
	L6-9	6.0	6.5	6.5	6.33	Third	√
	L9-23	5.5	6.0	6.5	6.00	Third	√

The total score of the questionnaire is 10. A score of more than 6 points is the basis for the formation of corridors. A score of more than 8 points or 7 points is the basis for the formation of a first-class corridor and a second-class corridor. From the evaluation results, synthesizing various opinions, it is possible to form corridors between nodes 6, 9 and 23 between nodes 1 and 6. The original first-class corridor in the west can be further extended. Accordingly, the final structure of Ningan Greenway Network is formed. The GIS tool is used to simulate the greenway, combining with the network structure (Fig. 10).

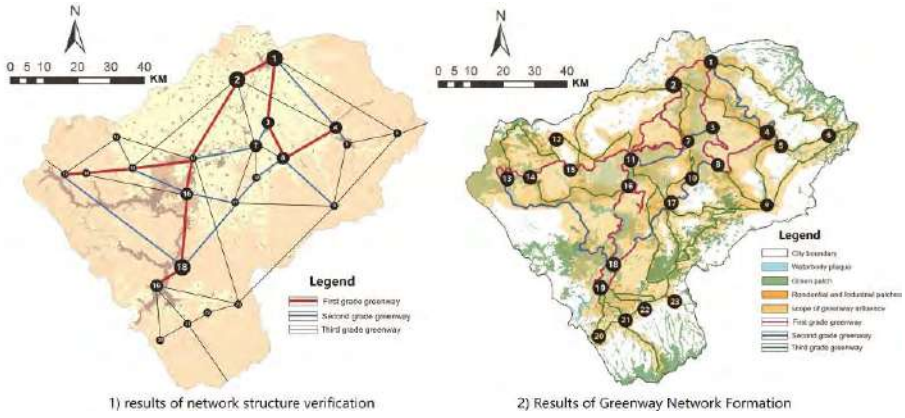


Figure 10 Network structure revision and greenway network formation results

Figure sources: drawn by author

5. Conclusion

The comprehensive construction of greenway network organized from the perspective of Whole-region tourism reflects the basic demands of the comprehensive resources' endowment of regional greenway network and the comprehensive promotion of the integration of greenway network resources. The construction of greenway network structure based on gravity model studies the idea of resource flow allocation through network in the evaluation of corridors. It embodies the mutual attraction of elements and explores the

source corridor with strong interaction as the main corridor. This study obtains a more scientific greenway structure based on traffic measurement, and makes a comparative analysis of the two types of network structure from the perspective of Whole-region tourism. It determines that the overall planning of resources is the optimal path for the network development of Greenway system. Through the research, the influence scope of Greenway at all levels in the Whole-region tourism greenway network is determined, and the actual form of greenway network is formed with the help of GIS. It lays a foundation for the construction and actual construction of county and municipal greenway network.

6. References

Binyi Liu. Evolution of urban and rural greenways and their key role in urban greening [J]. Landscape Architecture, 2012 (3): 62-65.

Xiaolong Zhao, Jingran Xu, Bo zhang. Study on the usage of slow-moving system in Guangdong greenway from the perspective of news [J]. Landscape Architecture, 2019, 26 (01): 86-90.

Chen Keshi, Zhou Yanlu. Summary of Greenway Planning Practice in China under the Background of Urban-Rural Coordination [J]. Modern Urban Research, 2015 (5): 51-57.

Kairan Li, Ecological Corridor Function and Planning Principles of Greenway Network, Chinese Gardens, 2010 (03): 24-27.

Zheng Liu. Urbanism Transition: Planning and Implementation of Greenway in Pearl River Delta [D]. South China University of Technology, 2017.

Ding Yan, Gong Yanan, Du Peishan, Chen Ye, Sun Feng and Guo Yiyan. A method of constructing urban-rural greenway network for Whole-region tourism: taking Dandong as an example [J]. Journal of Liaodong University (Natural Science Edition), 2018, 25 (03): 207-213.

Kong Qiang, Li Xiaolan. Rural Greenway Planning and Construction Strategy Guided by Whole-region Tourism [J/OL]. Anhui Agricultural Science, 2019 (03): 111-113 [2019-02-27].

Ergen, B., 2014. Euclidean distance mapping and the proposed greenway method in Malta. J. Urban Plann. Dev. 140.

Environmental Systems Research Institute (ESRI), I, 1994. Arc/Info Users Guide, Cellbased Modeling With GRID.

Yue Liu. Construction of Greenway Network in Dahexi Pilot Area of Changsha City based on GIS [D]. Hunan University, 2011.

Jing Q, Wei-Ning X, Yanfang L, et al. Incorporating landscape diversity into green way alignment planning [J]. Urban Forestry & Urban Greening, 2018, 35:45-56.

Chandio, I.A., Matori, A.N., Lawal, D.U., Sabri, S., 2011. GIS-based land suitability analysis using AHP for public parks planning in Larkana City. Mod. Appl. Sci.5.

Research Paper

The Informal Syndicate Raj:

Emerging urban governance challenges in newly incorporated villages of Bidhan Nagar Municipal Corporation, West Bengal

Dr. Ratoola KUNDU, Assistant Professor, Centre for Urban Policy and Governance, TISS Mumbai, India

Abstract

*Peri-urban spaces in the Global South are regarded as sites of radical and often violent of transformation of social and spatial structures, of brutal dispossessions of lives and livelihoods to make way for speculative real estate development and the accumulation of capital through the expropriation and commodification of land. What kinds of politics and governance configurations emerge in the peri-urban areas of mega-cities? A host of state and non-state actors such as developers, aspiring middle-class urban dwellers are reimagining these sites. This paper investigates the complex governance and livelihood transformations following the upgradation of Bidhan Municipality to a Corporation in 2015 through the state driven merger of the existing planned satellite township of Salt Lake with the surrounding unplanned rural and urban areas. The paper argues that a new politics of unsteady alliances characterises the messy, unsettled and restless territories of the newly formed Municipal Corporation. A highly contingent, informalised and powerful configuration of non-state actors – locally known as **Syndicates** control the development dynamics and political fortunes of the periphery.*

Keywords

Informal sovereign, periurban governance, land acquisition, political party

1. Introduction: The conflicting stakes in governing the fragmented urban periphery

The frontiers of urban areas are particularly volatile and dynamic where urbanisation is posited as the primary driver of economic growth and the harbinger of socio-spatial transformation from rural to urban (Roy). Contestation and violence against people and their habitats is central to this process whether it is carried out in a planned manner by the state and market or through informal means wherein land is subdivided into layouts and its use is converted from agricultural to non-agricultural with the active collusion of state and non-state actors. Along with the displacement and dispossession of the erstwhile peasants and other groups of people living and working in the urban fringes, peripheral urbanisation processes hasten the erasure of histories of people – their identities, their economy, their social ties, kinship and caste networks, collective associations and institutions, their common property resources, and their built and lived habitats. It leads also to an incredible socio-spatial churning, as groups continue to be simultaneously settled and unsettled, often clashing with

one another over control of territories, access to resources and cultures (Gururani). The resulting territory is therefore characterised by uneven urban development, splintered, fragmented, incomplete geographies of being and becoming urban or resisting urbanisation (Cowan, Gururani).

While studies have highlighted the different trajectories of peripheral urbanisation, or examined the drivers of peri-urbanisation (particularly the role of the state and the market), and the impact of socio-spatial transformations on the original inhabitants of these areas, there has been little work on the ways in which different sets of actors struggle to a) reassert, or consolidate their power, authority, collectively mobilise access and claims to the emerging urban periphery through different and perhaps new regimes of territorial governance arrangements and b) assert their agency in reclaiming and remaking one's identity and making sense of the changed reality through varied, incremental, contested strategies of place-making.

However given the dynamic and emerging nature of the periphery, there is very little understanding of what kind of relationships and mediations emerge between different groups that live and work here. What kind of relationships, strategic yet unstable alliances are forged between these new and old actors – particularly between erstwhile (internally displaced) farmers and the new migrants? How is the relationship between land and labour reconstituted through new circuits of capital accumulation and regimes of governance? How is the shifting terrain of the periphery mediated, structured and governed? How are inhabitants making sense and attaching meaning to these spaces and in turn being influenced by the dynamic shifts in the landscape? What kind of power structures and locally contingent assemblages have been carved out to influence and control these processes of large scale transformations and the limits of such influence? And finally, what can the study of these relationships, everyday practices, contestation and negotiations reveal about the future of urban peripheries as viable and livable places?

2. Theoretical and Conceptual Frameworks: Informal sovereigns and everyday governance

Urban governance in the periphery, particularly the formal institutional mechanism is characterised by multiple authorities, overlapping jurisdictions, lack of coordination and fragmentation that lead to further problems in articulating decisions as there might be internal contradictions and conflicts (Dupont, Cowan). Thus while the merger reflects a political decision to bring in more votes or consolidate control over a particular territory by reconfiguring the existing political boundaries, it may also lead to emerging fractions and conflicts as a result of the fallout of the new power sharing arrangements. Moreover, while the rationale for the merger is to attract central government funds in order to undertake large scale policy driven infrastructure improvement projects, the governance situation in the context of a newly cobbled local body presents multiple challenges as interests and stakes are at cross purposes. This is exacerbated by the socio-economic divergence, cultures, aspirations for development and widely divergent political mobilisation across the three localities. Thus while there are elected members and elite, politically connected middle class lobbies in Salt Lake, based on the idea of tax paying propertied citizens, the governance of the gram panchayat areas is often under the control of big men, or party leaders with particular elite

caste/class backgrounds or land owning privileges, or the ability to use muscle power, and/or lend money and negotiate with state level functionaries.

Given that the peri urban area is characterized by fragmented and overlapping governance arrangements and conflicting interests of locally elected representatives, infrastructure and services continue to develop in an uneven and unequal manner, creating archipelagos of well serviced areas (Graham and Marvin). Therefore, new actors emerge in the interstices of service provisions, trying to bridge the gap in terms of service provisioning (Simone) and also staking out an opportunity to control new territories (Lund, Hansen and Seputtat). In return of these services/infrastructure/resources, these powerful local entities are able to extend their control over the locality, or command votes and allegiance (Lund, Cornea). In this case, there are powerful syndicates which have emerged in the area who control the pattern of urbanisation in the area, and the local economy by exerting their influence over labour, construction material supply and the negotiated arrangements they carve out with the new and powerful urban institutions that dot the landscape – from parastatals and development agencies, to newly elected ward councillors in the newly formed corporation. These informal sovereigns (Lund) could take the form of Syndicates or local clubs (Cornea) and often overlap with the local political parties and yet are also important intermediaries. They are critical to the everyday governance of these dynamic frontier urban areas and specific to the political economic context of West Bengal.

The paper is based upon my dissertation fieldwork in 2008 and 2009, followed by subsequent research projects through ethnographic fieldwork by Masters and MPhil students in 2013, 2015. In 2017, in depth, semi structured interviews with key person residents (6 total) and elected councilors (9 total) from the three merged spatial units were carried out by a PhD student to understand the dynamics and the impacts of the merger. In addition to the field level primary data collection, newspaper archives, government reports and documents were also studied in detail for secondary data.

3. Introduction to the Case study area: Bidhannagar Municipal Corporation and its surrounding areas

The North eastern periphery of Kolkata has been shaped through multiple and highly contested state driven attempts at urbanising rural agricultural and ecologically sensitive areas. In the early sixties a planned new satellite township called Salt Lake was created to decongest the city of Kolkata. A strong regulatory regime controlled the supply, subdivision, and sale or transfer of lands in these planned townships, and the entry of private players was strictly regulated by the state (Sengupta, 2013). As this township began to get populated, spurred by the setting up of the Special Economic Zone in Sector V of the township, the villages around the township began to be transformed in an unplanned and haphazard fashion. In the mid 90s, the Left Front Government decided on urbanization as a strategy to attract businesses and investments into the state. The rural areas adjoining Salt Lake city (Bidhan Nagar Municipality) was chosen as the site for the setting up of the Rajarhat New Township, three times the size of Salt Lake. Massive displacements and dispossessions of farmers, share croppers, fisherfolk and others dependent on the rural economy were hushed up by the State to enable the acquisition and development of Rajarhat New Town. These processes in turn created a ripple effect in the peripheries with private developers, big and small, buying up

villages, converting ponds and wetlands to gated urban complexes through speculative urban development. Eventually, the discontent of the erstwhile villagers led to a political denouncement of the LFG and the Trinamul Congress (TMC) came to power in West Bengal in 2011 with promises of protecting the rights of farmers and villagers from predatory capitalists.

In May 2015, the West Bengal government headed by TMC formed the Bidhannagar Municipal Corporation (BMC) through the official merger of three territorially distinct, socio-economically diverse, administratively separate settlements - Salt Lake City (a planned satellite township and a municipality), Rajarhat-Gopalpur town (an older, unplanned peripheral urban area and municipality) and parts of Mahishbathan (a rural Gram Panchayat area on the fringes of Salt Lake). This was ostensibly a top down, state driven strategy to enable the sustainable development of these extremely disparate and unevenly developed areas. The state government also argued that it would be easier to access central government schemes such as Smart Cities Mission, AMRUT etc. due to the changed administrative status to a Corporation.

It resulted in the delimitation of the geographical area into 41 wards through a process of violent territorial reshuffling – administrative boundaries being redrawn, territorial mergers and divisions that have had far reaching socio-political consequences in terms of reconfiguring existing power structures and institutional arrangements of decision making across state and non-state actors. Accompanying these shifts in power relations, alliances and alignments as well as notion of territoriality are the emerging conflicts, aspirations and claims over the control, management and distribution of resources and urban services, particularly land, water and labour. Given that the area under the newly formed Corporation is undergoing rapid urbanisation, fuelled by the construction industry and the IT sector, vacant lands, common areas, and shared natural resources are under threat as is the sustainability of the area as a whole. The urban peripheral region is likely to be affected by the transposition of new power structures and hierarchies on to existing, contingent and locally negotiated and tenuous institutional arrangements around power sharing.

The diversity of social backgrounds, occupational status and interest politics in three different locations and the socio-spatial transformations that accompany the merger leads us to question the process of evolution of governing institutions themselves – will the new institutional arrangement be exclusionary, unjust? Will it be co-opted by elite actors and middle class interests that are concentrated in Salt Lake? Will the newly elected local government be captured by vested interests of developers working in the fringes? Or, will the local government carve out new opportunities for more just and sustainable, people-friendly and industry friendly mechanisms of governance? On the other hand, how does the socio-spatial merger affect the transformation of social institutions given the changes in values, norms, preferences, class relations, and aspirations and in turn influence the politics and governance processes?

In the next section I discuss the emerging relationships between these new and old actors, the reconstitution of the relation between land and labour and between older structures of power and new emerging centres of power and influence that simultaneously reinforce and challenge the status quo.

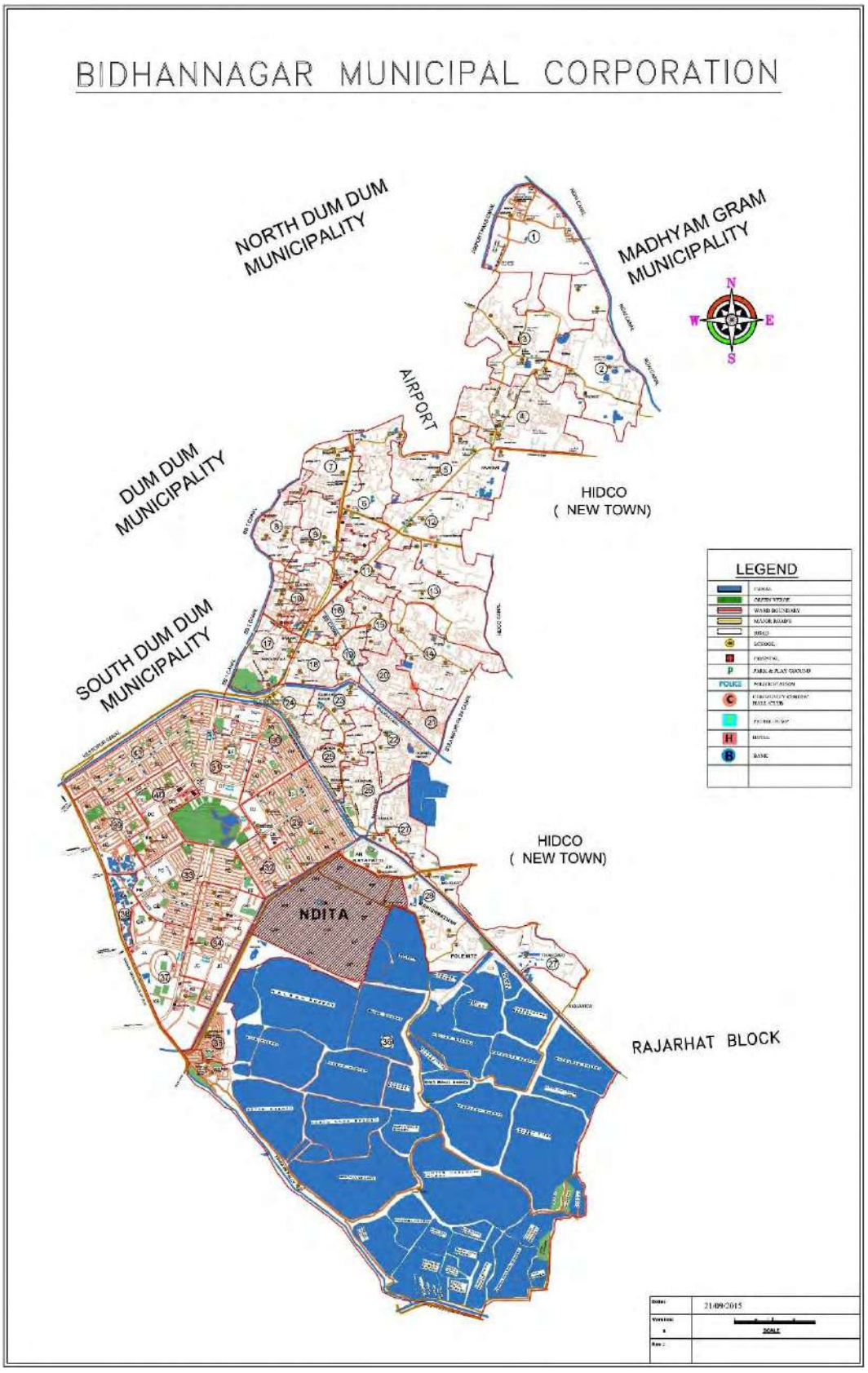


Figure 1 Map of Bidhannagar Municipal Corporation. Source: BMC website

4. Findings

4.1 The Village in the City

Prior to 1995, Mahishbathan was part of a larger fertile agricultural region dotted with dense villages with long histories of settlement, ponds, orchards and substantial waterbodies. Inhabited by farmers and fishermen, two thirds of who were from marginalised socio-economic groups - either the Muslim community or Dalit community, the locality was connected to Kolkata through the exchange of fresh produce, goods and services (Dey, Samaddar and Sen 2013). Landholdings were typically small and there were multiple tenure structures that enabled some to work as share croppers, as tenants, and even as farm labourers. Many inhabitants were engaged in fishing and in the trade and transport of fresh produce and fish. With the formation of Salt Lake city, Mahishbathan began to transform through a spillover effect as those unable to afford rents in Salt Lake moved into these adjacent villages. Villages received electricity connections, upgraded primary schools, and access to water (though filled with impurities), irrigation facilities and roads. Given that this area was already informally urbanized, there was little protest from the villagers to the proposal of the merger. In fact, for most villagers, this was welcomed given that they felt they would now be treated at par and get more money for development works and not be seen as the poorer cousin of Salt Lake city.

This facilitated new circuits of rent extraction and capital accumulation that mediated the relationship between older village inhabitants and the new migrants. Some villagers with extended and pucca houses became land lords, renting out rooms to the new migrants, often distant relatives, asserting new forms of social and economic power in the process. Residual lands along the wetlands and canals are being deliberately occupied by political force in order to settle the new migrants for a steep price, in exchange of the right to stay in those areas and access water and other urban infrastructures, away from the gaze of the state.

Hiru Ganguly (name changed) lives in Mahishbathan. He has a house with an orchard and with the transformation of the surrounding villages, he too built up his house to two floors, along with a row of small rooms in the orchard which he lets out. Though a landlord, he has worked as a driver in a logistics company for 25 years. The past two years, he has taken up the job as a private driver to a family living in the gated complex nearby as the hours are more relaxed. His distant cousins have rented rooms in the orchard. Hiru has also taken a hefty commission from his cousin's wife who has secured employment as a domestic help in the same family he is employed with. Hiru's wife does not work and his children are studying in English medium schools that have opened in Rajarhat. When asked about his choice to work as a driver, he articulated "*it is not out of a necessity. I am quite comfortable financially because of the steady rent I get. For a long time, I have not practiced agriculture though our family had a lot of land. It was increasingly difficult to find good agricultural labour. The New Town project changed this as my agricultural land was acquired and with the money I built the rooms for renting. I rent out to only known but distant relatives and*

they also benefit from this association. I choose to drive because I like to be out of the house. I am respectable person in the village and I ensure that I maintain my status".

The families with larger land holdings (often belonging to higher castes or influential families with political clout) in these villages have also been able to sell of portions of their land to private developers to construct apartment complexes given that the regulatory regime is weaker in the village pockets and the gram panchayat colludes with private players to approve the building plans. While some villagers have rented out the extra space to new migrants, others have opened up small grocery shops, cable TV shops, mobile repair shops, tea shops, etc., revealing a changing village economy. Many of these products and services sold in the villages are extended to the residents of the adjacent gated communities. These new livelihood practices, entrepreneurial spirit, moving away from subsistence economy, an emerging sense of private wealth and competition and constant efforts to improve one's property permeate the village atmosphere. Thus investing in rental property has become a strategy for villagers to enter the informal land market in Rajarhat.

However, not all residents are able to seize these new opportunities, leading to a deepening of social and spatial inequalities in the villages. While the new urban economy is dependent upon the labour of non-skilled informal workers and have absorbed the migrant labourers as security guards, maids, drivers, construction labourers but many erstwhile farmers in the villages are skeptical about these kinds of jobs, which they consider undignified and underpaid and thus prefer not to these jobs (Basak 2013).

One newly elected local councilor said "*we have been here since our forefathers came here and made the land habitable. With the rapid urbanization, many have lost access to livelihoods. It is true some have improved their houses, but where do we go now? What do we do? Where will our cows graze? The big buildings will soon stifle us. Every inch of land now is up for grabs.*"

For some of the villagers, there is no choice however but to engage in menial jobs such as rag picking – these are usually the low caste and the most marginalised sections of the village population who worked as agricultural labourers, share croppers or fishermen in the wetlands that are fast being engulfed by urbanisation. Their huts are visibly in a dilapidated kuccha state and their families impoverished. They have also lost access to the commons which were essential to their daily life for feeding their livestock, or cultivating vegetables, or for their children to play, leaving these families in an extremely vulnerable state.

The social fabric of these villages, thus far from being insulated, are now sites of emerging conflicts over resources between original residents and new migrants and original residents, further disembodying the experience of place (Kundu 2017). These villages are actually very much at the centre of the constant processes of settling and unsettling that is remaking the urbanising landscape of New Town though in highly uneven, unequal ways and often by exploiting migrants and the most disadvantaged. As Gururani (2017) has argued, "*they sustain and accommodate the everyday life of an unfolding urbanism. These rural enclaves challenge the standard narrative of urbanization and urge us to consider how in the postcolonial context unlike the post-*

industrialized world, the urban is constituted materially and symbolically, by what lies outside of it or excluded from it".

4.2 People as Infrastructure

Simone has posited that in the extremely marginalised and neglected inner city areas such as that of Johannesburg, there exist an incredible capacity for inhabitants of limited means to co-create spontaneously, very flexible and fleeting social arrangements that enhance the potential for economic and cultural operations. This conjunction – "*complex combinations of objects, spaces, persons, and practices" is what Simone refers to as "people as infrastructure*" – at once provisional and mobile, operating without clearly delineated notions of how the city is to be lived or used – and yet managing to bring together very different skills, resources, practices that enable them to reproduce life in the city with the only certainty that the outcomes are flexible and radically open ended. He posits this idea of a highly urbanised social infrastructure in contrast to the dominant idea of infrastructure as a physical entity – the provision of which through networks places people, objects and territories in a city in a way that it increase the idea of efficiency (Simone).

In the frontiers of urban Kolkata, which is marked by its distinctive lack of such complete and efficient systems of networked infrastructure (whether it is water pipelines, electricity supply, or roads) and population is scattered, density is low, and there is no distinct urban feel to the place, the concept of people as infrastructure takes on a different meaning. The Bidhan Nagar Corporation is still in the process of becoming an integrated functioning unit. This state of administrative limbo has led to a splintering of the geography and has impeded how inhabitants make sense of their surroundings and access basic infrastructure such as transport, water, electricity and garbage collection, particularly in the fringes of the Corporation.

Erstwhile farmers have become bridges for the apartment dwellers by providing services that are absent in the New Town. There is a vibrant network of informal autorickshaws that ply in New Town area responding to the needs of residents to access markets, schools, offices in the absence of public transport. Apartment dwellers in the periphery highlighted their dependency on the villagers for a number of their daily requirements. Mr. B. Poddar, a long-time resident of Greenfield Heights says, "*…the Atharotala market continues to exist because we (meaning the residents) protected it from being evicted by HIDCO. They are illegally occupying land and they charge us more for fresh vegetables and fish. But without the market, we would have had to go to Salt Lake which is 5 or 6 km away. In the absence of transport, how do you expect a retiree like me to go that far?"*

Debolina, a resident of an apartment complex in the peripheries, sums up the uneven and complicated nature of this dependence, shot through with class inequality and social tensions, "*The surrounding area of the village is basically dominated by Muslims. We have never heard of any communal issues in this region. They are very helpful in nature in fact all the service providers like drinking water, paper wala, milk provider, flower wala, maids etc. are from their community. Somehow we are dependent on them. As it was their land they keep on reminding us about the matter that we are living on their land*". Thus the dependence is simultaneously built on an

economic transaction and an act of social "othering", which distinguishes apartment dwellers from the villagers (Kundu 2017).

From the formation of local informal markets selling fresh produce collected from neighbouring ponds and fields, to informal tea stalls feeding the formal white collar workers to the construction labourer, to the supply of drinking water in housing complexes, the intricate web of autorickshaws that ply through the rural-urban divide, infrastructural gaps are being filled in by the village people (original residents and new migrants) who see an opportunity opening post the phase of being dispossessed of their lands and identities during the course of land acquisitions. In the absence of adequate physical urban infrastructure, people across the rural-urban divide have become part of the interconnecting infrastructure, filling in the gaps, through uneasy, temporary collaborations with unlikely partners born out of need in an unfamiliar territory. Much of these arrangements belie the confines of territoriality and involve potential economic risks as many of these arrangements are considered illegal – particularly hawking, illegal tapping of water and electricity.

Najimuddin, a hawker opposite DLF II in the Unitech area says, "*This shop that we have built here. HIDCO and the police obstructed us. We got around 3000 people out on the street and blocked the main road connecting DLF. The police came and but they ended up cooperating with us*". Eviction threats are all too real and the administration sometimes destroys all the goods while at other times, the police and the administration may reach a certain agreement for the hawkers to operate their food stalls in these very visible spaces of Rajarhat New Town. For Najimuddin however, the risks associated with hawking brings back memories of being forcefully evicted from his family's agricultural lands in the very same DLFII area. Yet at the same time, it also reveals a spirit of making new connections to survive – not only with the customers, but with the police and the HIDCO administration as well as collectively mobilising through the city wide Hawker Sangram Committee's network.

Yet, people invest in these risky ventures based on an implicit trust and not always necessarily on traditional identities of belonging to the same religious community, village, kin or caste networks. Yet these are tactics of surviving a harsh environment that has in many ways refused to formally accommodate the erstwhile village populations into the emerging urban economy, expropriating their control over land and the means of production and stripping them of spaces to voice their grievances. The economic ventures people create are fraught with tensions, are extremely fragile and tenuous in nature and are dependent on their ability to flexibly negotiate changing regimes of rule and administration, be attentive to changing demands of customers and to mobilise themselves on more broad based social platforms to alleviate their risks.

4.3 The rise of the Syndicate Raj in Rajarhat New Town

The analysis of the changing social relationship between the different groups in Rajarhat New Town and its surrounding areas is incomplete without an examination of the ways in which it is governed, who are the actors that mediate access to votes, voters as well as infrastructure, open up informal spaces of deliberation and resolve territorial conflicts, and control the complex and dynamic logics of settling and unsettling populations over the periphery? Given the deep socio-economic divides

and fragmentation of political authority in the periphery, the pervasive fear and terror that accompanied the accumulation of capital through the expropriation of land, the emergence of a mixed rural and urban population with various competing claims and differentiated subjectivities of citizenship, as well as the presence of a surplus population facing expulsion from the circuits of corporate capital accumulation – it is important to understand how these tensions are being managed in the present day.

Historically, the social production of the eastern periphery of Kolkata is premised on unimaginable violence committed against farmers, sharecroppers, CPI(M) party workers, activists, women and others by a combination of politicians – administrators – police – criminal strong men from the late 80's onwards. For instance, Ruis Mandal, a strong man in the Thaakdari, Mahishbathan area, was nominated as an election candidate for CPI(M)from the area. In spite of being a history sheeter, with charges of murder and arson against him, he was made to win the election, thus paving the way for a reign of terror where oppositional voices were swiftly stifled. During his rule, the civil society organisations such as the farmers association and the *bhery* workers association from the area, who had struggled against the atrocities and exploitation of the landed gentry in the area, were dismantled. Internal opposition to the Party's collusion with powerful private players trying to assemble land chunks of land, was also quashed through violent means – thus making way for a "peaceful" land acquisition process in 1996.

The formation of extra-legal land procurement committees and neighbourhood committees that made it possible to co-opt opposition parties and have them coerce and convince the farmers to give up their land at prices which were priced at far lesser rates than the market and the government rates supplemented the actions of the "strong-men" cum politicians who used their capacity for violence to exude control over territories, dispense their own justice, and make decisions with respect to life and death. Political fortunes and positions in these coveted extra-legal structures of mediation became the vehicles to consolidate power as well as immense personal fortunes.

For example, the MLA of CPI(M), Rabin Mandal held on to his seat for close to two decades, and used his political clout to become the Chairman of a Special Purpose Vehicle called Bhangar Rajarhat Area Development Authority, through which he controlled the power to control private developers access to urbanisable land. At the time, TMC MLA Tanmay Mandal was also made a member of the LPC and this further dampened chances of popular protest over large scale land acquisition. Tanmay Mandal was later sacked by Party president Mamata Banerjee for his alleged involvement in the Vedic Village land scam in the area which exposed the complicity and deep imbrications between the then ruling party, the opposition party, the district administration, private players, the local police and criminals in the use of violence to grab land from farmers. Hansen and Seputtat have thus argued that "*The gangster, the underworld, or the informal sovereign who has become "a law onto himself" are, in other words, central to the endeavors of governments and police forces to produce legitimacy, and to perform the sovereignty of the state."* In many ways, we see that the rule of individual 'big men' subsumes the state and the rule of law, highlighting how the distinction between state and market is increasingly blurred.

The nature of governance regime in Rajarhat shifts post 2011 when the TMC won the state elections with a resounding victory over the Left Front Government. Land and anti-land acquisition were the central plans of TMC's bid to overthrow the regime of Left rule. While BRADA was dissolved on charges of appeasing private interests in land, there emerged a political vacuum in New Town area which was being administered by parastatals (HIDCO and NKDA) but had no urban elected local body. Although it appeared as if these Special Purpose Vehicles were empowered to bypass the local elected bodies at the village level, especially regarding land acquisition and land development and planning decisions, this period saw the rise and consolidation of the power (and personal fortunes) of the panchayat leaders from TMC. Jehanara Bibi is one such powerful figure from Patherghata who acts as a formidable leader and a mediator between the multiple stakeholders and their conflicting claims to the periphery. She proudly proclaims, on being asked about her role in the area, "*I stand as the most approachable person in this case. HIDCO approaches me to empty lands and villagers also approach me negotiate with HIDCO. So I am everywhere. Panchayat is a good governance in Rajarhat where matters are resolved within hours and which benefits all."*

Jehanara begum is a strong woman in her own right and has a long association with the area. She was elected to the Patherghata gram panchayat as the Pradhan in 1989 from TMC. She went on to consolidate her political clout by becoming the Rajarhat Panchayat Samity Savapati in 2003. She will be completing two full terms at the Zilla Parishad covering Bishnupur, Chandpur and Patherghata. She confidently responds that she takes decisions on behalf on the Panchayat as well given her long years of experience. While sceptical of the possibility of the formation of an urban local body in Rajarhat New Town, she maintains that she is integral part of the decision making processes in the area – from settling hawkers by negotiating with HIDCO, to deciding what slab of rents they should pay in the newly constructed hawker's market, to convince farmers to give up their lands for development, to listening to the issues faced by migrants and helping them access services. Jehnara Begum however thinks that the current regime of rule is one that is markedly more peaceful that the strong-men dominated CPI(M) era- "*CPM used to send bouncers wearing red turbans and young boys on motorbikes to capture lands, once upon a time. Now, it is negotiated. TMC rule is peaceful"* reflecting a broader party strategy to consolidate its power base and move away from oppositional politics to one that is more grounded in the question of governance.

Informal sovereigns are certain non-state actors, with a capacity for violence, who act as vote aggregators for the party in power but also have some autonomy within their own territories with respect to rule-making, providing housing and services to 'informal' residents, facilitating real estate/ infrastructure deals or becoming real estate developers themselves. Their public authority is constituted by making public decisions and providing services as non-state actors but while referencing the state (Lund 2006). Instead of individual sovereigns who sustain the rule of the regime, Rajarhat New Town is governed through a complex, ever shifting alliance of different Syndicates – both labour based and material supply based. Though seeded during the CPI(m) era in a bid to appease land losers in the area, today the Syndicates act as informal structures that not only provide muscle and money power to elected

representatives but they also help to marshal political forces in support of local political leaders and to protect their political and economic turf. It is a complex assemblage of hydra-headed organisations – blurring significantly with land losers collectives, local "para" clubs, and lower level of party workers. In exchange of their ability to collect money, the labor and the materials supply syndicates get privileged access to construction projects, contracts, etc.

Figure 3 The political nexus with Syndicates. Source: Newspaper

These Syndicates are shown to have significant decision making powers in the governance of the highly uneven fringe areas of the Corporation: (i) control over labour and material requirements of the periurban economy (ii) ability to mobilise large numbers of people and votes (iii) influence decision making with respect to the development of urban infrastructure networks in and through villages where real estate developers are flocking to.

Some of the elected representatives who were interviewed professed widely varying opinions about the Syndicates. One of the elected councilors from the Salt Lake area complained that the Syndicates had become a menace and were supplying inferior quality material for a premium. They were able to wield this power over the construction business because they were armed, violent and often had the support of some party leaders. For an elected representative from erstwhile Mahishbathan panchayat area, who is also actively involved in the local social club, syndicates are nothing but peoples collectives that were formed during the state driven land acquisition drive by the LFG. These state sanctioned bodies were formed so that land losers could be rehabilitated through skilled training and by gaining a foothold in the changing economy through contracts for supplying building materials or labour. This representative insisted that the media had wrongly portrayed this "peoples collective" as a criminal and violent mode of organizing the local unemployed youth. This view was publicly corroborated by the Mayor of Salt Lake, Sabyasachi Dutta, who said, "*I am simply looking out for the underprivileged in my area. They look to the construction business for employment*."

Figure 2 Photograph of a banner showing the Syndicate's support for Mayor Sabyasachi Dutta. Source: Newspaper

With strong infighting and regular territorial clashes erupting regularly between TMC factions in the Rajarhat area, the gradual institutionalization of syndicates raises the question whether this will ultimately challenge the authority of established leaders and ultimately the rule of TMC, or will their continued presence consolidate TMC's presence in a fractured, volatile, and highly differentiated urban periphery. These multiple sovereigns thus point to the constant blurring between the business of politics and the politics of doing business in a regime of rule onto themselves and evokes close connections to the state to gain legitimacy in the eyes of other stakeholders.

4.4 The Unsettled City

For the planned township of erstwhile Bidhan Nagar Municipality, which is largely populated by an urban middle and urban middle class population, it means being clubbed together with areas which are underserviced in terms of basic infrastructure – piped water supply, underground drainage networks, sewerage networks, etc. An uneven property and land use regime plays out across the three territorial units – Salt Lake has lease hold properties only, with strict laws about transferring of property and even in terms of land use conversions. However the other two areas have freehold property regimes. There is an underlying unease amongst the city dwellers of Salt Lake city that their needs will be overlooked in favour of the more pressing concerns and political pressure from the added areas. There are also claims that the direct, face to face contact and access to the local elected officials will change once the delimitation takes place and thus people will be removed from the decentralised governance of the urban local area. "This is vote bank politics. The demography of the

three areas is vastly different and it would be disastrous to merge them" said a lawyer from the Salt Lake area.

In the checkered development politics of the periphery, Salt Lake city has been deliberately left out and neglected in the past four years since the merger. This is particularly a sentiment that is voiced by middle and upper class propertied citizens who feel that they have been central to the growth of Salt Lake, its identity as a peaceful urban area with excellent amenities. Their ties to the place has been cemented not only through their social and cultural bonds that have developed over time in the neighborhoods, but also through the municipal taxes they have diligently paid to the urban local body in exchange of services.

Retired bank official Soumen Chatterjee, who lives in AG Block of Salt Lake, is uneasy about law and order. "*All funds are likely to go to Rajarhat-Gopalpur because that area has more voters. Problems like syndicate wars might spill over.... It's a lose-lose situation for us*," he said. "*Salt Lake and Rajarhat (Gopalpur) have two separate characteristics in all aspects. They also have socioeconomic and cultural difference. We are very apprehensive and doubtful as to how these two areas with separate identities could function together*" said Kumar Shankar Shadhu, Secretary, Bidhanagar Welfare Association.

The fears are not misguided given the political undertones of the merger. Krishna Chakraborty, the last chairperson of the erstwhile Bidhannagar Municipality (TMC) said her party would develop the backward areas without neglecting the rest. "*Families grow. Everyone has to work together for the whole family to prosper. For the next five years, Rajarhat-Gopalpur will be our focus, but not at the cost of Salt Lake.*"

4.5 Red to Green to Saffron: The shifting politics of the periphery

Some political commentators have astutely observed that it was a deliberate political strategy to add Mahishbathan (II) and Rajarhat Gopalpur Municipality areas to Bidhan Nagar Municipality in order to regain control over the urban area in the Lok Sabha elections of 2016. Elections were delayed for a considerable time to enable the merger of the three areas and the formation of the Corporation. However, Opposition parties to TMC (particularly the Bharatiya Janata Party) have been gaining ground in the Bidhan Nagar urban area with the increasing dissatisfaction that the urban populace of Salt Lake city have faced with the urban local governance. Residents and businesses have developed a fear the Syndicate Raj that now mediates development activities and offers "informal protection" to businesses in Salt Lake, and whips up votes for the party in return of the political patronage they receive. Though these informal power brokers were somewhat more controlled during the era of the LFG rule, given the total penetration and control of the party machinery over the bureaucratic and administrative structures of governance, there is a distinct shift in their operations under the TMC rule. Given that the TMC as a party lacks the organizational structure of the LFG, it has also been at the mercy of these informal power brokers at the local and regional level to ensure control over voters. "Syndicate, as is being imagined, is not a centralised network. The local power brokers under the patronage of regional strongman form the mainstay of the syndicate. The regional strongman could be a political leader of any party, not just TMC's" (The Wire,2016). And even within the TMC, party leaders from adjoining or overlapping

territories in rapidly urbanizing areas such as Rajarhat, are competing against each other to curry favours with the Syndicates. Severe infighting within the party, particularly between the Mayor and the Deputy Mayor who respectively control syndicates from Rajarhat Newtown and Rajarhat Gopalpur areas, have led to policy paralysis and deteriorating services in the newly merged Corporation. Bidhanagar Corporation area has also been embroiled in the most bitter and violent clashes across rival factions of TMC supported syndicates given the real estate boom in the area. However, in a recent turn of events, TMC has demanded the resignation of Salt Lake Mayor, Sabyasachi Dutta, who also happens to be the MLA for New Town Rajarhat. Sabyasachi's growing closeness to the BJP and his openly anti-TMC statements led to the party stripping him of his powers.

5. Conclusions

The paper attempted to explore the different contours of relationships that are emerging between the different groups of actors in the periphery of Salt Lake city – particularly between the erstwhile villagers, the new migrants to the erstwhile villages, and the citizens of Salt Lake city. Migrants remain largely invisible and immensely vulnerable – they are kept in a state of permanent impermanence as they are selectively handed documents and ID proofs to consolidate their claims to land, housing, services, jobs etc. They are not allowed to collectivize although they are encouraged to support the local powerbrokers during elections.

The erstwhile villagers on the other hand, have a graduated and differentiated access to the new economy jobs or the option to rent out land. They lack skills or the drive to get involved in some of these new forms of informal labour – but are part of the circuit in other ways – as middle men or intermediaries brokering information, land deals, renting houses, creating connections to local political strong men and parties, getting connections to services, connecting to government agents who will provide an identity or documentation proof to new migrants. "Here having the right information and building fluid, provisional relationships with powerful builders and political actors is key to social mobility" (Kamath and Raj).

The fragile ecosystem of syndicates, local intermediaries, para statals and party functionaries belie any definite forms of institutionalization of governance structures but remain powerfully open ended, a highly contested field, where each actor tries to influence the other or subvert the other, or negotiate the terms of trade-off between political allegiance and economic gains, straddling the urban and rural divide. The powerful Syndicates are open in their support for heavyweight party functionaries such as the Mayor of Bidhan Nagar Municipal Corporation, which was manifest in their show of strength in numbers during the filing of his nomination and also in the public display of congratulations upon his victory in 2016.

The urbanising landscape is one that is patchy, fragmented and extremely volatile. There are elements of the village that seep into, sustain and change the dynamics of urbanisation. The circulation of capital happens through the calculated informality that creates differentiated spatial values and the control over labouring bodies.

6. References

Cornea, Natasha; Zimmer, Anna; Véron, René (2016) "Ponds, power and institutions: the everyday governance of accessing urban water bodies in a small Bengali town". International Journal of Urban and Regional Research. 40(2):395-409

Cornea, N. (2019). Territorialising control in urban West Bengal: Social clubs and everyday governance in the spaces between state and party. Environment and Planning C: Politics and Space.

Cowan, Thomas (2015) Fragmented Citizenships in Gurgaon. Economic and Political Weekly. June 25. Vol. L. Nos. 26 and 27

Dey, I., Samaddar, R. and Sen, S.K. (2013). Beyond Kolkata: Rajarhat and the Dystopia of the Urban Imagination. Routledge. New Delhi.

Dupont, V. (2007). "Conflicting Stakes and Governance in the Periurban Areas of Large Indian Metropolises: An Introduction". Cities, 24(2): 89-94

Graham, S. and Marvin, S. (2001) Splintering Urbanism: networked infrastructures, technological mobilities, and the urban condition. Routledge. London.

Gururani, S. (2012) "Flexible Planning: The Making of India's 'Millenium City', Gurgaon". In: Rademacher, A. M. and Sivaramkrishnan, K. eds. Ecologies of Urbanism in India: Metropolitan Civility and Sensibility, pp 121-123. Hong Kong University Press. Hong Kong.

Hansen, T.B.and Stepputat, F. (2009) Sovereign Bodies: Citizens, Migrants, and States in the Postcolonial World, Princeton University Press

HIDCO. (1999). The Project Report of New Town. Government of West Bengal. Unpublished Report. Kolkata

Kamath, L. and Deekshit, P. (2014) Planning as Practice?, Review of Urban Affairs, Economic and Political Weekly, Vol. 49, Issue 22

Kennedy, L. and Sood, A. (2016) Greenfield Development as Tabula Rasa: Rescaling, Speculation and Governance on India's Urban Frontier, Economic and Political Weekly Review of Urban Affairs 51 (17), 41-49

Kose, B and Gururani, S. (2014) "Shifting Terrains: Questions of Governance in India's Cities and their Peripheries." In Suburban Governance. Pierre Hamel and Roger Keil. University of Toronto Press. Toronto.

Kundu R. (2017) Inserting Local Agendas in the planning of New Town Rajarhat, in Mega-Urbanization in the Global South: Fast Cities and New Urban Utopias of the Postcolonial State, Routledge

Kundu R. (2016). Making Sense of Place in Rajarhat New Town, Review of Urban Affairs, EPW, Vol. 51, Issue No. 16, April 23 2016

Lund, C. (2006), Twilight Institutions: Public Authority and Local Politics in Africa. Development and Change, 37: 685–705.

Roy, A. (2003). City Requiem, Calcutta: Gender and the Politics of Poverty (Globalization and Community Series). University of Minnesota Press. Minneapolis. USA.

Simone, A. (2004) People as Infrastructure: Intersecting Fragments in Johannesburg. Public Culture. 16(3): 407-429.

https://thewire.in/politics/west-bengals-syndicate-raj-a-boon-and-bane-for-political-parties

Case Study / Project

Anticipation Strategy for Urban Conurbation

in Semarang- Surabaya Corridor

Dwitantri Rezkiandini LESTARI ,
Latifah LATIFAH

Abstract

Semarang-Surabaya corridor is the backbone for economic growth of Central Java and East Java. This corridor also plays a role in national economic growth. Semarang-Surabaya corridor development is expected to create positive externalities, such as creating spillovers in urban areas along the corridor. The spillovers in an urban area along the corridor happen in Jakarta-Cipularang corridor. Besides creating positive externalities, the development of Jakarta-Cipularang corridor as the backbone for economic growth of Jakarta-Bandung also create uncontrolled urban conurbation. Weak spatial control is the trigger for this phenomenon. Based on the phenomenon that occurs in Jakarta-Cipularang corridor, Semarang-Surabaya corridor development should pay attention not only in the infrastructure development plan but also in the spatial control strategy. This project applies the concept of economic corridor development, which produces outputs such as urban cluster plans along the corridor, anticipation strategies, infrastructure development programs, and spatial control along Semarang-Surabaya corridor.

Research Paper

Response Path Adapted to the Unbalanced Shrinkage of Small Towns in Metropolitan Areas

A case study of Wuhan in China

Yanqun LI, Huazhong University of Science and Technology; China
Hong GENG, Huazhong University of Science and Technology; China (Corresponding author)
Erpeng SHI, Huazhong University of Science and Technology;

Abstract

Along with the global wave of urbanization, urban agglomerations with megacities as the core have become the main form of urbanization in various countries. The polarization effect around the metropolis leads to the centripetal flow of capital, labour, land and other resource elements in the surrounding small towns, which causes the shrinkage of small towns in the metropolis, such as population reduction, economic recession, idle housing and dilapidated space. The shrinkage of small towns in the metropolis has become a global issue. However, as an important spatial unit in the spectrum of urbanization that serves, connects and couples urban and rural areas, the shrinking phenomenon faced by small towns has an important influence on the healthy development of urbanization. Exploring the development path of adaptive shrinkage for small towns has become an important part of the healthy urbanization of metropolises.

Based on the public data of population, land and economy in Wuhan, China from 2004 to 2014, this paper uses GIS and other spatial analysis technologies to comprehensively measure the relevant characteristics of the shrinkage of small towns. The results showed that the small towns in Wuhan are in the form of "unbalanced shrinkage" under a local growth. And the towns present a spatial pattern of "circle increasing shrinkage" around the boundary of main downtown. With a further exploration of the formation mechanism of "unbalanced shrinkage", it is found that this shrinkage pattern is caused by a combination function of various factors, such as downtown deprivation in the policies supply, centripetal delivery of social capital and reconstruction of regional division of labour network. Based on this, this paper tries to propose some response paths for small towns in metropolitan areas to adapt to the "unbalanced shrinkage". First of all, the small towns should integrate into the regional differential development pattern and strive for the institutional dividend. Secondly, the small towns should promote an industrial transformation, and then attract the market release of social capital. Thirdly, the small towns should improve the living environment and promote intensive use of land. Through these paths, we can stabilize the three-level structure system of "urban-township-village", and ensure the healthy urbanization of metropolitan areas.

Keywords

Small towns, Unbalanced shrinkage, Circle increasing pattern, Formation mechanism, Wuhan

1. Introduction

Along with the global wave of urbanization, urban agglomerations with megacities as the core have become the main form of urbanization in various countries. More than 55 percent of the world's population live in the urban agglomerations. The polarization effect around the metropolis leads to the centripetal flow of capital, labour, land and other resource elements in the surrounding small towns, which causes the shrinkage of small towns in the metropolis, such as population reduction, economic recession, idle housing and dilapidated space. Countries such as the United States, Germany, France, Japan and the Netherlands are generally facing the shrinking plight of the development momentum of small towns (Oswalt 2006, Johnson 2006, Glock 2004, Ortiz-Moya 2015 & Bontje 2012). The shrinkage of small towns in the metropolis has become a global issue. A comprehensive comparison of the development characteristics shows that there are significant differences in the types, characteristics and mechanisms of the shrinkage of small towns in different countries. For example, the shrinking small towns in both the United States and Japan are located in suburban, but the United States shows the phenomenon of poverty agglomeration and middle class outflow, while Japan shows the phenomenon of functional decline (Downs 1997 & Saori and Polivka 2008). The shrinking small towns in Germany are mainly concentrated in East Germany, showing the phenomenon of continuous decrease in population and employment rate, and spreading to West Germany (CHEN, et al. 2018).

In the context of China's localized development, it is found that the general growth and local shrinkage in China's rapid urbanization process have become the normal, with the economy entering the new normal (DU and LI 2018). For small towns in metropolitan areas, it shows local shrinkage under the overall urban growth. Specifically, Chinese metropolises are still showing a strong growth trend, and small towns still have a strong development potential on the whole. However, on the one hand, the outflow of labour force, the hollowing out of families and the aging of population have reduced the population vitality of small towns, while the convenient urban transportation network has provided the opportunity for township residents to go to the city for over-consumption, which has compressed the local consumption market and business service level of small towns. On the other hand, the government finance and social capital traditionally invested in small towns turn to the central supply driven by the value-added in the central city, leading to the market risk of small town businesses facing the transfer, withdrawal and withdrawal of business entities (GAO, et al 2019). Under the combined action of internal and external forces, some small towns in China's metropolitan areas show multi-dimensional shrinkage of population, space, economy and ecology, including the outflow and aging of labour force in the population dimension, hollowness and index deprivation in the spatial dimension, imperfect industrial development in the economic dimension, systematic low-level consumption in the ecological dimension and other external manifestations (DU and LI 2017, LIU and YANG 2017, LI and GENG 2018). Public and micro survey data show that more than 45% of the small towns in China's metropolitan areas have a new spatial pattern of "growth and shrinkage" co-existing

in a certain degree (LI, et al 2019). However, as an important spatial unit in the spectrum of urbanization that serves, connects and couples urban and rural areas, the shrinking phenomenon faced by small towns has an important influence on the healthy development of urbanization. Exploring the development path of adaptive shrinkage for small towns has become an important part of the healthy urbanization of metropolises.

Located in central China, Wuhan is the central city of Wuhan city circle, with a population of more than 12 million and a total area of 8,848 km^2. Over the past 20 years, Wuhan has become a typical metropolitan area in China, relying on its strong absorption capacity of population and economic resources. However, during the development, the small towns in Wuhan metropolitan area is faced with the simultaneous competition of Yangtze River Delta Urban Agglomeration and Pearl River Delta, and also faced with the challenge of resource backflow under the strategy of rural vitalization. It leads to irregular flow of urban and rural resources such as population and capital. As a typical area that has experienced the "collapse of the central region" and "rise of the central region", and also experienced frequent population migration, the small towns in Wuhan metropolitan area show remarkable logic of growth and shrinkage.

Based on the above, by taking small towns in Wuhan metropolitan area as the research object, this research uses the government open statistical data, supplemented by some micro survey data, to identify the growth and shrinkage pattern of small towns in Wuhan metropolitan area. Then the research analyses the phenomenon and formation mechanism of the growth and shrinkage of small towns in Wuhan metropolitan area, and puts forward the adaptive planning response path to promote the healthy development of small towns in metropolitan area.

2. Methodology

2.1. Analytical Framework

Population change is widely used internationally as the main criterion to measure whether the towns shrink or not (Oswalt, et al. 2006). The Shrinking City International Research Network (SCIRN) defines shrinking towns as "areas with a population of at least 10,000, most of which should experience population decline for more than two years, accompanied by structural economic transformation and crisis" (Wiechmann 2008; Hollander, et al. 2009). However, as a complex system with overlapping factors of population, land and economy, it is limited to evaluate the shrinkage of small towns simply by population index. If the development of small towns is regarded as the flow and agglomeration of capital, labour and other production factors in the built space (Bertinelli et al. 2004), then the shrinkage of small towns should be understood as the spatial decay caused by the outflow and relocation of capital, labour and other mobile production factors (Du, et al. 2017). It is proposed in relevant studies that town's shrinkage has economic, population and spatial dimensions, which can be used to emphasize multidimensional processes and effects (Martez-fernandez et al. 2012). Based on the above, population, economy and land are selected as the index dimensions to evaluate the shrinkage of small towns in this study, with a view to systematically explain the phenomenon of shrinkage of small towns.

2.2. Research Method

Based on the above, a three-dimensional comprehensive index system of population, economy and land was firstly established. The comprehensive index system includes eight indexes, which are: total population, urbanization rate, regional GDP, total fixed asset investments, local fiscal revenue, built-up area, population density, and area of public green space. Then, all the indexes are standardized, and the weight of indexes is determined by means of "Standard Deviation Decision" (Wang 1999), so as to avoid the influence of each index dimension and subjective assignment (formula (1)). And then, the comprehensive development index of small towns is calculated according to the formula (2), and the shrinkage degree of small towns is characterized according to the change of the comprehensive development index of small towns in different years, seen in formula (3).

$$W_j = \sigma(Index_j) / \sum_{j=1}^{m} \sigma(Index_j) \quad (1)$$

$$Index_i = \sum_{j=1}^{m} X_{ij} W_j \quad (2)$$

$$\text{Shrinkage} = \Delta_{Index} = Index_{it1} - Index_{it2} \quad (3)$$

2.3. Data Source

This research takes all the small towns in the six remote districts of Wuhan except the Chengguan Towns as the research objects, with a total of 58. The six districts are as Huangpi district (located in the north of Wuhan, contains 16 towns), Xinzhou district (located in the northeast of Wuhan, contains 13 towns), Jiangxia district (located in the south of Wuhan, contains 10 towns), Dongxihu district (located in the west of Wuhan, contains 6 towns), Caidian district (located in the west of Wuhan, contains 10 towns), and Hannan district (located in the southwest of Wuhan, contains 3 towns). With a comprehensive consideration of the urbanization process and characteristics of both China and Wuhan, this research selects the year of 2004, 2009 and 2014 as the time points of indicator measurement. The demographic and economic data of research evaluation indexes are all directly or indirectly derived from the statistical yearbook of Wuhan and six districts, supplemented by relevant data obtained from field observation and questionnaire survey. The land data are derived from the built-up area patches downloaded from the Google map.

3. Result

3.1. Comprehensive Development Index of Small Towns

Through the use of population, economy, land and other relevant data of the year 2004, 2009 and 2014, the comprehensive development index of small towns in Wuhan was measured, and the spatial distribution map of the comprehensive development index of small towns in corresponding years was drawn (Fig.1). The results show that the overall difference of the comprehensive development index of small towns in Wuhan in 2004 is small, with a spatial pattern of "high in the north and low in the south". The small towns with high comprehensive development index are mainly concentrated in the north of Wuhan, including Yangluo and Xinchong in Xinzhou district, and Shekou, Tianhe, Hengdian in Huangpi district. In 2009, the north-south difference in the comprehensive development index of small towns in Wuhan gradually weakened. Small towns with high comprehensive development index are concentrated in the north of Wuhan. Especially Yangluo and Shekou have become the significant growth poles. However, the comprehensive development index of small towns far

away from the main downtown have showed a decreasing trend, such as Mulan, Xiaosi, Sandian, Jiujie and so on. By 2014, the comprehensive development index of small towns in wuhan has formed a spatial structure of "decline of circle layer" which rings the main downtown, that is, the closer to the main downtown, the higher the comprehensive development index is; the farther away you are from the main downtown, the lower the composite development index. The first circle layer consists small towns surrounding the main downtown, including Yangluo, Wuhu, Shekou, Tianhe, Jinghe, Zoumaling, Zhashan, Zhengdian, etc. The second circle layer refers to the small towns located in the middle of six districts, including small towns such as Shuangliu, Wangji, Cangbu, Liuzhi, Qijiawan, Yuxian, Jinkou, Dazhi and so on. The third circle layer is located at the edge of Wuhan. And the small towns present continuous spatial pattern with small comprehensive development index, mainly concentrated in the north of Huangpi district, the north of Xinzhou district, the south of Jiangxia district and the west of Caidian district.

At the district level, the differences in the comprehensive development index of small towns in six districts of Wuhan were relatively small in the early days. However, by 2009, the comprehensive development index of small towns in various districts showed a polarization trend and the differences were significantly enlarged. Till 2014, the differences in the comprehensive development index of small towns among different districts gradually narrowed. But there were significant polarizations in the small towns within the six districts, which was manifested as the spatial pattern of the declining circle layer of the comprehensive development index of small towns from the main downtown to the outside.

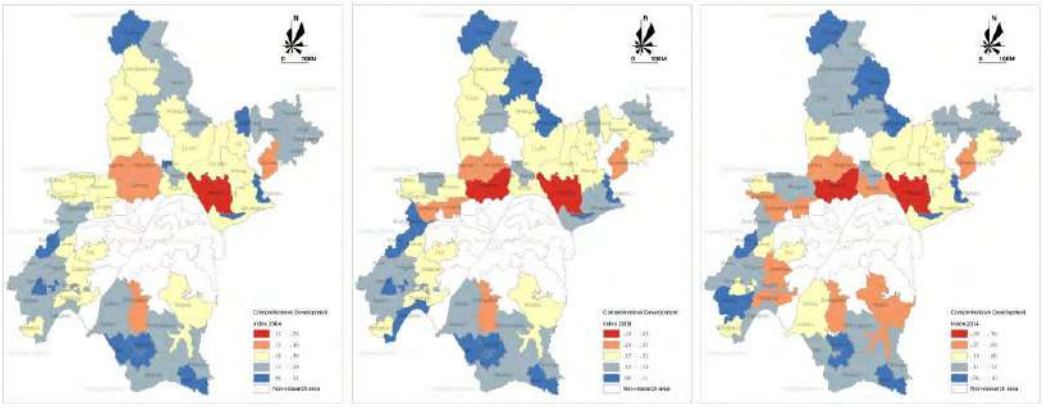


Figure 1 Spatial difference of comprehensive development index of small towns in Wuhan

By comparing the calculated results of the comprehensive development index of small towns with the spatial distribution characteristics of retail business in Wuhan (FIG.2), it is found that the calculated results of the comprehensive development index of small towns are highly consistent with the spatial distribution characteristics of economic industry, so as to further verify the authenticity of the comprehensive development index

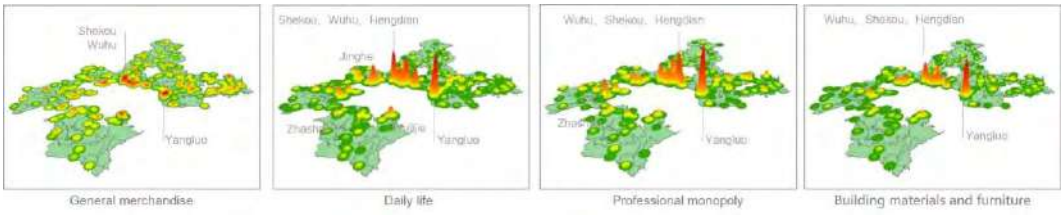


Figure 2 Spatial distribution pattern of entity retail business in small towns in Wuhan(2014)

3.2. Unbalanced Shrinkage of Small Towns

The change of comprehensive development index is used to measure the growth and shrinkage of small towns. If the comprehensive development index declines, it can be defined as the shrinkage of small towns, and vice versa. This research measured the shrinkage degree of small towns in Wuhan in three periods: 2004-2009, 2009-2014 and 2004-2014. The results show that from 2004 to 2009, there was a large area of shrinkage of small towns in Wuhan (FIG.3). More than 50 small towns showed varying degrees of shrinkage, but most of them showed small extent of shrinkage. Only Yangluo, Tianhe, Dongshan, Zhengdian and other small towns, concentrated in the northern part of the main downtown, showed relatively high degree of shrinkage. From 2009 to 2014, small towns in Wuhan showed an overall growth trend. But there were still 17 small towns which were far away from the main downtown got a shrinkage, such as Changxuanling, Xinchong, Baiquan, Caijiacha, Yuxian, Xiaosi and other small towns, mainly concentrated in the northern Huangpi district and the western Caidian district. Small towns near the main downtown showed a significant growth pattern, especially small towns such as Yangluo, Wuhu, Jinkou and Zhashan, which showed an increase of more than 0.1. On the whole, during the period of 2004-2014, small towns in Wuhan have showed a pattern of "unbalanced shrinkage" which coexists with significant growth and shrinkage. The shrinking small towns were mainly concentrated in Huangpi district, Dongxihu district, the west of Caidian district and the middle of Xinzhou district. The growing small towns are concentrated in the first circle layer outside the main downtown and some small towns in the south of Jiangxia district and the east of Xinzhou district.

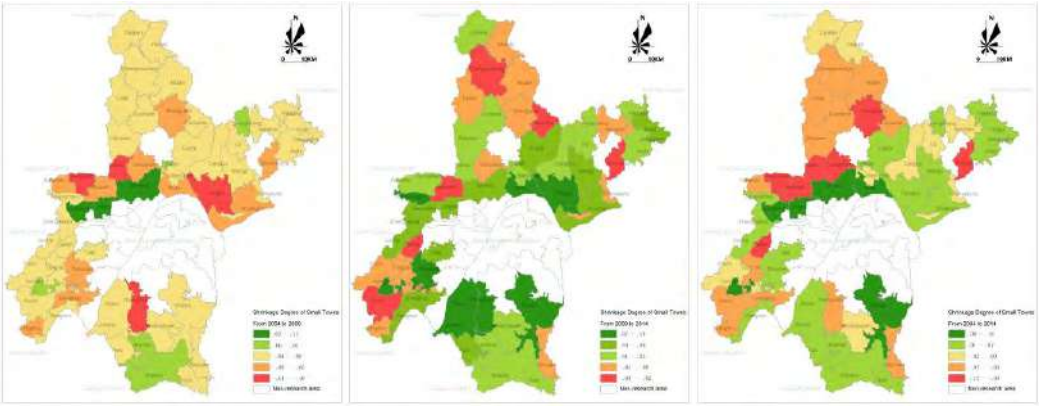


Figure 3 Shrinkage degree of small towns in Wuhan (2004-2009, 2009-2014, 2004-2014)

At the same time, the research measured the shrinkage degree of small towns from the single dimension of population (FIG.4). The results show that from 2004 to 2009, 45 small towns in Wuhan experienced population shrinkage, covering all six districts. The population shrinkage of Huangpi district is the most serious, especially the small towns like Shekou, Liuzhi, Qijiawan, Luohansi, Hengdian, Yaojiaji and Caidian, whose population fell by more than 7,000. From 2009 to 2014, only 10 small towns experienced population decline, which was quite different from the previous stage in terms of population evolution space. Based on a ten-year investigation from 2004 to 2014, it is found that the population of small towns in Wuhan has a development pattern of "shrinkage in the north, growth in the west, growth and shrinkage coexists in the south and east", and presents a circle structure of "shrinkage in the periphery towns and growth in the main downtown". Further analysis from the district level shows that the population of six remote districts in Wuhan are all decreased from 2004

to 2014 (FIG.5), but the decrements are significantly different. Xinzhou district and huangpi district had the largest total population reduction, with 217,000 and 154,000 respectively. While in Caidian district, Dongxihu district and Hannan district, the population decline was no more than 30,000, among which Caidian district has the smallest decline, only 13,000. In terms of the shrinkage degree of population, the most severe one is Dongxihu district, reaching 0.41, followed by Xinzhou district (0.35) and Jiangxia district (0.37), and the least significant one is Caidian district (0.17).

By comparing the above two calculation results, it is found that there is a significant difference between the two methods of measuring the shrinkage degree of small towns. Although population is the most direct variable to measure the shrinkage of small towns, as a complex multi-dimensional feature, the "unbalanced shrinkage" of small towns cannot be measured independently by a single index, and a multi-dimensional evaluation system must be established to scientifically identify the growth and shrinkage of small towns.

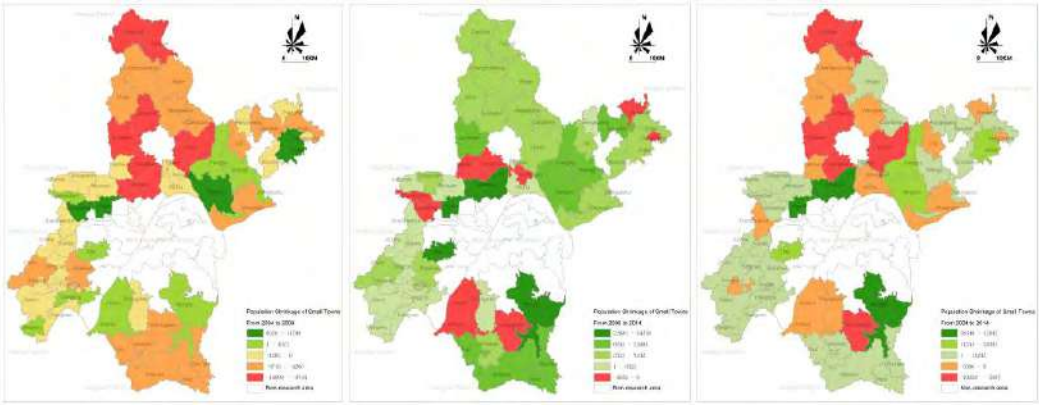


Figure 4 Population shrinkage of small towns in Wuhan (2004-2009, 2009-2014, 2004-2014)

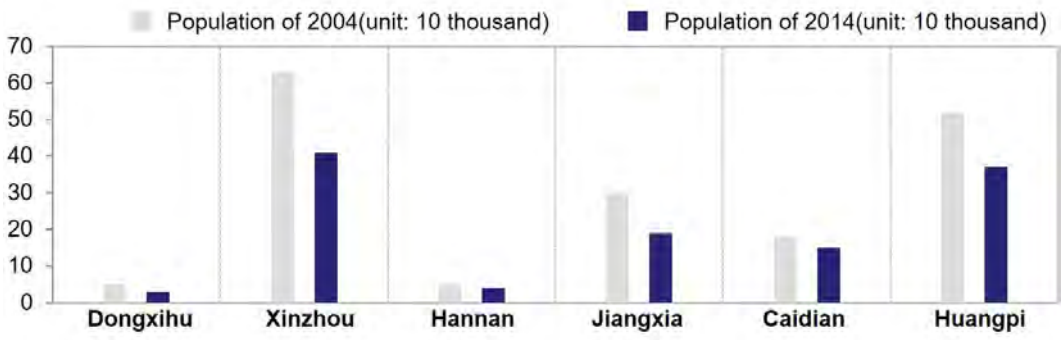


Figure 5 Population of six districts of Wuhan in the year of 2004 and 2014

4. Discussion and Conclusion

4.1. Formation Mechanism of the “Unbalanced Shrinkage”

The above results show that the small towns in Wuhan have shown a certain trend of unbalanced shrinkage, with a regional unbalanced spatial characteristic. A comprehensive interpretation of the internal characteristics of regional unbalanced shrinkage found that the formation of this shrinkage pattern lies in the unbalanced supply of city institutions,

centripetal delivery of social capital and reconstruction of regional division of labour network.

(1) Unbalanced supply of institutions

The effective supply of upper institutions will significantly affect the social and economic development and space construction process of small towns. Since 2004, Wuhan has issued a series of policies to support the development of its peripheral small towns (Table 1). Due to the bias and preference of the government-led institutional supply, the small towns present regional unbalanced institutional environment. It has become the general trend of Wuhan's development to put public resources and social capital into orderly groups around key towns, central towns and new towns. Especially since 2010, according to the development strategy of "upgrading the main city and expanding the new city", Wuhan has further increased the investment and construction in the new city, formulated the regional employment and housing balance plan, and supported the gradient transfer and agglomeration distribution of urban population and industries. The new towns such as Zhashan, Shekou, Wuhu, Yangluo, with the aid of regional public service facilities, further enhance their industrial development and economic strength, leading to the further intensification of the polarization trend of regional development. On this basis, the regional growth poles have gradually formed, such as Yangluo, Zhashan, Wuhu, etc. For example, Wuhu, the new town in the north, is in a leading position in Huangpi district with the construction of transportation facilities such as new Huangwu Highway, Hankou north road, the fourth ring road and regional functional facilities such as Hankou north market group and Taichuang zone (FIG. 6).

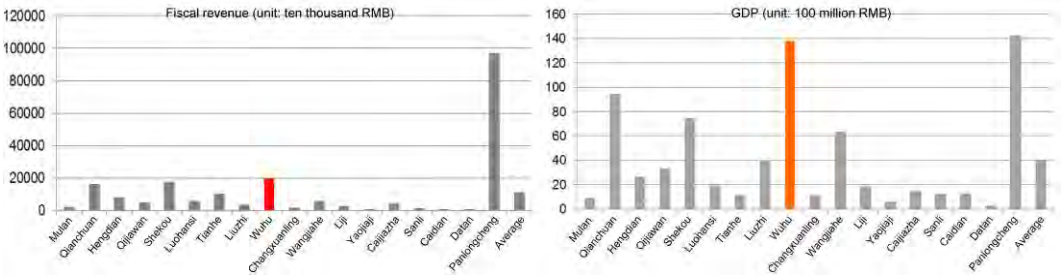


Figure 6 Comparison of fiscal revenue and GDP between Wuhu and other towns in Huangpi district in 2014

Table 1 Evolution of policy and institutional supply of small towns in Wuhan from 2004 to 2014

Time	Policy/ institution	Content	Effect
2004	Opinions on speeding up the construction of small towns	Developing key towns, accelerating investment in infrastructure and public service facilities and guiding the injection of social capital	Effectively promoting the construction and development of Yangluo, Wuhu, Zoumaling, Xingou, Xiangkou, ZuoLing, Shekou and other key towns
2006	Urban agriculture development planning of Wuhan	Promoting the construction of urban agricultural industrial zones	Six industrial parks have been formed, including Wuhu to Shuangliu, Dongxihu, Caidian to Hannan, Huangpi to Xinzhou and Jiangxia

2008	11th five-year plan of city spatial layout in Wuhan	Delimiting six new town clusters and six ecological green wedges	Promoting the rapid growth of towns within the new town cluster and limiting the development of towns within the ecological green wedge;
2010	Master plan of Wuhan	Determine the four-level town system of "main city - new town - central town - general town"	Strengthening the supporting facilities of the new town and the central town and improve the construction scale of the central town
2011	Opinions on accelerating the implementation of new urbanization	Cultivating the development of central town, characteristic town as a strategy to promote new urbanization	Further strengthening the development level of the central town. And show policy preference on land indicators, financial supply, and public facilities construction
2012	Notice on the pilot reform of the administrative system of economically developed towns	Carrying out a reform of strengthening the administrative system of expanding the power of economically developed towns	Three regional growth cores have been formed, including Zhashan and Wuhu

(2) Centripetal delivery of social capital

The Neo-Marxist theory holds that the spatial production of urban construction environment is the result of social capital control and action (ZHANG and CAI 2006). The effective allocation of government and social capital has become the main driving force for the social and economic development of small towns. Before 2004, with a small agglomeration effect of the central downtown of Wuhan, the capital investment in small towns remained relatively stable, which effectively promoted the construction of facilities in small towns. But with the rapid development of the central downtown of Wuhan since 2005, the capital appreciation effect and effective recovery rate of the central downtown are much higher than the peripheral small towns, causing the government finance and social capital of the traditional small towns to turn to the central supply. Especially the industrial capital, mainly concentrated in the industrial parks in urban development areas, which leads to the general lack of industrial support and vitality in peripheral small towns. At the end of 2010, the "Industrial doubling plan" of Wuhan has put forward that the layout of industrial project and allocation of development factors would mainly located in nine key blocks, which only covers three small towns, which are Yangluo, Shekou and Zhashan. In 2014, the comprehensive planning of the four major blocks of Wuhan proposed that industrial enterprises should be centrally distributed, new town centres should be centrally built, supporting infrastructure should be centrally built, and "industrial agglomeration, spatial concentration and land use intensification" should be strengthened. At the same time, the establishment of industrial parks in peripheral small towns is prohibited, especially those located in efficient and characteristic agricultural circles. These requirements directly make it difficult for the peripheral street towns with a certain development foundation to play their important carrier role in the urbanization process due to a lack of proper support, and the local

industrial development of the towns and villages is limited, and the towns and villages all show the trend of decline. Statistics show that during 2004-2014, the new construction lands of the small towns, with an area of 175.1 square kilometres, are mainly located in the first circle around the main city, such as Yangluo, Shekou, Tianhe, Wuhu, Zhashan, Jinkou and other towns (Fig.7). While the area of construction lands for small towns outside the first circle has only increased by square kilometres. Due to a lack of injection of social capital, the peripheral small towns generally face the dilemma of slow space growth and sluggish development.

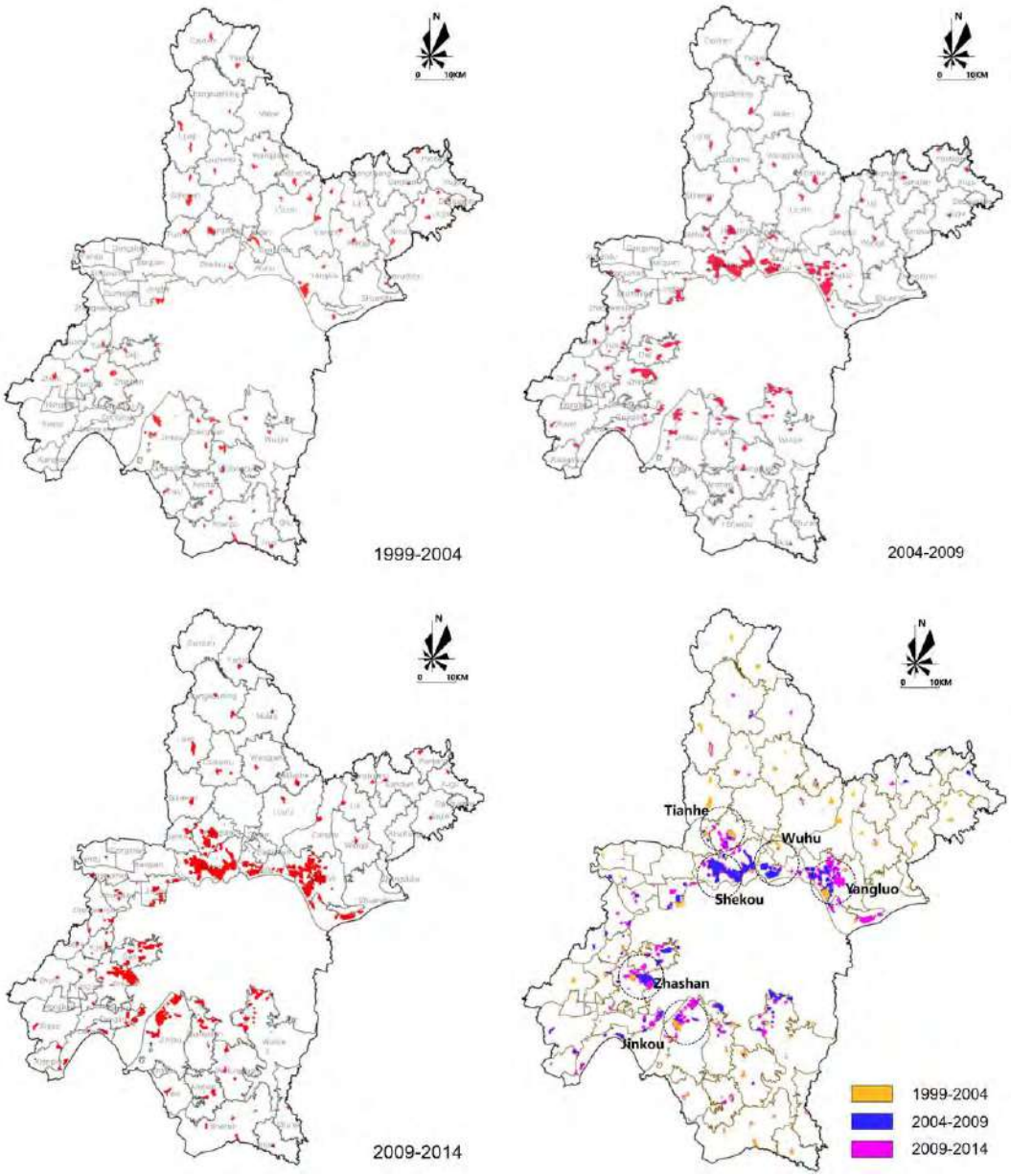


Figure 7 Distribution of new construction land in small towns from 1999 to 2014

(3) Reconstruction of regional division of labour network

According to social network theory, urban and rural social and economic development is attributed to the spatial flow effect of material resources, in which material resources are

mobile elements and social and economic network is the connection bridge of element circulation. Since 1978, Wuhan has long valued urban areas over rural areas, leading to the solidification of the urban-rural dual structure. Small towns become the connection bridge and transfer station connecting the circulation of material resources between "urban area" and "rural area", thus gradually forming a stable "city-town-village" three-level division of labour network within the scope of the city. However, with the introduction of policies in China such as the new socialist countryside in 2005, the beautiful countryside in 2009 and the rural revitalization in 2017, Wuhan has made great efforts to improve rural construction and promote the overall planning and integrated development of urban and rural areas. After more than ten years of rural construction, Wuhan has basically achieved the integration of urban and rural facilities, which has weakened the public service function of small towns to the countryside. At the same time, the industrial capacity of small towns declines, and the functions of small towns fade as a result of transmission. There is a phenomenon of "city-village" cross-level factor flow between urban and rural areas in Wuhan city, and the service shrinkage of function decline generally occurs in small towns.

In addition, Wuhan has focused on the development of rural tourism industry since 2010, and formed a number of unique tourist towns relying on their own landscape resources and tourist attractions, such as Caidian, Yaoji, Changxuanling, Mulan, Liji, Wangjiahe, Daoguanhe, Suohe, Yong'an, Fasi and other towns. In accordance with the idea of key transformation and upgrading, 74 beautiful villages and 15 central villages (communities) have been built successively by adopting four models, including the mode of combining agriculture with tourism, the mode of combining poverty alleviation with development, the mode of building new countryside and the mode of developing characteristic agricultural products. The villages gradually get rid of the dependence on towns, which leads to the significant weakening of township functions.

4.2. Response Path Adapted to the “Unbalanced Shrinkage”

As mentioned above, under the influence of institution, capital and network, the development of small towns in Wuhan city shows a significant feature of "unbalanced shrinkage". In spite of the regional integration development, the shrinkage of small towns has its inevitability and rationality. However, this kind of shrinkage also adversely affects the healthy development of social economy in small towns. Therefore, it is necessary to adjust the development mode of small towns, explore the development path of small towns adapted to the unbalanced shrinkage, so as to promote the healthy development of small towns and urban division of labour network.

(1) Integrating into the regional differential development pattern and striving for the institutional dividend

To cope with the influence of regionalization, the self-cognition initiative of small towns should be exerted firstly. On the one hand, small towns need to seek differentiated and characteristic development in regional competition, give full play to their advantages in region, culture, resources and location, and seek a breakthrough in development based on characteristics and advantages, so as to eliminate the adverse impact of contractive elements. On the other hand, small towns should extend the industrial chain and form linkage development with surrounding industries to integrate into regional development pattern and improve regional competitiveness based on their own characteristics, development capabilities and regional development requirements.

On this basis, small towns should actively strive for institutional dividends. In the process of institutional supply, the government always gives priority to the overall development efficiency of the city, while lacks independent thinking of individual small towns. Therefore, small towns must actively acquire the preference of urban institution to better support their own development. To be specific, on the one hand, during the process of regionalization development, small towns should face up to the reasonable shrinkage under the influence of regional environment, and effectively adjust, restructure or streamline the regional and internal functions of small towns according to the changes of regional environment. And then they should pay attention to the reallocation and selection of resources after shrinkage and expansion, so as to meet the needs of regional development. On the other hand, small towns should change the development mode from the self-centred mode to the regional cooperation and become the important node of the network town cluster with multi-centre connection. In the meantime, the city government need to targeted put forward the strategies adapted to the "shrinkage" for the small towns in the overall urban planning, including regional economic collaboration, urban and rural public service facilities sharing, town and country information interaction between urban and rural areas, ecological network and other dimensions, with a view to improve the precision of unbalanced resource allocation and delivery, scientific nature and rationality.

(2) Promoting an industrial transformation and attracting the market release of social capital

The low level industrial structure and low efficiency industrial type are the important factors that cause the sluggish industrial development and economic shrinkage of small towns. For small towns in Wuhan, due to the spatial attenuation and selective orientation of radiation from the main downtown, most of them still mainly rely on agriculture and traditional industry, while the tertiary industry is weak. However, the production benefits of agricultural products gradually tend to be saturated, and the development of traditional industries is mostly in a state of small scale, low level, poor benefits and short industrial chain. It is not only unable to support local residents' jobs, but also difficult to effectively realize industrial agglomeration and driving effect. These small towns supported by traditional industries are prone to economic shrinkage due to their difficulty in adapting to the requirements of economic development in the post-industrial era in regional competition.

Therefore, small towns must adjust the industrial structure, reorganize and make full use of internal factor resources, strengthen and expand the industrial chain, and improve the industrial system to form an industrial development model of agglomeration and linkage. At the same time, we should abandon the unsustainable resource-consuming industries in the adjustment of industrial structure, and realize the intensive transformation, so as to lay a good foundation for the healthy and sustainable development of small towns. In addition, the injection of social capital also provides a new opportunity for the renewal of urban built environment and space reproduction. According to David Harvey's secondary circuit theory, the effective delivery of capital plays a significant role in stimulating the social and economic development of cities and towns. Therefore, in the shrinking small towns, we should return to the capital market, use urban industrial transformation to attract capital backflow and stimulate urban space reproduction.

(3) Improving the living environment and promoting intensive use of land

In 2019, China's urban and rural planning has officially entered the era of spatial planning. Land improvement oriented by intensive utilization of land resources has become an important part of space governance. However, the construction of small towns is blindly expanded with a widespread use and waste of land for a long time under the stimulation of land finance. Although the Wuhan government has restricted the construction scale of small towns in terms of land transfer index, the lack of forward-looking spatial planning has led to the lack of orderly guidance for the construction of small towns, and the phenomena of land waste, environmental pollution and farmland occupation still exist. Along with the phenomenon of population outflow and economic deactivation, the living space, commercial space, public space and industrial space in small towns are all in the state of vacant and decaying to varying degrees, which further worsens the dirty and poor urban environment in small towns. Therefore, it is particularly important to promote the intensive use of land and improve the living environment of small towns.

For shrinking small towns, the increment of urban land should be reduced, the existing land stock should be used for follow-up land development as much as possible, and the idle urban construction land caused by the sluggish economy should be revitalized. And the government should weaken the concept of land finance, strengthen the improvement of urban living environment, supply urban environmental sanitation facilities, and strengthen the supervision of urban land development, utilization and construction with the goal of creating a good urban living environment.

For small towns that have not shrunk, we must adhere to the development principle of intensive use of land and efficient use of space in small towns, and carry out appropriate incremental development on the basis of not reducing the development efficiency of urban stock land, so as to avoid the decline of energy efficiency of urban land and enter the shrinkage trap of "land overdraft". At the same time, urban living environment should also be improved, and the supervision mechanism of urban living space protection should be done well, to avoid population loss and urban deactivation caused by uninhabitable urban.

(4) Building a stable regional division of labour network

While facing up to the shrinkage of small towns, China's unique "semi-urbanization" phenomenon cannot be ignored. The basic social security function of small towns is still an important link in the relationship between towns and villages. Especially for the small towns in the outer suburbs of Wuhan, most of them are not highly urbanized, and also not completely divorced from the leading mode of agricultural production. Those small towns still have the structural function of linking urban and rural relations, promoting the flow of factors and serving rural revitalization. A healthy relationship among city, towns and villages is still an important problem in the process of urbanization. Therefore, small towns should not only optimize their service functions, social functions and ecological and cultural functions, but also further strengthen the linkage development relationship in the "city, town and village", "town and town" and "village and village", so as to build a network city-town-village hierarchical model. Small towns also need to integrate scattered elements of regions and grass-roots units, form a network of industrial interaction, service sharing and transportation interconnection supporting system, and build a networked and flat multi-dimensional city-town-village space system, in order to realize the interconnection of elements and resource sharing in the overall shrinkage process. In this way, the service efficiency of grassroots public service facilities can be strengthened, and the relationship

between towns and villages can be reshaped to prevent the rupture of the single linear hierarchy relationship formed by shrinkage and to resolve the inertia of dependence on the original linear hierarchy system and its negative impact.

5. Acknowledgments

This research was supported by the National Science Foundation of China (51878306).

6. References

Oswalt P (2006) Shrinking cities, Ostfildern, Germany: Hatje Cantz Verlag.

Glock B, Häussermann H. (2004) “New trends in urban development and public policy in eastern Germany: dealing with the vacant housing problem at the local level”, International Journal of Urban and Regional Research, Vol. 28 No. 4 (April).

Johnson, K., & Johnson, K. (2006) “Demographic trends in rural and small town America”, Demographic Trends in Rural & Small Town America, Vol. 44 No. 1 (January).

Bontje M, Musterd S. (2012) “Understanding Shrinkage in European Regions”, Built Environment, Vol.38 No. 2 (February).

Downs A. (1997) “The challenge of our declining big cities”, Housing Policy Debate, Vol. 8 No. 2.

Saori K, Polivka J. (2008) “Shrinking of Japanese middle sized cities”, Shrinking Cities Complete Works, Vol. 19 No. 3 (March).

ORTIZ-MOYA F.(2015) “Coping with shrinkage: rebranding post-industrial Manchester”, Sustainable Cities &Society, Vol. 22 No. 7 (July).

Martinez Fernandze C, Audirac I, Fol S, et al. (2012) “Shrinking cities: Urban challenges of

Globalization”, International Journal of Urban and Regional Research, Vol. 36 No. 2 (February).

CHEN Yulu, LI Jingsheng, YANG Chen, QIN Mengdi (2018) “Research on the Shrinking of Small Cities in Germany: A Case Study on Sachsen”, Development of Small Cities & Towns, Vol. 36 No. 11 (November).

DU Zhiwei, lI Xun (2018) “Characteristic and Mechanism of Urban Growth and Shrinkage from Demographic Change Perspective: A Case Study of Dongguan”, Scientia Geographica Sinica, Vol. 38 No. 11 (November).

DU Zhiwei, lI Xun (2017) “Growth or shrinkage: New phenomena of regional development in the rapidly-urbanising Pearl River Delta”, Acta Geographica Sinica, Vol. 72 No. 10 (October).

LIU Chunyang, YANG Peifeng (2017) “A Comparative Study on the Motivation Mechanism and Performance Characteristics of Chinese and Foreign Shrinking Cities”, Modern Urban Research, No. 3 (March).

LI Yanqun, GENG Hong, GAO Peng (2018) “A Discussion into the New Development Pattern of Town and Village under the Guidance of Smart Decline”, Development of Small Cities & Towns, Vol. 29 No. 4 (April).

GAO Zhe, YIN Ningwei, TONG Xinyi, LI Dongxin, GU Jiang (2019) “Shrinkage under Urban Growth: A Case Study of Wuhan City”, Tropical Geography, Vol. 39 No. 1 (January).

LI Xun, LI Xianfeng, DENG Jiayi (2019) “The Growth and Shrinkage of China’s Rapidly Urbanizing Areas from the Perspective of Property Rights: A Case Study of Dongguan”, Tropical Geography, Vol. 39 No. 1 (January).

ZHANG Yingxiang, CAI He (2006) “Capitalist and urban social change-perspective of Neo-Marxist urban theory”. Urban Studies, Vol. 13 No. 1 (January)

Wang Mingtao (1999) “Deviation and mean square deviation decision method for weight determination in evaluation index”, China Soft Science, Vol. 26 No. 8 (August)

Research Paper

Rural revitalization under the background of balancing urban and rural development:

A case study of Batang village, Guangdong province, China

Weihong GUO*, South China University of Technology; China
Bin LI*, South China University of Technology; China
Yuqing ZHANG*, Jilin Jianzhu University; China

Abstract

Since reform and opening up, the development of Chinese urban and rural areas has shown an evolution of integration from isolation. The government promulgated national policies and related planning strategies, aiming at realizing the goal of rural revitalization through the system reform and planning adjustment of balancing urban and rural development. In the complex process of social development, there are many problems with rural areas, such as lack of infrastructure, unbalanced economic development, dilapidated living environment and insufficient sharing between urban and rural areas. On the premise of meeting the requirements of national laws and policies, this paper takes the planning of Batang village in Yunfu city of Guangdong province as an example. Combine with ReBAM theory to make sure Batang village is suit for developing tourism. And based on field survey made a Batang plan by planning knowledge. Through literature review and field survey to explore how to realize the revitalization of the rural areas under the development mode of balancing urban and rural development. The conclusion of the research took rural tourism as the breakthrough point, and formed complementary and dislocation development mode with the city. In living aspect, the research optimized infrastructure and improved people's living environment as well as summarized cultural elements to inherit rural civilization. In production aspect, it exploited rural commercial potential and income-generating path, and completed the transformation from passive development to active revitalization to achieve prosperity industry and life. In ecology aspect, it combined with sustainable development model to create an ecological and livable rural landscape. At last, the research established urban and rural co-management system and shared rural information platform to achieve effective governance, to ensure that tourism mode as a starting point for rural revitalization planning can be sustainable development. The research of this paper practiced the national experience of rural revitalization as a pilot project, facilitated the implementation of relevant policies and supported planning for rural revitalization, and explored the methods of rural revitalization under the background of balancing urban and rural development. Based on the acceptance of the plan by local villagers, the approval of Guangdong Postgraduate Education Innovation Project in 2018 and got the third prize of National Competition for Ecological Wisdom Inspired Urban and Rural Practice in 2019, it is hoped that the research will contribute to the rural revitalization under the background of balancing urban and rural development.

Keywords

Rural revitalization, plan, tourism, balance urban and rural development

1. Introduction

Since reform and opening up in 1978, China has taken a series of strategies to balance urban and rural development. In 1980s, Shenzhen firstly took into an economic zone for achieve the urban development in Pearl River Delta. In 1990s, Pudong area in Shanghai of Yangtze River Delta developed rapidly (Suh, 2007). In the early 2000s, Binhai New District started to establish in the area around Bohai Sea Area. In 2017, the country sets the development strategy of Xiongan new district (Li et al., 2017). With the fast development of urban areas in China. More and more rural people have moved to big cities for living. Thus the urbanization level is rapidly catching up from 10.6％ in 1949 to 56.1％ in 2015 (Gu et al., 2017). Villagers abandoned their houses and lands and turned their villages into ghost towns (Gao and Wu, 2017). The development of urban and rural is unbalanced.

In fact, since the founding of the PRC in 1949, rural revitalization has been the important step for national development (Zhu,1999; Zhang, LeGates, & Zhao, 2016). In recent years, with the vigorous development of industry in China's cities, it is time for industry nurturing agriculture (Zacharias and Tang, 2010; Wang et al., 2019). Rural revitalization has been more focused of people's attention in China now. It aimed to break through the urban and rural binary system and reduced the disparity between cities and countrysides to realize the urban-rural integration (Li, 2015).

In 2017, the party's report on the Nineteenth Congress placed the issue of rural revitalization (Sun, 2018). Rural revitalization is a theoretical system and strategic guidance aimed at achieving comprehensive rural development with strong agriculture, beautiful countryside and rich farmers, aiming to accelerate the modernization of agriculture and rural areas, narrow the development gap between urban and rural areas and realize the construction of a well-off society in an all-round way (Zhou et al., 2018). As for rural planning strategies, Chinese focus extended from the function and economy to the cultural, aesthetic perspectives and other relative aspects (Chen, 2011).

But up to now, with the unbalanced development of urban and rural development in past few decades, there are lots of problems took into rural in China. Here takes the Batang village as an example to analyze.

2. Problems

2.1. Lack of infrastructure

In living aspect, lack the infrastructure of sewage system, public transportation system, public restroom, garbage disposal and relative service facilities are common problems in the rural of China. Even more and more villages have been established sewage system but imperfect infrastructures for using caused the problem of living environment. And the public transportation system hasn't established perfect in most of the villages. Incomplete traffic system will take harmful influence on rural revitalization (ChengBo, 2018; Zheng and Iop, 2018).

As the Figure 1 shows, the sewage system in Batang village doesn't wonderful for local villagers use. The restroom on the lake not only polluted the local living environment, but also affected the mood of the view. And Figure 2 shows the only public station in this village. There is no identification to show this is a bus station. The public transportation system doesn't perfect.

Figure 1 Restroom without sewage system

Figure 2 Unrecognized bus station

2.2. Unbalanced economic development

In production aspect, the economic gap between urban and rural areas is widening. The urban-rural income ratio had increased from 1.86:1 in 1986 to 3.33:1 in 2009, even though it's reduced to 2.7:1 nowadays (Chen et al., 2019). But the unbalanced economic development had been led to widening the gap between rich and poor people, for the harmonious development of the overall society had a negative impact (Chen et al., 2018). As Figure 3 and Figure 4 show, rural production mainly rely on primary industry in Batang village. And the articles for daily use made by old people of hand weaving.

Figure 3 Primary industry

Figure 4 Hand weaving

2.3. Dilapidated living environment

In ecology aspect, China's cities have attracted more and more people from rural to urban for living. By contrast, less and less people living in rural (Li et al., 2017). As the Figure 5 shows, Batang village is one of the villages in Xinxing county. And the population of Xinxing county is gradually decreasing.

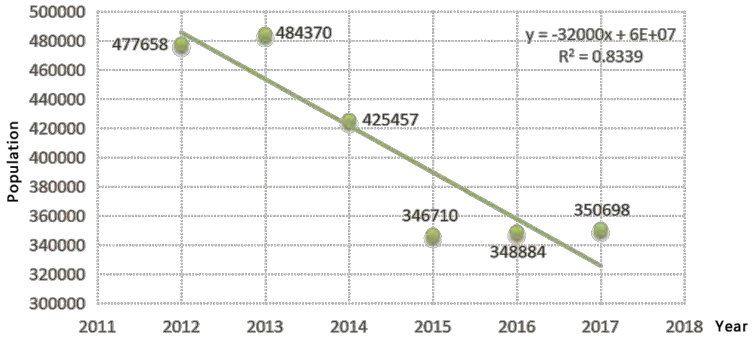


Figure 5 Population trends of Xinxing county

Less population means less people for living and producing in rural areas (Li et al., 2014). With the time goes, the rural left dilapidated living environment. And the left people for agricultural production, they had to use more pesticides for high levels of agricultural output. This took the problem of soil pollution, food safety issue and other environmental problems (Fan et al., 2009; Chen and Zhang, 2019). All of these makes the ecology environment decadent.

2.4. Insufficient sharing between urban and rural areas

In governance aspect, insufficient sharing between urban and rural areas is a historical issue. In order to develop the national economy from 1949, China had implemented a series of policies to support industry priority development. As the Introduction mentioned, the big city rapidly development is under this historical background. Since the 21st century, rural governance recognized and reformed to establish long-term mechanism of industry nurturing agriculture and cities supporting countrysides (Wang and Jin, 2014; Fang, 2017). With the process of rural revitalization in recent years, rural tourism became the main way to implement (Li et al., 2018). But just with the support of government is not enough, insufficient sharing between urban and rural areas needs bottom-up initiatives of local people to achieve rural revitalization (Li et al., 2016).

3. Methods

3.1. ReBAM theory

With the development of rural revitalization of tourism model, this paper focus on ReBAM (Recreational Belt Around Metropolis) theory try to find a reasonable way for revitalizing Batang village in Xinxing county. ReBAM theory firstly offered by Prof Bihu WU in 1998. This theory has been applied and developed in Xiamen (Dong, 2010), Chongqing (Zhou et al., 2013), Kunming (Baohong et al., 2011), Shanghai (Wu and Cai, 2006), Wuhan (Li et al., 2016), and Beijing city (Guo et al., 2010). It's an effective method for rural revitalization which includes three determinants, they are the growth of domestic demand, transportation networks, and policy-driven supply.

As the Figure 6 shows, the travelling population more than sevenfold increased in Xinxing county form 2005 to 2017. The demand of tourism is rapidly developing. This is one of the three determinants underlying the formation of ReBAM theory.

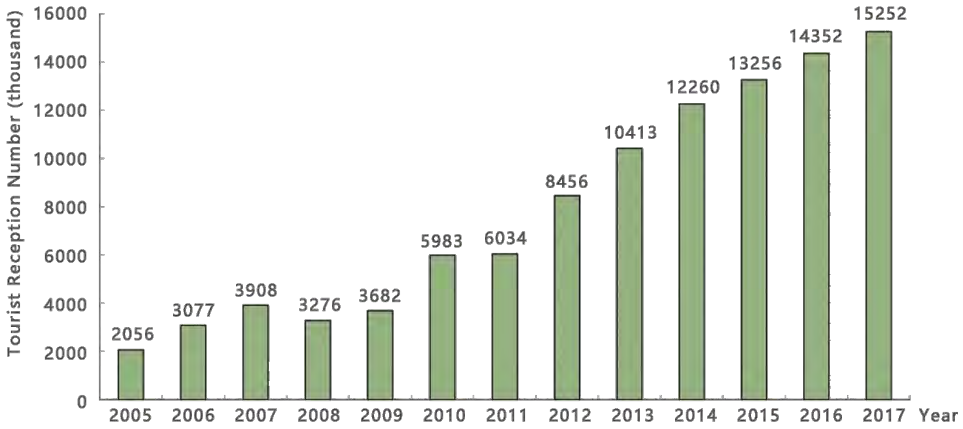


Figure 6 Travelling population trends of Xinxing county

3.2. Field survey

Through field survey we can see Batang village is located in Xinxing county, Yufun city, Guangdong province (Fig. 7). The traffic system of Batang village is convenient that include

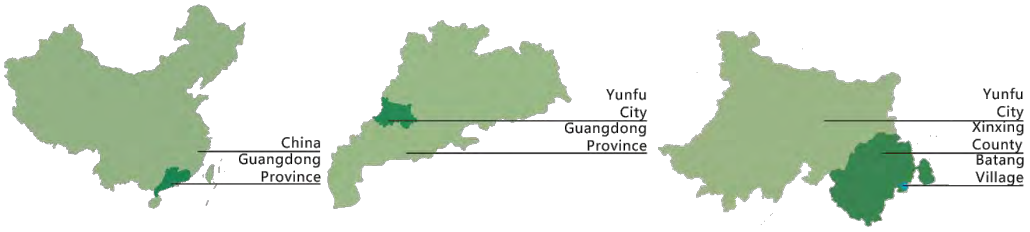


Figure 7 Batang village location

No.534 county highway to connect surrounding cities (Fig. 8). There are 5 cities can be arrived within 2 hours transit time (Fig. 9). And the total population of these cities are around 12.4 million that provide great potential tourists. The convenience traffic network support the ReBAM theory of rural revitalization for rural tourism.

Figure 8 Traffic network of Batang

Figure 9 Transit time of Batang

3.3. Literature review

Besides reference ReBAM theory to analyze the demand of tourism for Batang village is sufficient, and through field survey to verify the transportation network is convenience for travelling, this research also took literature review to find the policy-driven supply to further support the rural revitalization of Batang village is suitable for tourism model.

Chinese Central Rural Work Leading Group published *Strategic Planning for Rural Revitalization (2018-2022)* in 2018. It aimed to develop rural revitalization in national macro level. This policy document mentioned rural revitalization ways based on balancing of urban and rural development. And it emphasized tourism development way should combine with rural in living, production, ecology and governance aspect.

Department of Natural Resources of Guangdong Province and Department of Agriculture and Rural Affairs of Guangdong Province joint released *Land Use Policies and Measures to Implement the Strategy of Rural Revitalization* in 2019. The Chapter 10 clearly stated that to increase land use support for rural tourism.

Yunfu City Master Plan (2012-2020) and *Xinxing County Master Plan (2013-2035)* show Batang village in Promote Development Zone (Fig. 9 and Fig. 10). It means the urban planning of this area is supported by relative urban planning departments and policies.

Thus tourism model can be concluded as a method that rural revitalization in Batang village is suitable whatever from ReBAM theory, filed survey and literature review.

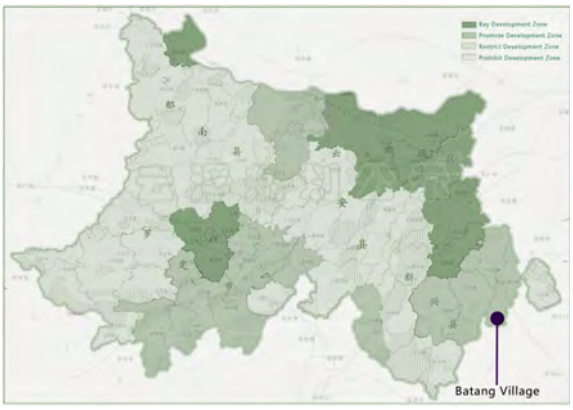


Figure 9 Yunfu city function plan

Figure 10 Xinxing county function plan

4. Results

4.1. Living aspect

Based on tourism model of rural revitalization, the research combined with planning knowledge to plan Batang village from four aspects.

In living aspect, as above analyzed there are lack of infrastructure such as garbage disposal, public restroom and public transportation system. So the plan designed facilities system and traffic system. As Figure 11 shows, the facilities system include public service facility, plaza and park, public restroom and garbage collection point according to the current situation of Batang village. And Figure 12 shows the traffic system include county high way, main village road, secondary village road and car parking. Even though the transportation network is convenience to Batang village, but the original traffic system needs to be optimizing inside of

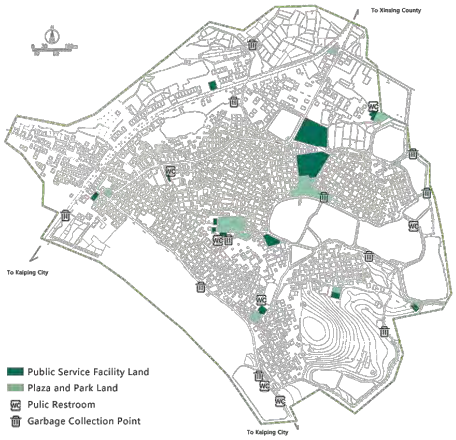


Figure 11 Facilities system

Figure 12 Traffic system

the village. These will give local residents a better living condition. Then more and more local people will be willing to live in here. It's also better for servicing tourists and inheriting rural civilization.

4.2. Production aspect

In production aspect, this plan classified land use nature firstly. The land use of Batang village divided into 6 categories. They are water land, agroforestry land, residential land, public service land, industrial land and transportation facility land. These land use coordinated with the design of living aspect (Fig. 13). According to unbalanced economic development problem analyzed above, the plan tried to mix some new industries in Batang village. Based on field survey, on both sides of the county highway has been existed some workshops. So it will be better to plan industrial development zone in these areas. The plan considered the local hand waving industries to plan handicraft development zone. And it complement business development zone for people trading in here (Fig. 14). The land use and industrial layout will

Figure 13 Land use

Figure 14 Industrial layout

offer more opportunities for improving local economy, and this will support the tourism development of Batang village.

4.3. Ecology aspect

In ecology aspect, the design planed landscape structure and landscape conservation areas based on field survey (Fig. 15 and Fig. 16). Not only considered the tourism model for rural

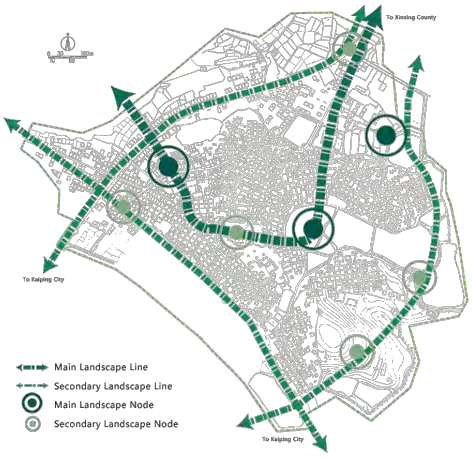


Figure 15 Landscape structure

Figure 16 Landscape conservation areas

revitalization, but it also attended to balance the relationship of natural landscape and cultural landscape. From different kinds of landscape levels, such as landscape nodes, landscape lines and different areas, the plan tried to integrate ecological landscape as a whole and to achieve harmony between man and nature. Even though existing population of Batang village is decreasing, but the better ecological environment will support rural revitalization.

4.4. Governance aspect

In governance aspect, even though a series of national policies has been inclined to rural areas since the 21st century. But just rely on the strategies conducted by country is not enough. It should be also taken an action from bottom to up. Especially for rural revitalization is based on tourism model. The support by government is limited, the better life need local villagers strive for that. So on the basis of government support, the plan also emphasized to found local organizations for rural revitalization. National governance coordinate with local autonomy will form a co-management system for rural revitalization. Even if the governance consist of government and local villagers can not be drawing as a blueprint, but this governance system is almost the most important link of rural revitalization chain.

5. Discussion and conclusion

The research focused on rural problems of China, found four main problems such as lack of infrastructure, unbalanced economic development, dilapidated living environment and insufficient sharing between urban and rural areas. Combined with ReBAM theory, field survey and literature review analyzed tourism model for rural revitalization is a good way especially for Batang village. Based on planning knowledge from living, production, ecology and governance aspects designed a new way for rural revitalization as well as try to solve the existing problems.

Based on the guide of School of Architecture, South China University of Technology, PB Design and relative organizations support, the research started from August, 2018 through field survey (Fig. 17), workshop study (Fig. 18), finally got the acceptance by local villagers and approval of Guangdong Postgraduate Education Innovation Project (Fig. 19). And recently, this research got the third prize of National Competition for Ecological Wisdom Inspired Urban and Rural Practice in July, 2019.

Figure 17 Field survey

Figure 18 Workshop study

Figure 19 Awarding ceremony

Up to now almost one year past, Batang village is developing well. The problem of restroom on the lake to pollute the living environment has been solved (Fig. 20). New plaza and excellent sewage system is gradually constructing (Fig. 21).

The ReBAM method based on three determinants of the growth of domestic demand, transportation networks, and policy-driven supply. It's also need to explored diversely for different villages (Van et al., 2008). Even though Batang village meets the requirements of these. This research creatively found the rural revitalization way combine with the existing theory and current problems. Not only is it just for tourism model of ReBAM, but it solves current problems too.

Figure 20 One year ago before research

Figure 21 Present view after plan

Under the background of balancing urban and rural development, the research found a feasible way based on tourism model for rural revitalization. Hope this research will be useful whatever in practice or academic field.

6. Acknowledgements

This work was supported by the National Key Research and Development Program (Grant No. 2017YFC0702505 (2017YFC0702505) and 2018YFC0704900), General Program of National Natural Science Foundation of China (No. 51678239) and Science and Technology Program of Guangzhou, China (No. 201804020017).

7. References

BAOHONG, H., LILI, Z. & JUN, C. (2011). Tourism travel behavioral characteristics of city self-driving: A case study in Kunming.

CHEN, C., LEGATES, R. & FANG, C. (2019). From coordinated to integrated urban and rural development in China's megacity regions. Journal of Urban Affairs, 41, 150-169.

CHEN, F., YU, M., ZHU, F. W., SHEN, C. Z., ZHANG, S. L. & YANG, Y. J. (2018). Rethinking Rural Transformation Caused by Comprehensive Land Consolidation: Insight from Program of Whole Village Restructuring in Jiangsu Province, China. Sustainability, 10.

CHEN, H. & ZHANG, X. Y. (2019). Study on the Path of Agricultural Ecological Construction Improving Agricultural Production Efficiency. Ekoloji, 28, 1737-1744.

CHEN Yulin. (2011). Selection, Integration and Adaptation: Legacy of Traditional Regional Design in the Capital Region, China. 47th ISOCARP Congress.

CHENGBO, Z. (2018). Thoughts on the Construction of ldquoVillage to Village Roadsrdquo in Rural areas. IOP Conference Series: Earth and Environmental Science, 186, 012052 (6 pp.)-012052 (6 pp.).

DONG, J. (2010). Study on the Design and Exploitation of Tourism Products in ReBAM: the Case of Xiamen, China.

FAN, L. Y., WANG, Z. & GAO, W. J. (2009). A Study on Reconstruction and Revitalization of Rural Area in China with Consideration of Environment Sustainability.

FANG, J. (2017). Study on Functional Mechanism and Effectiveness of Land Ticket System in the Process of New-Type Urbanization.

GAO, J. & WU, B. (2017). Revitalizing traditional villages through rural tourism: A case study of Yuanjia Village, Shaanxi Province, China. Tourism Management, 63, 223-233.

GU, C., HU, L. & COOK, I. G. (2017). China's urbanization in 1949-2015: Processes and driving forces. Chinese Geographical Science, 27, 847-859.

GUO, F., MA, L., LI, R., ZHANG, J. & FU, X. (2010). The Spatial Aggregation Pattern, Characteristic and Driving Mechanism of Recreational Region around Metropolises A case study in Beijing, China.

LI, B., LI, T. J. (2017). Research on the Activation of New Countryside Local Place. Journal of Asian Urban Environment.

LI, J.-M., LI, W. & DESTECH PUBLICAT, I. (2016). Research on the Development Strategies of Tourism Internationalization in Wuhan City.

LI, T. J., LI, B. (2017). Research on urban-rural coordination and rural development from the perspective of tourism - Taking the planning of Lotus town as an example. The 11th International Association for China Planning Conference.

LI, Y. H., WESTLUND, H., ZHENG, X. Y. & LIU, Y. S. (2016). Bottom-up initiatives and revival in the face of rural decline: Case studies from China and Sweden. Journal of Rural Studies, 47, 506-513.

LI, Y. J., WANG, Z., ZHAI, S. J., XIN, M. & XI, Y. Y. (2018). Research on Rural Tourism Poverty Alleviation Strategy from the Perspective of Rural Revitalization.

LI, Y., LIU, Y., LONG, H. & CUI, W. (2014). Community-based rural residential land consolidation and allocation can help to revitalize hollowed villages in traditional agricultural areas of China: Evidence from Dancheng County, Henan Province. Land Use Policy, 39, 188-198.

LI, Z. (2015). Chinese Comprehensive Rural Reform: Institutional Vicissitude, Theoretic Framework and Content Structure. Journal of Northeast Agricultural University (English Edition), 22, 79-90.

SUH, S.-H. (2007). The Development-Opening of Shanghai Pudong New Area : Background, Promoting Method and Economic Result. Chinese Studies, 28, 377-410.

SUN, L. L. (2018). The Exploration and Promotion of the Revitalization Strategy of Rural Areas in Hainan Province.

VAN, Y., GONG, R. & AMERICAN SCHOLARS, P. (2008). A Research on Optimization Strategies of Rural Tourism Products in ReBAM: the Case of Xiamen, China.

WANG, X., SHAO, S. & LI, L. (2019). Agricultural inputs, urbanization, and urban-rural income disparity: Evidence from China. China Economic Review, 55, 67-84.

WANG, Y. & JIN, C. (2014). Research on Necessity of Strengthening He Bei Rural Public Service at Middle and Latter Stage of Industrialization. In: ZHANG, H. (ed.) 2014 2nd International Conference on Economic, Business Management and Education Innovation.

WU, B. H. & CAI, L. P. A. (2006). Spatial modeling - Suburban leisure in Shanghai. Annals of Tourism Research, 33, 179-198.

ZACHARIAS, J. & TANG, Y. (2010). Restructuring and repositioning Shenzhen, China's new mega city. Progress in Planning, 73, 209-249.

ZHANG, L., LeGates, R., & Zhao, M. (2016). Understanding China's urbanization. Cheltenham: EE Press.

ZHENG, C. & IOP (2018). Thoughts on the Construction of " Village to Village Roads " in Rural areas. 2018 International Conference of Green Buildings and Environmental Management.

ZHOU, Q., ZHAO, Y. Y. & LI, J. X. (2018). The Scientific Construction and Contemporary Value of Xi Jinping's Theory of Rural Revitalization. In: ZHAO, Z., YANG, J. & CHENG, C. (eds.) Proceedings of the International Academic Conference on Frontiers in Social Sciences and Management Innovation.

ZHU, J. (1999). Local growth coalition: The context and implications of China's gradualist urban land reforms. International Journal of Urban and Regional Research, 23(3), 534 – 548.

ZHOU, J., PENG, L. & GUAN, D. (2013). Research on Evaluation of Sustainable Development of Rural Tourism in Chongqing ReBAM. In: TANG, X., ZHONG, W., ZHUANG, D., LI, C. & LIU, Y. (eds.) Progress in Environmental Protection and Processing of Resource, Pts 1-4.

Research Paper

Short Analysis of the stakeholders' benefit and satisfaction about Rural Land Share Cooperatives of the Southern Jiangsu Province

- A Case Study of Jinxi Town, Kunshan City

Yi LI*, Shanghai Tongji Urban Planning& Design Institute Co.Ltd; China

Xihua ZHU, Jinxi Town government; China

Abstract

The agricultural land around Shanghai is famous for its huge population and intensive cultivation. With the expansion of the metropolis, a large number of agricultural people have entered the city to work, and rural land has been abandoned[1,2]. In 2009, Kunshan City implemented a land transfer system, and 99% of the cultivated land was packaged for large-scale farmers, and initially realized large-scale operation[3]. However, the large-scale business model has gradually experienced problems such as predatory management, ecological destruction, and no sense of social responsibility. Through the establishment of agricultural land share cooperatives, Changyun Village took the lead in realizing the collective management of agricultural land, taking shares in the land, giving priority to paying dividends to the land, and paying wages to the farmers working in the cooperative. The peasants' enthusiasm for entering the city has become an important buffer for the migrants to work in Shanghai and surrounding villages[4]. It has increased the employment rate. At the same time, it has supplied green agricultural products to the city, passed on agricultural technology, and activated local communities.

This article intends to analyse the correlation between several village share cooperative models based on Changyun Village and the large family farm contracting model of more than ten villages, and the satisfaction of villagers, combined with property rights theory, scale economy theory, and accounting cooperatives. Cost-benefit, evaluate the effect of "long cloud-style" collectivization on revitalizing the surrounding villages of metropolises and assess the satisfaction of governments at all levels. Through field interviews and questionnaire surveys, the correlation analysis of village cadres and villagers' satisfaction was conducted.

The government is optimistic about the role of the "long cloud model" in grassroots management and improvement of people's livelihood. Even if public finances are required to invest a large amount of money, it is necessary to strengthen the medical and social security of the villagers. The government is also quite satisfied with the Changyun model. At present, the economic benefits of the stock cooperatives have steadily increased. Although the growth rate is not large, the villagers have a strong sense of well-being, and the village's ecological environment has been improved. In the future, the cost of the village will be reduced after the large-scale operation, and the overall economic benefits will be improved. The

future research direction will be how to solve the specific problems that plague the cooperative's production and operation, such as low rice prices and lack of high value-added finishing facilities to continue to activate the surrounding areas of the metropolis and improve the satisfaction of the government and villagers.

Keywords

Countryside around metropolis, Rural revitalization, Large-scale agriculture, Collective management

1. Agricultural land cooperatives

1.1. The definition of land cooperative

Agricultural land joint-stock cooperative is made by who enjoy the right to the contracted management of rural land and farmers engaged in agricultural production and operation of collective organizations, such as the management of land investment, entrust DaiGeng circulation mode of centralized and unified planning, unified management of the rural mutual cooperative economic organizations (hereinafter referred to as land cooperative). Since the household contract responsibility system, China's agricultural land is mostly decentralized management. In 1987, China put forward that where conditions permit, land management on an appropriate scale can be steadily promoted. In October 2008, the communist party of China (CPC) stated: "farmers are allowed to transfer their contracted land management rights in the form of subcontracting, leasing, exchanging, transferring and joint-stock cooperation in accordance with the principle of voluntary compensation in order to develop diversified scale operations." This provides a theoretical basis for the establishment of specialized farmer cooperatives based on the pricing of land contracting and management rights. The land transfer began to speed up after China made it clear that "farmers are allowed to transfer their contracted land management rights".

1.1. The causes of land cooperatives

Rural land joint-stock system reform comes into being in accordance with the development conditions of rural economy and society. With the development of China's industrialization and urbanization, the household land equalization system based on the land contract responsibility system is facing more and more problems.

In economically developed areas, rural labor transfer to the town and non-agricultural industry, farmers farming will reduce, even some villages have per capita arable land area is small, low degree of intensive land use, the efficiency is not obvious, and some are willing to engage in farming the land farmers and foreign individuals and enterprises need enough land scale management, land circulation strong demand, so the government issued documents, encouragement policy and related supporting policies to promote land scale. As an innovative mode of land transfer, rural land stock cooperative system has been actively responded and promoted by farmers and the government. The reform experiment of rural land joint-stock cooperative system was first carried out in Nanhai, Guangdong province in the 1980s, and then developed to a certain extent in Jiangsu and other places. The south China sea model and Kunshan model came into being in the actual work.

2. Basic information of Jinxi town and Changyun village

2.1. Subheading 2.1

Kunshan is located in the Southern Jiangsu, which is economically developed, highly urbanized and has a leading land transfer speed in China. With the expansion of the metropolis, a large number of agricultural population have been to cities for work and rural land is facing the risk of being abandoned. In 2009, Kunshan city implemented the land transfer system. The transfer land is up to more than 200,000 mu. All villages in Jinxi town have set up land joint-stock cooperatives, which have contracted out 15,315 mu of farmland to 127 large professional farmers, covering 99% of the town's total farmland . The large-scale farmland operation has been initially realized, which has solved the problems of land fragmentation and small-scale agriculture to some extent, and promoted the land intensification and agricultural mechanization degree.

Changyun village is a typical agricultural village, located in the north of Jinxi town. It has thousands of mu of farmland, and a large number of fish ponds. It has 6 natural villages, with 530 residents and 1,780 registered population, covering an area of 3.5 square kilometres. The disposable income of permanent residents is 29,000 yuan per person (2019).

Figure 1 Area of Jinxi Town

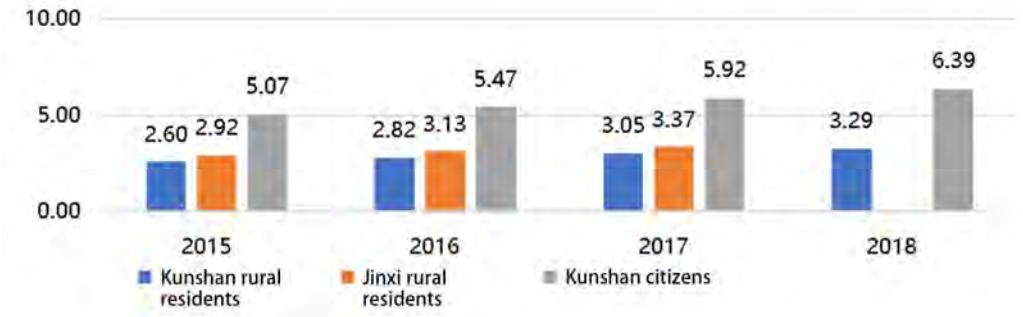


Figure 2 Kunshan urban and rural residents and Jinxi rural per capita disposable income from 2015 to 2017 (ten thousand yuan)

2.2. Subheading 2.2

In this research on Jinxi town, we found that the aging degree of rural population in Jinxi town is relatively serious. There is income gap between urban and rural areas. Young adults gather in cities and old people stay in villages. The elderly account for about 30 percent of the farmers surveyed, which is higher than the aging level of the surrounding urban population. The average age of the sampled changyun villagers was 55. Among the rural elderly interviewed in Jinxi town, 50% live alone or live with their spouses, while half of the surveyed families are 3-6 people, and the younger generation lives in other places. Most of the young and middle-aged people working in the area are outsiders. The population engaged in agriculture is aging.

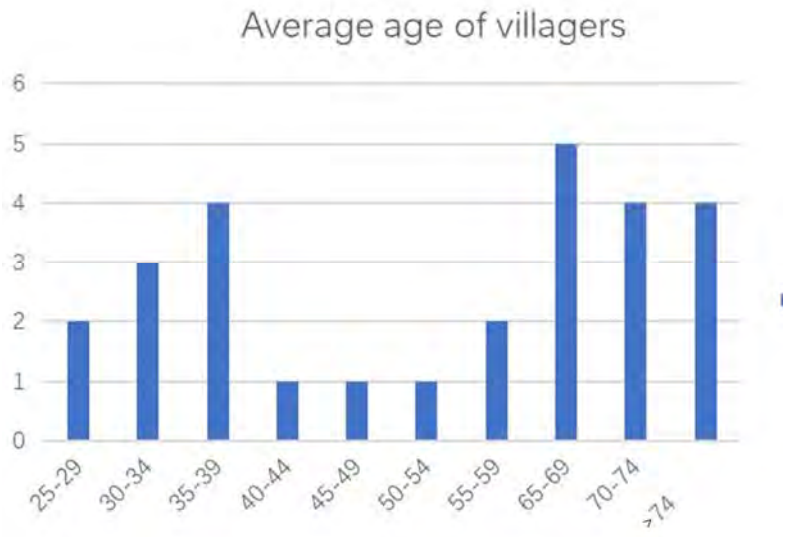


Figure 3 Average age of villagers

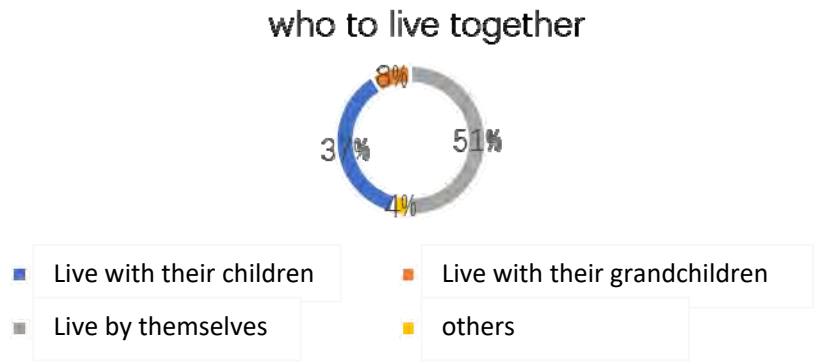


Figure 4 who to live together with villagers

3. Changyun Agricultural land cooperative

3.1. Subheading 3.1

In 2009, Changyun village gave land to 8 large farmers, and the rest farmers received a circulation income of 700 yuan/mu. Problems such as predatory operation, ecological destruction and no sense of social responsibility gradually appear in the large family management model, which leads to the widening gap between the rich and poor in the village. The government's subsidies to farmers for growing grain have risen gradually, to the point that they are equivalent to rental payments, while farmers who have transferred their land have not received dividends. Many large farmers sublet their farmland to earn the price difference. Large families disregard social responsibility, and perfunctory or even resistance to instructions such as pesticide safety, environmental protection, water conservancy and other, Leading to the pesticides disorderly and ecological damage.

Changyun village takes villages and towns as units and turns the traditional large contract into the farmland stock cooperative. In 2009, it established the Changyun agricultural land share professional cooperative (hereinafter referred to as the agricultural land cooperative). The agricultural land cooperative has been registered for industry and commerce, engaged in agriculture, forestry, its registered capital is 7.31 million yuan (2019). Cooperatives adopt the corporate system of operation and management, and farmers become shareholders with their contracted farmland rights and enjoy dividends. Changyun village tries to "co-own, co-manage and co-enjoy", and adopts the new mode of "cooperative farm" such as collective operation, contract labour and fixed production. Farmers' income mainly comes from dividends and labour in cooperatives.

Currently, about 1900 mu of rice is planted in Changyun village. In 2019, the farmland cooperative cultivated 1,850 mu. As a pilot project of collective agricultural cooperative operation in the town, Changyun farm launched innovative practice and promoted agricultural modernization and intensification in combination with Jinxi town's "10,000 mu of good farmland" project. At the same time, the development of ecological agriculture, raising rice paddy duck, rice paddy crab.

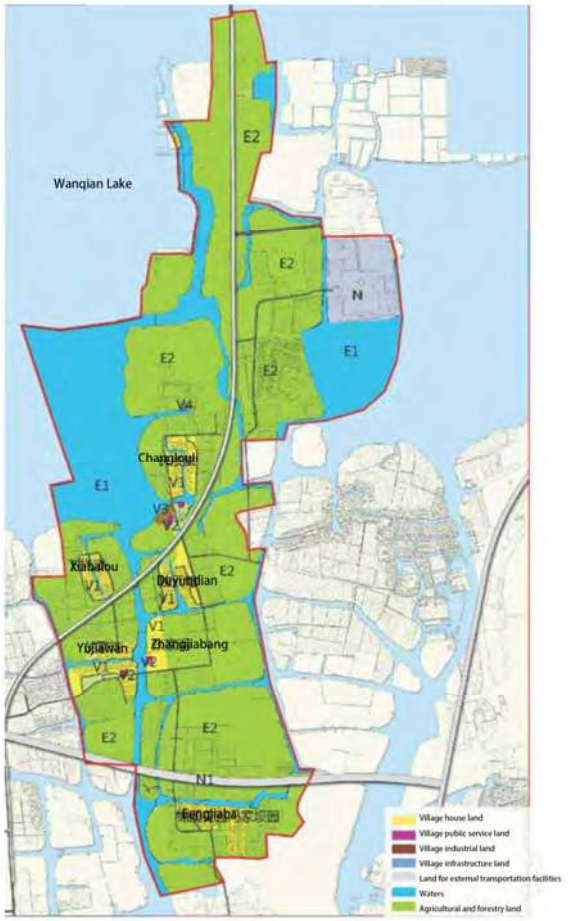


Figure 5 Agricultural Land of Jinxi Town

4. The model of Changyun land cooperative

4.1. Profit distribution of agricultural land cooperative

Cooperative dividends include two parts： Guaranteed income + dividend income. The form of guaranteed minimum income is the most suitable distribution form of land joint-stock cooperatives.

The first dividend is the farmland guaranteed income distributed to the shareholders at the beginning of the year, which is 900 yuan per mu per year. The second dividend is paid at the end of the year, which is no less than 100 yuan per share.

4.1. Production mode of agricultural land cooperative

1) scale and standardization

The cooperative carried out reclamation, building contiguous high-standard farmland. Improve soil quality through fallow cultivation and ecological transformation. With rice, oilseed rape、wheat, barley, highland barley and other crops as the key, the planting structure is optimized.

Farmland joint-stock cooperatives coordinate the allocation of capital, technology, labor force, land and other production factors, realize centralized support of agricultural technology services, unified seed supply, unified fertilizer use, unified disease prevention and pest control, unified field management, and unified settlement; We will implement centralized management of agricultural production, and settle production costs, operating expenses, subsidies for policy funds and production benefits.

2) Contractor's Scheduled Production Village collective and experienced farmers signed a contract production responsibility, every 100-200 mu to hire experienced farmers as administrators, awards for overproduction and compensation for reduced production. If more workers are required, the cooperative arrange villagers to do farm work. At the end of the year, farmers receive their wages by work record.

5. The cost-benefit analysis of stakeholders

5.1. Cost-benefit analysis of Jinxi town, Kunshan city

Tangible cost of government:

The cost of Jinxi town and Kunshan city mainly comes from land subsidies, water conservancy investment, agricultural tools support, technical support and so on.

Local government finance has supported land transfer. Since the 21st century, the investment of modern agriculture at Suzhou and county levels has been more than 2 billion yuan every year. Land about 15,400 hectares, equivalent to 231,000 mu, an average of 26.58 million yuan per mu. Changyun village irrigated area is a key construction project of Jinxi irrigation and water conservancy, which has invested 28 million yuan to transform the irrigated area of 5,000 mu of farmland. Now the village has formed a contiguous irrigated area, and the mechanization degree has been further improved. Jinxi Changyun irrigation district has built "one body and two wings" water conservancy technology information application platform. Jinxi has established a long-term water management and protection mechanism for small farmers. At the same time, the higher government needs to carry out technical promotion and scientific research support. These constitute tangible costs.

Intangible benefits of government:

The government's grass-roots construction income is the largest intangible income. It is reported that Changyun village's cadre and mass communication is closer, the degree of mass participation in management is strengthened, and party members' sense of responsibility is also increased. Villages have increased farmland and increased the balance of occupied and subsidized land. The government promoted agricultural techniques and trained more talents familiar with practical agricultural techniques. Provide members with free technical and professional training. The governments of Kunshan city and Jinxi town think highly of the role of "Changyun model" in grass-roots management and improvement of people's livelihood, and take it as a model to promote.

5.1. Cost-benefit analysis of Changyun Village

Tangible benefits:

Total village income has increased.

At the village collective level, the costs include land transfer payment, agricultural labor settlement compensation, and the purchase of tools and tools seeds. Expenditure: 1.87 million yuan for rice and 450,000 yuan for wheat. Before 2012, the total income of Changyun village was less than 1 million yuan, which is a relatively weak village in jinxi town of Kunshan. Cultivated land area: 1,850 mu. Jinxi ecological rice planted in the irrigated area was rated as "the ten most popular real estate rice by Suzhou people". It was mainly sold to Jinxi town and Kunshan city with a market price of 9.8 yuan/kg.

In terms of income, the total revenue was 2.9 million yuan, based on the per mu yield of 1,000 jin of rice and 600 jin of wheat. In terms of expenditure, the planting cost of rice and wheat, the service fee of labor and agricultural technology per mu and the payment of circulating gold amount amount to about 1 million yuan. Total revenue minus total cost, the net balance is about 500,000 yuan. If the contract is contracted by a large family, 300 yuan/mu will be paid according to the contract, which is only 100.2 million yuan. By contrast, the net operating income of "cooperative farm" has increased by 194,100 yuan.

The intangible benefit is the improvement of ecological environment. The sanitary environment of changyun village has been improved, the village capacity environment, the appearance of farmland has been increased, and pesticide has been applied.

5.1. Cost-benefit analysis of Villagers

Intangible costs:

Opportunity cost of farmer: working income is measured and calculated.

Land is not only a means of production, but also a means of living. After the transfer of land, farmers cannot grow their own vegetable seasonings, but need to buy them. Field research found that many people were growing vegetables at the head of the village. Manpower liberation: expand the scale of operation, farmland concentration area is conducive to mechanized operation, is conducive to the efficient use and liberation of labour force, help farmers go out to work.

The increase of cooperative income can bring the income of farmers who have become shareholders. The land transfer fund increased from 750 yuan per mu in 2012 to 1050 yuan per mu in 2015, an increase of 40%. Farmers transfer income steadily. Before 2012, the village's per capita income was less than 20,000 yuan. Some 50, 60 personnel, through participating in the demonstration of agricultural labour settlement compensation, the annual salary can increase about 20,000 yuan. The per capita income of villagers increased from 21,000 yuan/person in 2012 to 29,000 yuan/person in 2015, an increase of 36%.

6. The satisfaction of villagers

6.1. The fieldwork analysis to satisfaction of Changyun's villagers

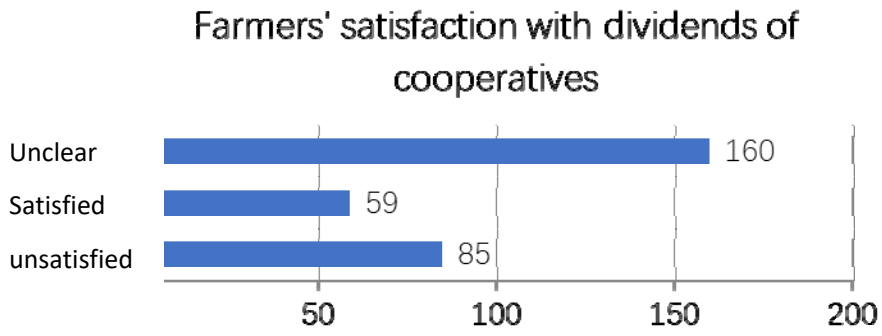


Figure 6 Farmers' satisfaction with dividends of cooperatives

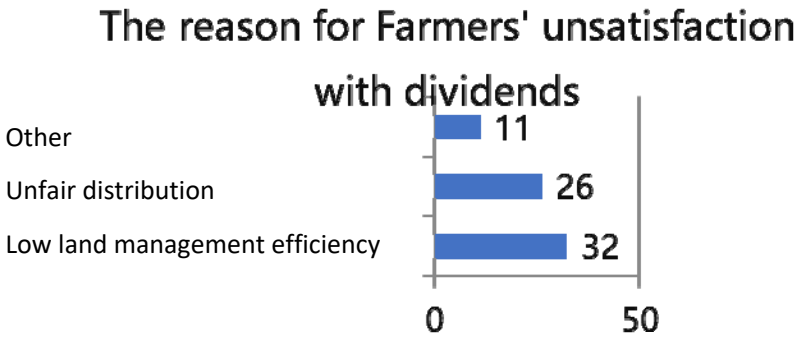


Figure 7 The reason for Farmers' unsatisfaction with dividends

Farmers in Changyun village are more satisfied with the dividends of the cooperative than those in Kunshan city. 18% are dissatisfied with the dividends of the cooperative, 19% are satisfied, 52% avoid answering questions directly and choose unclear, and the remaining 11% do not choose.

The main reasons for low satisfaction are the land management efficiency and distribution fairness. The villagers also suggested improving the quality of their produce.

6.2. How to increase returns

Jinxi agricultural products sales market is small in number and scale, and no well-known consumption place has been established. Comparing with the surrounding areas of Yangcheng lake, it can be found that the professional market and comprehensive market in Jinxi town, as well as the catering places for consuming agricultural products, are far less than Yangcheng lake area. The high value-added industrial chain did not come into being in this town. Most of the primary industries in Jinxi village produce raw materials with less primary processing and lower added value.

In the main functional area planning, Jinxi town belongs to east China grain and oil production area, so it can develop characteristic aquatic products. Changyun cooperative is

also doing shrimp farming in rice paddies and crab farming in rice paddies. Increase the added value of farmland. Deep processing of grain can be considered to explore the value of farmland. Build your own rice processing plant, but no land and no money. Village officials hope to build a centralized rice processing plant in Jinxi. The cooperative develops rice paddies to raise fish, shrimp and crabs, and resells them after processing outside. It needs technical guidance and training.

6.3. A brief analysis of the risks associated with earnings:

Increased risk of scale operation

With the deepening of land circulation and the concentration of agricultural production factors including land, capital, technology and labor, the rights and interests of village collectives and farmers have also entered the production and operation entities of agricultural enterprises in the form of shares. However, agricultural production faces the dual pressure of natural risk and market risk. Cooperatives should enable farmers to participate more actively in management and be more aware of risks.

Production risks faced by Changyun cooperative include: low quality and low price of rice brand. Second, although agricultural products have brands, there is still room for improvement in quality. We hope to give priority to improving the quality of agricultural products. Changyun village also faces management risks. The Changyun model relies on strong village cadres. The management sustainability of the Changyun model still needs to be explored. The long-term disadvantages of agricultural land cooperatives have not been shown yet, but the risks in the future are also worth paying attention to. Precedent has been set in Nanhai, Guangdong, and equity distribution has solidified and caused conflicts. The village committee and the joint stock company are identical, the financial income and expenditure lacks the supervision. Villagers lack information and professional experience, making it difficult to express their demands

7. Conclusions

The land stock cooperative system imitates a company, but its nature is different from that of a company. The people who make up the joint-stock system of land are local villagers. But also assume the function of food security, social harmony and stability resettlement of farmers, rural construction function. As can be seen from Changyun cooperative, rural migrant workers in cities have volatility. The cooperative has become an important buffer for migrant workers in Shanghai and surrounding villages, increasing the employment rate, providing green agricultural products, inheriting agricultural technologies and activating local communities. The advantage of cooperative is that it is convenient to introduce capital and profit distribution, which can promote the large-scale operation of agricultural land, and it is suitable for areas with deep industrialization and urbanization. In terms of equity distribution and agricultural production efficiency, cooperatives still need to be improved. Faced with fierce market competition, cooperatives mainly composed of middle-aged and elderly people left behind are not profitable, but they have their applicability and advantages, which can bring certain benefits to grass-roots governments, villages and villagers, and need to be promoted according to local conditions.

8. References

Wu, Fulong, Fangzhu Zhang, and Chris Webster, eds(2013) Rural migrants in urban China: enclaves and transient urbanism. Routledge,

Han, Sun Sheng(2000) "Shanghai between state and market in urban transformation." Urban Studies 37.11 (2000): 2091-2112.

Yun, Jin Xiongbing Pu Lijie Luo, and Peng Buzhuo.(2003)"LAND USE AND LAND COVER CHANGE AT COUNTY LEVEL——A CASE STUDY OF KUNSHAN CITY [J]." Soils 3 (2003): 5.

Croll, Elisabeth J., and Huang Ping.(1997)"Migration for and against agriculture in eight Chinese villages." The China Quarterly 149 (1997): 128-146.

Research Paper

Out-migrate Elites as Rural-Urban Link

An Innovative Pathway Toward Rural Development Around Metropolis

Tianzhu LIU, China
Jingsheng LI, Tongji University, China

Abstract

Urbanization has caused the outflow of rural population, leading to the depression in rural areas. However, out-migrate elites (OMEs) are found involving in rural affairs in China's coastal areas and contributing to the rural development. This paper questions what is the role OMEs play in rural development. We undertake the research with the participatory research method: taking the practice of village planning as the opportunity to conduct in-depth interviews, questionnaires, and observations in the planning processes. The analysis concludes the binary nature that OMEs have: both "rural" and "urban". OMEs' kin, geographical and economic relations with the village derived from their rural experience, are the motivation of their participation in rural affairs, while their urban life experience contributes to the significant human, physical and social resources that the village is lack of. On this basis, OMEs deliver resources to the village in the process of participating in rural development. Through the delivery of knowledge and physical resource, they provide diversified ideas and funds for the village. Meanwhile, they bring long-term influence to the villagers by affecting their values and building endogenous capacity for the village. Furthermore, OMEs help expanding the social network of the village by introducing their personal social resources from cities into the village, bringing developing opportunities for the village.

Keywords

Out-migrate elites, Rural-urban link, Rural development, Village planning

1. Introduction

The rapid growth of urbanization and industrialization in China in recent decades has brought about the prosperity of the whole nation, but also accompanied by the large population flowing into the city from rural areas. The proportion of rural population to total population decreased from 82.1% in 1978 to 41.5% in 2017 (National Bureau of Statistics, 2018). Most of the rural population who have moved to the city are young and middle-aged people aged from 15 to 50 years old with greater ability. In such way, urbanization has caused the outflow of rural population, as well as the productivity, capital, and knowledge resource, leading to the depression in rural areas. Thus, unbalanced urban and rural development come to be a significant problem around metropolis in this era. On the other hand, however, diverse subjects in cities are involved in rural areas in different ways as the rural villages are increasingly open, which could be seen as the rural urban interaction, supplying the rural endogenous power (Douglass,1988; Sabet and Shahryar, 2017). Especially

in coastal metropolitan areas where cities are in high degree of aggregation with strong economy, with the increasing integration of urban and rural areas, individuals and organizations from cities participated in the development of the rural villages and affected them. In this rural-urban interaction, we recognized a type of people and we call them "out-migrate elites" (OMEs). They were born in the village and now live in the cities, but till keep contact to the village and bring opportunities to the village.

There have been some discussions about this group of people. It's found that new generation of rural elites who go out to work have improvement their abilities and insights in the process of earning a living and employment, thus making up for the lack of resources, projects and leaders in the village (Chen, 2015). It is also concluded in the study that more than half of the "County sage" had experience in migrant work, contributing to their "elites" property (Xu, 2015). Having a strong sense of self is an important attribute of the village elite, which is related to the experience of having more education and working and living outside (He, 2000). These researches further proof the value of OMEs, but they simply discuss the elite attributes of the persons who are out of the village. The value of OMEs in village development has not been systematically studied. What is the role OMEs play in rural development? Specifically, what characteristics do OMEs have? Why do they keep contact with the villages? And on those basis, in what way do they affect the rural villages? These are the questions we are going to explore in this research.

2. Definition and methodology

2.1. Definition of Out-Migrate Elites

In order to carry out the research, we need to have a preliminary definition of the OMEs. Though there is no generic concept and title accepted by academia, scholars have recognized the existence and value of this group of people. Luo described them "the third force", representing people who went out from villages and work in administrations and enterprises but still care about village development and try to deliver resources for the village (Luo, 2002). Ren (Ren, 2003) named these former villagers who were seeking development outside the village but participate in the village life crossing space barriers as "outflow elites", with the meaning of the potential of elites' return and the long last contact with the village.

Learning from the above literature, we use the term "out-migrate elites" here, aiming to directly express the identity of our research objects, especially the attributes comparing to the normal villagers who live inside the village. "Out-migrate" describes the status of grown up in the village but going out to study or work, and often living outside the village. "Elite" means that he or she can help the village public affairs because of the resource advantages. Actually "out-migrate" determines the attribute of "elite": the small-scale peasant economy situation in China determines that it is difficult for the rural areas to achieve the affluence of most people simply through traditional agriculture. Those who come to the town and city through employment, business, military participation, and further studies have the ability to make a living in the city through their efforts, gradually escaping from the way of relying on land to survive. In conclusion, OMEs in this paper are defined as "the original villagers who migrate to cities to make a living but still care about the development of the village and have

the ability to provide certain resources to the village". This includes, but is not limited to, civil servants, entrepreneurs, engineers, and the alike who works outside the village.

2.2. Participatory research method

In order to answer the questions mentioned before, we undertook the research with the participatory research method, with the opportunities provided by the village planning projects in coastal areas of China. Village planning aims to promote rural socio-economic development through industry planning and spatial strategies, based on the investigation and communication with villagers (Li, 2019). As a part of public policy of rural areas, the planning compilation is normally authorized by government and is always supported positively by villagers. With the support of village planning projects, we have little difficulty to get access to the village and to contact villagers and OMEs, being able to gain trust with them so as to collect information and to conduct in-depth interviews and questionnaires. Moreover, as a typical tool to promote village development, the planning process reflects the OMEs' participation in rural development. Thus, we got the chance to organize meetings and discussions so that it was possible to make observations in the planning processes of initiation, design, decision-making, and implementation (see figure 1).

Figure 1 Group meeting of village planning process in case study villages

2.3. Case study villages

Figure 2 The location of case study villages (left: in China, middle: in Fujian, right: in Zhejiang)

Explicitly, three rural villages (figure 2) in the coastal areas of China, Leishan Village (L village), Pucheng Village (P village), and Tangxi Village (T village), were studied as example, from 2014 to 2017. They belong to Ningbo (L village and T village) and Fuzhou (P village), two well developed large municipalities, at the administrative level. Though through different ways, OMEs in those villages participated in the planning process in diverse forms. Besides to the basic information like geographical and cultural resources of the villages, we collected data through the observation in group meetings and semi-structure interviews and questionnaires with OMEs. Different village planning projects were initiated for different

reasons and therefore were accompanied by different participants, so the research method applied in those cases were not exactly the same.

T village belongs to Yuyao, Ningbo, with the distance of 86 km to Ningbo city centre, 71 km to Yuyao city centre and 11 km to the town, with around 1280 people in 2014. Its village planning was initiated in the 2014 by the villagers, looking for an avenue to better village industry to improve the villagers' income. So that the funding of planning was shared by the village and government. The village has very proactive leaders, who recognized the value of those people "*who has quite good status in cities but always contact the village as well*" and thus organized a series of activities attached to the village planning to enrol them in the process. In addition, a Wechat (a social media app) group was built for the instant communication between villagers, OMEs and planners. In T village, we mainly collect information about OMEs via the village head and through the observation in the planning discussion meetings and the group discussion via social media.

P village is located on the southwest of Fuzhou, with the distance of 80km to Fuzhou city centre and 22km to Yongtai county centre. It is composed of three administrative villages with continuous built-up area and with the villagers sharing same ancestors so that they treat the villages a whole from a cultural identical perspective. P village is very large because of the mentioned reason with around 7000 villagers, 49% of whom migrated to the large cities, mainly being in business. The village planning project started in 2016 because of the OMEs' willing to improve the living environment of the aged and the project fund was shared by OMEs and government. While the main initiator of the planning project was the OMEs group and the amount the the OMEs is considerable, we did semi-structured interview with some OMEs and did a questionnaire through the internet with the help of an OME who was the main contact of the project.

L village is located in Fenghua, Ningbo, with the distance of only 32 km to Ningbo city centre. Different from the former two villages, the planning of L village started in 2017 was not actually an official statutory planning but was a voluntary project attached to the activity "nostalgia economy +" organized by city government which aimed to improve the rural village development though community building. Because the village is very close to the city, many people still lived within the village. The village head didn't realize the value of OMEs, but she accepted our suggestions and contacted the OMEs to participate in the planning discussion, which was the main channel for the data collection.

3. Profile of Out-Migrate Elites

3.1. Basic characteristics of OMEs

In terms of age, OMEs are mainly young and middle-aged people. In P village, the average age of OMEs is 44 years old, and the average age when they migrate is 19 years old. The OMEs who are older than 60 years old often have weaker physical capacity and the less desire for struggling due to their age, and they miss the village life and choose to return to the village. As Lin S, OME in P village stated: "*The first generation of villagers who came to Shanghai to make a living have been in Shanghai for 30 years. Take my parents as an*

example, they came to Shanghai in 1988 and now they chose to go back to live in the village. My father and mother have returned to the village, and they are not willing to work so hard here. (In the city) Although they don't have to do much thing, they feel bored. In the village, the circle of communication is bigger, while in the city they can only share a small family. My mom lived very close to her sister in Shanghai, but they meet at most two times a month. However, in the village, friends meet everyday".

Different from the occupational status in village where people mainly work in agriculture, the professions of OMEs are diversified because of the opportunities provided by the city. In P village, the professions of OMEs include at least civil servant, entrepreneur, engineer, university teacher, middle school teacher, and bank staff. In T village, more than 54 OMEs own the leading positions in their working area.

As for the geographical distribution, most of the OMEs live in cities not far from the village, normally in the same metropolitan area. As shown in figure 3, OMEs in P Village and T Village are mostly located in the county-level cities (Yongtai County/Yuyao City) and municipal-level cities (Fuzhou/Ningbo City) where the village belongs to in the administrative level and mega cities like Shanghai.

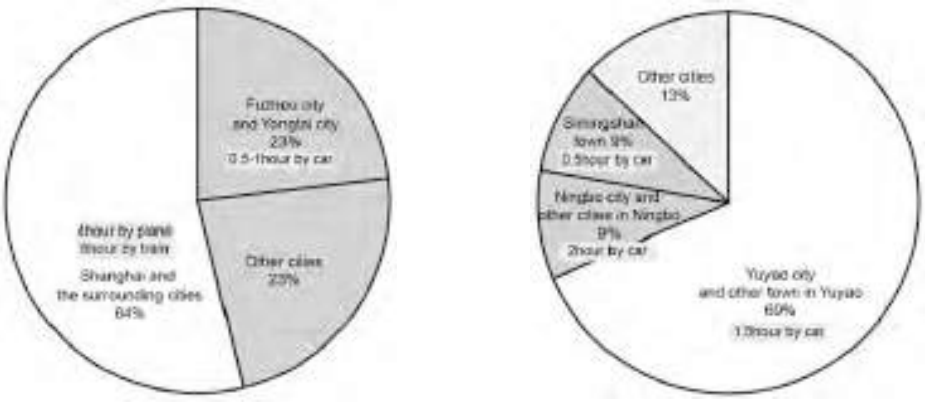
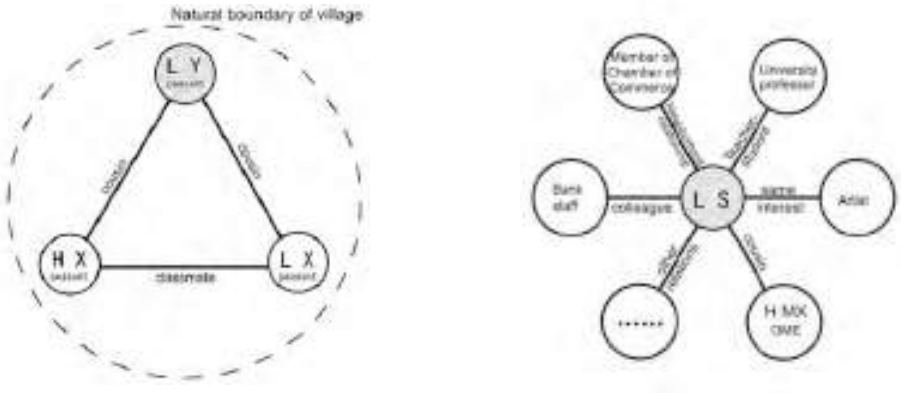


Figure 3 OMEs geographical distribution and time distance (left: P village; right: T village)

3.2. Resource characteristics of OMEs: based on the comparison of villagers

The above information about OMEs provides us with a view to understand their resource characteristics, especially with the comparison of villagers who stays inside the village. This characteristic will be described from the human resource, physical resource and social resource (Lin, 2005). In terms of human and physical resource, generally the most labour intensive age and the ability to set up a career in a more developed city are the support of OMEs' richness in resources, as well as the broad vision and ideas gained from the experience in the city. While many OMEs have also achieved business success, most of the people in the village are still peasants with an annual income of 7,500 yuan in average, relying on the economic support of the OMEs. Moreover, occupation, especially occupational status, is more indicative of the OMEs' rich resources. They have obtained professional skills and organizational skills related to their professions, and accumulated corresponding physical resources due to those skills. A considerable number of OMEs are leaders of government departments or management personnel of the company, which means relatively higher wealth, power and prestige resources (Lin, 2005).

As for the social resource, figure 3 presents the comparison of the social network of a typical villager and an OME: the ability to access a wider range of resources. The village is a “society of acquaintance” which means that people are familiar with each other and have similar job occupation. Therefore, social relations are limited to small-scale primary relations and people's interactions are often repeated with homogeneous resources, as shown in figure 2a. On the contrary, OMEs live in towns and cities and have developed various secondary relationships in social interactions. Thus, the social network is open and wide with rich heterogeneous resources, as shown in figure 2b. The latter may acquire a wider range of resources due to the opening of social networks (Lin, 2005).



a：villagers’ close social network **b：OMEs’ open social network**

Figure 4. Comparison of social network of villagers and OME in P village

3.3. OMEs’ Participation in rural affairs

In the era when transportation and internet infrastructure are not well developed, the OMEs keep in touch with the village by sending money to the family (Li and Xue, 2014). With the improvement of those infrastructure, the contact between those who migrated out and the village comes to be easier. 44% of the OMEs in P village keep contact with the village every week, while the remaining 36% keep monthly contact with the village. The frequency of visiting the village is determined by the geographical location. OMEs living in the county area always visit the village 20-30 times a year, while those who live in municipal-level cities go to the village about 10 times a year, and those who live in other cities return to the village 1-8 times a year. In the village planning projects, though in different ways, there are OMEs involved in the all those villages. OMEs in P village gathered together spontaneously with the consensus goal of making the village better for living. 44 OMEs in Shanghai and more than 20 OMEs in Fujian province were involved in the settlement of “Beautiful Village Committee” and were distributed with tasks by each person’s advantages. In T and L village, more than half of OMEs came to attend the village planning discussion after the call from the village head.

Other than the actual participation, the willingness of OMEs also reflects their possibility of participation in village affairs. In P village, 68% of OMEs are willing to give suggestions for the village development; 36% of them would donate for the village construction if needed; 32% of them would like to get policy and funding for village with their social resources; and 16% of them are willing to bring friends to consume in the village. OME in L village who was doing business in Ningbo believes that the development of the village still depends on young OMEs.

He was not likely to return to the village to make a living and work, but he could invest money to the village.

4. Social Relationship: the motivation of OMEs' participation in rural areas

The participation of OMEs to the village has been presented, further, it's necessary to understand why they are involved in the village issues. When we treat OMEs as a kind of exterior resource of the village, the social capital theory is helpful to explain their participation. In the theory, social relation, resource and action are the components of social capital (Lin, 2005). We have discussed the action and resources of the OMEs, so we try to explain the motivation of their behavior through their social relationship with the village.

4.1. Kinship: rooted relationship of OMEs and the village

There is a strong "family" concept in Chinese culture especially in rural areas. Fei described it as "the differential mode of association", which means that the most intimate relationship is with relatives such as parents, and as the kinship goes weaker, the social tie becomes weaker (Fei, 2006). Many young and middle-aged OMEs have parents who still live in village because of the difficulties in adapting the lifestyle in cities, which is the reason why OMEs have intimate contact with the village. In P village, 76% of the OMEs visit the village for their parents and relatives, composing the main reason for why visiting the village. For those OMEs, they care about the living environment of village because the infrastructure and environment is strongly related to the living quality of their parents and relatives.

In addition, OMEs have clan relations with the village, which is derived from the sense of belongings based on kinship, and 60% of the OMEs expressed that they will visit the village for ancestors' worship festival. Ancestral halls and activities are active till now, for which hundreds of OMEs came back to the village in the worship festival day in 2016 even though it was not in vacation.

4.2. Geographical relationship: OMEs' willingness to return to the village in the future

While the kin relationship leads to the connection between OMEs and the individual villagers, the geographical relationship brings the connection between OMEs and the village itself. 80% of the OMEs in P village indicated that they would like to return to the village for vacation or after retirement.

The natural environment, cultural environment and friendly social interaction atmosphere in the village are important parts of the OMEs growth, composing the beautiful memory and the nostalgia of their life. In P Village, the OME Zhang MH introduced the traditional house with deep emotion as "*I always dream of this place.*" Zhang ML expressed his love for hometown as "*The landscape and scenes of the village have always been a beautiful thing for us. We should keep those good memories.*" Lin JY, the OME who was doing business in the county, expressed her emotion for the village through the willingness to repair the ancestral home: "*I come back here three to four times a year. My best memories are about here. I want to come back and repair the old house…Then I can bring my child here to live and for vacation.*" Tang YJ in T village and Lin S in P village expressed most OMEs' willing to return to the village after retirement that "*I will go back to the village within five years in the*

future. My wish is to have a room to stay in the village." Though qualified to migrate Hukou to cities, some people chose not to do so just for keeping his land property in the village.

4.3. Economic relationship: property relations and industry opportunities

Most of OMEs have property related to house and land in village. In terms of land and house property, due to the collective ownership of village land in China, the property distribution of the village is closely related to the household registration (Hukou). The OMEs with their Hukou in the village still have the property of farmland, homestead, and cooperative shares. Moreover, there are some situations that OMEs still owns property in village though their Hukou migrated out. In general, almost every OME have property rights inherited from their parents and other relatives. For example, Lin JY, the OME of P village has been working in the city for decades with her Hukou in the city, will inherit a traditional house owned by his uncle. Further, if the land property has been confirmed before the migration of OMEs' Hukou, OMEs will have farmland property for a certain number of years. For example, P village has already done land rights confirmation about 30 years ago and the OMEs who moved out of his Hukou to the city after the confirmation still has a homestead and farmland. For another scene which can be seen in T village, with the permission of villagers, some OMEs have the shareholding of the cooperative whatever his/her Hukou is in the village or not. These are strong and long lasting ties between OMEs and the village, promoting OMEs paying attention to the village issues, which are related to their private property.

Another aspect of economic relation is about the industrial development. For those OMEs who want to operate a company, there is an advantage in the low cost of both land price and human labour for developing industry (a farm or a resort for example) in the hometown village. In addition, due to the demand for social network in business, people who go out to do business often operate industries that are related to the village and gather in neighbouring cities. For example, P Village has a traditional industry that produces dried fruit, and later OMEs who went out for business are mainly engaged in the food industry and gathered in Shanghai and surrounding cities for mutual support. This kind of link promotes OMEs to link each other closely so that they always have a sense of belongings of the hometown village.

4.4. The binary "rural" and "urban" nature of OMEs

Based on the description of the resources and social relationships of OMEs, a diagram depicting the social relations of OMEs and the village is drawn as shown in Figure 5, from which we conclude the binary nature of OMEs: the "urban" characteristic and "rural" characteristic. The "urban" characteristic presents the resource heterogeneity due to OMEs' occupational and workplace differentiation from their city living experience. This can be seen from the comparison outside and inside the natural boundary in figure 5. The latter "rural" property is reflected from the strong social link between OMEs and the village as well as within the OMEs group, which can be seen as "strong tie" because those are within the cultural boundary of the village shown in figure 5.

The social capital theory refers to the relationship between the strength of the relationship and the acquisition of resources. The weak tie theory believes that infrequent contact "weak tie" brings heterogeneous resources that are not easy to get in normal life (Granovetter, 1973), emphasizing the importance of heterogeneity of resources, though meaning the difficulty of the access of the resources. On the other hand, Chinese scholar Bian proposes that China is a strong relation-based society and the success of action depends not on the

breadth of information that weak ties can bring but on the certain help that strong ties can provide (Bian, 1998), underlining the importance of strong ties, though accompanied with less resources. However, when we talk about OMEs, this group could be treated as the combination of "strong tie" and "heterogeneous resources", thanks to the binary nature it contains. This characteristic indicates the convenience of getting diversified resources from OMEs. Especially when OMEs gather together, they cooperate and deliver integrated resources gained from the city to the rural village.

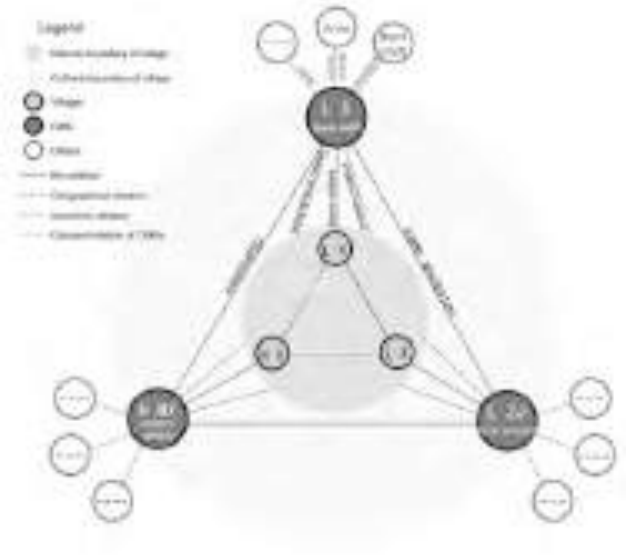


Figure 5 Diagram of the social relation network between OMEs and village (P Village)

5. OMEs' contribution to rural development: the delivery of urban resources to rural community

5.1. Delivery of information, knowledge and physical resource

Based on their own professional knowledge and long-term experience in cities, OMEs have developed diversified ideas for the village development. For example, in the discussion of industrial development in T Village, the OME Tang W working in the county government department proposed the idea to produce of agricultural and handicraft products in the coming years and to develop sports and health related projects in the long run, based on his knowledge of policy environment and economic situation in the county; while entrepreneur Tang ZG, based on his business management experience, recommended that the village could diversify its financing forms such as attracting private capital, crowdfunding, and shareholding. In terms of living facilities improvement, because OMEs have experience in the city and also have their own actual needs for the village facilities, they have put forward very specific ideas and suggestions for the improvement of the living environment, such as "*constructing the waterfront road with the roadway 6 meters wide and the sidewalk 2 meters wide, along with the houses with shops on the ground floor...*" and the OME who has gained training about urban planning even drew the section of the waterfront road to guide the construction. Those are ideas not be recognized by villagers and could be good opportunities for the village.

Moreover, those ideas are able to be achieved because of OMEs' involvement and operation in the project. For individual behaviour, this is reflected in the investment of funds and human labour by OME individuals. Based on the improvement of village environment and the development of individual industry, they provided funds by themselves for village construction and development. For instance, Lin Z, OME in P village devoted money for the construction of village pavilion and main road. In T village, Tang ZY wanted to invest in the hotel located in the village and was in the process of negotiation. Chen SH came up with the idea of developing local specialty for the village and has put it in practice with the result of well designed tea product, using the village's name as its brand name. For the village construction fundraising, the OME representative Lin ZJ expressed the general idea of OMEs as: "*We are obliged to pay for the village construction...The people living outside of the village are wealthier and ought to do something for the village.*" As for the public projects which requires large amount of funding, programs are more implementable with the OMEs' participation. Taking the waterfront road project of P village as example, the project's proposal, initiation, design, and implementation fundraising were all driven by the operation of the OMEs. They planned the project based on their own expertise, estimated the budget, and contacted the design company. In the fundraising phase, they apply government funds through their channel and invest their own money and goods for the project. Lin Z ， entrepreneur who was in charge of the fundraising told us how the money raising was planned: "*how to gather more than 9 million yuan for this project? First of all, we should apply for the money from government in the name of the 'beautiful village construction', which could get about 2 million yuan, and then it is not difficult for us to raise 1 or 2 million from individuals*". In those ways, OMEs introduces information, knowledge and physical resources into the village to provide ideas and development conditions for village development.

5.2. Delivery of values and capacity building

In their experience in large cities, OMEs have cultivated the values to understand the precious value of traditional culture and natural environment of rural areas. In the process of participating in the development of the village, the values were imported into the village and affected villagers. Taking the traditional landscape conservation as an example, in all those three villages, when the villagers proposed to demolish the traditional buildings and build the European-style houses, OMEs emphasized the preciousness of the tradition and proposed the necessity to protect traditional features. They suggest that the buildings should keep old style and should not use cement and steel in construction. As the authorized elites, they have influenced villagers and led their value orientation in the process.

In addition, as OMEs have broaden their horizons, accumulated knowledge, and fostered the consciousness of modern citizenship (Yang, 2008), combined with the authority of their elite roles and the ability to integrate village interests (Luo, 2002), they bring about the consciousness of modern governance to the rural village and promote the capacity building by encouraging the villagers through directly participating in village management and the organization of public activities. Research on rural social information dissemination points out that when information sources are homogenous to recipients, that is, when they have the same intention, subculture, language, and personal and social characteristics, the effect of communication to gain knowledge or change attitude is obvious (Rogers and Berger, 1988). The OMEs act as the "source of information" – comparing to the external subjects such as planners and government, the same cultural and linguistic background of OMEs and

the villagers determines the efficiency of communication with the villagers. At the same time, because of knowledge and occupation, they have prestige and authority among the villagers, thus being more effective in delivering information to the villagers. Taking L village for example, the new head of Chen SH, also as the senior executive of a big company in Ningbo, introduced the "5S Management Rule" into the village. He invited the old authorized villagers to give suggestions and make decisions and regulated the reimbursement system of the collective expenditure, modifying the governance model. Based on the introduction of those values and the consciousness of modern governance, the villagers have been fundamentally promoted, thus affecting the development of the village in the long run.

5.3. Expanding social network of the village: bringing developing opportunities for the village

The OMEs' participation has also expanded the social network for villages, through their own social resources, to attract more attention and development possibilities. These social resources include top-down government resources, potential investment subject resources, related technical organizational resources, and so on. In L Village, OME believed that the village had potential to attract investment, so he organized social media group with the entrepreneurs he made friends in business to introduce potential investors to the village. In P village, civil servants (those who were retired and who were serving in the occupation), entrepreneurs, teachers and other OMEs working in the local or other cities were organized as a committee. The civil servants and the member of the chamber of commerce usually have the social relations with government officials so that they were in charge of the contact with the government officials to gain policies, funds, and information support from the special bureaus such as traditional village conservation office. OMEs in the enterprise have social relations with the local propaganda company so that they are required to contact local TV station to film the tourism video for the village. OMEs brings more attention to the village and more development possibilities by introducing their social resources to the countryside.

6. Conclusion and discussion

We conclude the "binary" nature that OMEs have. To the standpoint of OMEs' relation with cities, the experience of working and living in the city contributes to the significant human, physical and social resources of OMEs. From the perspective of OMEs' tie with villages, the kin, geographical and economic relationship is found as the fundamental connections. The "binary" characteristics and the development of metropolitan area, especially the construction of highway and internet infrastructure, make it possible for OMEs to maintain close contact with the village. Meanwhile, OMEs' appeal to the countryside, which is based on their relationship with the village, and the environmental thrust from the cities, prompts them to participate in village affairs. It is in this process that OMEs deliver resources from urban to rural areas, promoting village development. Taking the rural planning process as the example, OMEs serve as the rural-urban link and provide a novel way for rural development by building endogenous capacity for the village. Through participating in public issues, OMEs bring the values and information from city into the village, diversifying ideas to the village development, and exchanging information with villagers to enhance their abilities. Furthermore, OMEs help expanding the social network of the village by introducing their personal social resources from cities into the village.

There are still some issues that need further discussion. First of all, as an important resource of the village, what kind of ways can promote the participation of OMEs in rural development? In addition, what kind of organization can strengthen the role of OMEs? As a link between urban and rural areas, in addition to playing a positive role in the countryside, can OMEs' actions in the countryside also have a positive impact on the city, so that this link is reciprocal? These are issues that need to be explored in the future.

7. References

Bian, Yanjie (1998) “Retrieving Strong Relationships: China's Indirect Relationship, Network Bridge and Job Search”, Social Sciences Abroad, No. 2

Chen, Kaibing (2015) “Research on Rural Population Flow and Village Governance in the New Period: Based on the Investigation and Thinking of Shantou Village in East Zhejiang”. South China Rural Areas, No. 5

Douglass, Mike (1998) "A Regional Network Strategy for Reciprocal Rural-urban Linkages: an Agenda for Policy Research With Reference to Indonesia." Third World Planning Review Vol. 20, No. 1

Fei, Xiaotong (2007) From the Soil, Shanghai: Shanghai People's Publishing House

Granovetter, Mark S (1973) “The Strength of Weak Ties”, The American Journal of Sociology, Vol. 78, No. 6 (May)

He, Xuefeng (2000) “Village Elite and Community Memory: A Two-dimensional Framework for Understanding the Nature of the Village”, Social Science Journal, No. 4

Luo, Xingzuo (2001) “The third Force”, Zhejiang academic journal, No. 1

Li, Jingsheng (2019) Principles of Rural Planning, Beijing: China Architecture & Building Press

Li, Nan; Xue, Jiliang (2014) “Outbound Labour Remittance Decision-making Mechanism: Active or Passive”, South China Rural Areas, No. 6

Lin, Nan (2005) Social Capital: the Theory of Social Structure and Action (translated by Zhang Lei), Shanghai: Shanghai People's Publishing House

National Bureau of Statistics (2018) China Statistical Yearbook 2018, China Statistics Press

Ren, Min (2003) “Outflow Elites and Rural Development”, Youth Studies, No. 4

Rogers, Everett M; Berger, Rabel J (1988) Rural Social Change, Hangzhou: Zhejiang People's Publishing House

Sabet, Naser Shafiei; Shahryar Azharianfar (2017) “Urban-rural Reciprocal Interaction Potential to Develop Weekly Markets and Regional Development in Iran” Habitat International, Vol. 61 (March)

Xu, Ming (2015) The Effect of the Rural Elite Social Network on Rural Governance: Take Rural Elite Council in D Country as an Example, Hangzhou: Zhejiang Gongshang University

Yang, Linfeng (2008). “Dialectical Thinking on the Power of the Returning Economic Elite”, Journal of Shanxi Agricultural University (Social Science Edition), No. 4

Case Study / Project

The Shrinkage and revitalization of villages

in metropolitan area of mega cities

Zhengyin LU, Xiaoyi WEN

Abstract

The megacities are a double-edged sword for the surrounding rural areas: while providing opportunities, they are also 'draining' the surrounding areas. The meaning of Water-related spaces of the rural area in South Jiangsu Province - China - are the cradle for the economy in history, and are also where lies its social, ecological and cultural characteristics. But rural and water-related activities in southern Jiangsu are weakening. Many rivers have been silted up or turned into arable land, and traffic has been reduced. The former studies focus more on space design and less on their network with different agencies and actors. And there lacks small to medium scale spatial economic network quantitative analysis and data visualizations among villages, towns, and cities. Meanwhile, an argument has been raised that developing real characteristics will help the villages to revitalize. How to find and revitalize the villages by reconstructing the center of the villages? Does this method work for the Chinese metropolitan villages and towns?

The paper focuses on studying the significant network of villages in metropolitan areas from ecological, cultural and economic perspectives.has a positive effect on how to preserve the cultural context of water towns. In this paper, the characteristics of hydrology, atmosphere and vegetation cover are analyzed at the regional level by remote sensing satellite image data analysis and field survey, the connectivity of main industries in rural areas is described. And the result network is coupling with economic, social and ecological network (e.g., fishery, aquaculture, tourism network etc.) and its influence scope. Finally, by comparing the industrial network characteristics of the towns and villages with better tourism towns such as Zhouzhuang and Wuzhen in Zhejiang Province, it is concluded that the coupling relationship between industry and ecological system should be well handled.

Case Study / Project

Defining the Rurban

- a case of Hyderabad

Sohini MAITI, Satyajit MAL

Abstract

Large parts of rural areas in India are not stand-alone settlements but part of a cluster of settlements, which are relatively proximate to each other. These clusters typically illustrate potential for growth, have economic drivers and derive locational and competitive advantages. Hence, making a case for concerted policy directives for such clusters. These clusters once developed can then be classified as 'Rurban'. (SPMRM, National Rurban Mission Ministry of Rural Development, Govt. of India). Is it possible to preserve the essence of rural community life with focus on equity & inclusiveness while providing urban facilities? As the word rural by definition means non-urban, is the Rurban model more applicable for the secondary cities or suburban towns? Hyderbad presents us with a situation where an Outer Ring Road (ORR) is created to contain the urban development but placement of Information Technology Investment Regions (ITIR) along the ORR and even in areas nearby the river Musi possess serious threats to the existing villages in this area. The paper aims to take a real life situation along the ORR and derive the forces of growth and a possible ideal model for the Rurban. The age old transect from natural zone to the urban core zone is to be questioned in this current era urbanisation and we are definitely in need of an answer that balances the extremities of rural and urban. Between 2000 and 2014, the proportion of the global urban population living in slums dropped from 28.4 per cent to 22.8 per cent. However, the actual number of people living in slums increased from 807 million to 883 million. They can become the target population for suburban towns or secondary cities if these are equipped to provide a sustainable model with more production, more employment more equitable distribution of income and focussing the poor. Development is, ultimately, the progress of human freedom and capability to lead the kind of lives that people has reason to value. (Sen & Dreze, 2013) A rurban model appropriate for today's context can be a tool to generate that value for the public.

Research Paper

THE ROLE OF FOOD IN RE-IMAGINING THE CITY

From the neighbourhood to the region

Teresa MARAT-MENDES, Instituto Universitário de Lisboa - ISCTE-IUL, DINÂMIA'CET-IUL; Portugal

João CUNHA BORGES, Instituto Universitário de Lisboa - ISCTE-IUL, DINÂMIA'CET-IUL; Portugal

Abstract

Humanity is now believed to live in a new geological epoch, the Anthropocene, as changes have been reported on the atmosphere, air, water, and soil, but also on societal perceptions of these issues. This presentation departs from the theoretical assumption that the impact of the abovementioned changes on culture and the environment have not yet found a stable influence on urban planning. This presentation overviews the implications of the food system within urban planning while considering it as a socio-technical system which integrates production, distribution, transformation, consumption and disposal patterns. The production phase of the food system in particular, emerges as a fundamental planning challenge, extending to urban form solutions, individual behaviours, dietary regimes, inequalities in foodsheds planning, and the cultural capital of food. Accordingly, the food system emerges here as an opportunity to identify how current urban fabrics of cities and their rural and regional hinterlands can be transformed in terms of their metabolic function and respond to the needs of people and the environment. To do so, this presentation introduces the preliminary results of an analysis conducted by an ongoing research project SPLACH – Spatial Planning for Change, at two particular scales: the region and the neighbourhood. Thus, while focusing in the Lisbon Metropolitan Area (LMA), in Portugal, we provide an analysis of the Regional Plan as well as of specific residential neighbourhoods located in LMA, regarding the relationship between the food system functioning and urban planning approaches. The analysis includes a comparative number of case studies which differ in urban form solutions, socio-economic conditions, but also geographical location. The results support the request for a stronger integration of the above-identified underexplored topics of the food system within urban planning, which will be fundamental to inform a new theory of the city that makes any serious contribution towards a sustainability transition.

Keywords

Urban Planning, Urban Agriculture, Sustainability Transition, Region, Neighbourhood

1. Introduction

Planning for a sustainable humanized environment requires the equilibrium between the social, the economic but also the physical systems. At a time when 55% of world population lives in urban areas and is expected to increase to 68% by 2050 (UN, 2015, 2016), it is important to disclose how cities socio-metabolism behave today accordingly and could be changed into a sustainable one.

Urban metabolism was first explored by Wolman (1965) who proposed to quantify the flows and stocks of materials and energy in given environments, thus understanding the city as a functioning organism. Later, advancing towards a different concept, that of socio-ecological metabolism, the work of the Vienna School of Social Ecology articulated the physical analysis of materials and energy with social activities, amounting to couple the socio-ecological systems (Fischer-Kowalski and Weisz, 2016). This approach allowed, among other possibilities, significant contributions on the transition processes between different metabolic eras (Krausmann et al, 2016) as well as on the deepening the environmental history of particular places (Winiwarter et al, 2016).

In the planning sphere, the metabolism would be acknowledged through its Circular perspective, while making effective use of waste, which was then regarded as a fundamental goal for urbanism (Rogers, 1997). The notion of Circular Metabolism would gain greater attention by academics, and the urban system was expected to work while making use of its own waste. However, this call for circular metabolism of cities found a difficult relationship with current planning in many countries. In some cases, this tension reveals the limitations of planning structures focused on 'management' rather than 'planning', which ensure relative liberty for urban development projects on the private sector, but often delay the necessary transition of urban systems to more sustainable models.

The project 'SPLACH – Spatial Planning for Change' aims to inform future public policies for such transition to sustainability, including the fundamental role of urban socio-ecological metabolism while reinforcing its spatial dimension, through the understanding of its implications on urban form. The research team of DINÂMIA'CET-IUL for SPLACH project is focusing its analysis on Lisbon Metropolitan Area (LMA), which includes 18 municipalities and is the most densely populated metropolitan area in Portugal.

Fundamental for an effective metabolism is the access to basic human needs, which all cities must ensure in order to be liveable: housing, water, electricity, transportation, internet and food. While some of these are widely acknowledged in Portuguese planning instruments, others, particularly water and food, are relatively absent.

The food system – the pattern across which food is produced, transformed, distributed, commercialized, consumed and disposed (Pothukuchi and Kaufman, 2000; Steel, 2008) – has inherent spatial implications, as it relates to land-use systems, infrastructure and both the built and natural environments of cities.

Although some studies have been developed to diagnose the LMA food system and its metabolic impact (Oliveira et al, 2017) this is still not reflected in the central documents of spatial planning in Portugal – the municipal Masterplans, as well as on urban design scale. Although some Portuguese municipalities have ventured into food-related programs, including refurbishing of municipal markets, urban allotment gardens and pedagogical farms, these are not yet included in the general strategies for the development of LMA municipalities (Cabannes and Raposo, 2013; Oliveira et al, 2017; Marat-Mendes et al, 2018).

On the other hand, many grassroots initiatives can be observed in the actual territory that are also invisible in planning documents, and which seem to have deserved little attention or interest from planners. Initiatives of urban agriculture have been subsidized by municipalities in the LMA, but these municipal programs are very different from Guerrilla Gardens in many of the same municipalities, which attest to how communities have appropriated vacant and even private spaces for food-production purposes. Nevertheless, it should be noted that such grassroots initiatives have already received the attention of a number of researchers, former members of FAO and UN organizations, such as Cabannes and Raposo (2013)

This paper aims to observe 'invisible' food-related initiatives, particularly at the production phase of the food system, emphasizing the potential role of urban agriculture in improving the socio-ecological metabolism of the LMA, and confronting it with the approach to the territory comprised in spatial planning. Two planning scales will be central here: the regional and the municipal. The former allows an observation of how the territory of the LMA is envisioned in public policy, while the latter allows a more direct confrontation between particular places and their treatment in planning, inclunding the design solutions which have guided them.

1.1. Literature review

The study of the relation between the food system and urban planning has deserved greater attention in recent years. A succinct description of the food system would present it as the system of activities across which food is produced, processed, distributed, cooked, eaten and disposed of (Pothukuchi, Kaufman, 2000; Steel, 2008). This includes not only the activities themselves but also the institutions (Pothukuchi, Kaufman, 2000) and the power relations (Wekerle, Classens, 2015) implicated in those activities.

Although nearly two decades ago, Pothukuchi and Kaufman (2000) presented the food system as a 'stranger' to the planning field, this situation seems to have changed meanwhile. Brinkley (2013) comprehensive account about the research in this area, concludes that most aspects of the food system have already entered into the concerns of urban planning studies, while emphasizing that the waste-disposal phase of the system, as well as the cultural capital of food remain however underexplored. Steel (2008) analysed the relations between food production and the structure and distribution of activities in specific cities, while Parham (2016) explored the role of food in relations of urban conviviality and concluded that this plays a fundamental role in a future sustainable development.

Notably, most authors interpret the food system as a holistic and multi-scale system, which comprise aspects related to the political economy, public health, environmental impact and cultural issues (Reynolds, 2009; Steel, 2008; Viljoen and Bohn, 2012; Reisch et al, 2013; Brinkley, 2013; Cohen and Ilieva, 2015; Sonnino, 2019). Reisch et al (2013) have used the term 'integrative paradigm' to define an adequate methodology towards the food system. This entails creating integrative, cross-sectoral, population-wide food policies extending to the entire food system in order to ensure its overall sustainability.

However, this definition is already enough to point out some problems arising from the food system and its study. One major problem has to do with the fact that the food industry is highly fragmented (Reisch et al, 2013) with inquiries usually struggling to establish inter-disciplinary links between fields of study and planning (Brinkley, 2013). This problem applies not only to the urban food system, but to the urban systems in general, particularly with

respect to sustainability issues (Webb et al, 2018). Analysing urban systems – including the food system – for their institutional role will then imply accepting that not only policies are fragmented, but also that several institutional forces may prove to be a barrier to integrated and large-scale change (Webb et al, 2018).

In a sense, this situation may be specific of our times, as neoliberalism, social inequality, the domain of the private market over cities (Drago, 2018) and sustainability threats (Cohen and Ilieva, 2015; Fischer-Kowalski and Weisz, 2016) call into question the institutional structures and power distribution underlying urban systems. With respect to the importance of neoliberal economics in the food system, Steel (2013:59) points out that agribusiness has created a situation in which food supplies are determined not by local cultures but by economies of scale. More recent accounts (Sonnino, 2019) have emphasized a shift of food system approach with public entities increasingly acknowledging their own participation as actors in the food system.

As such, we may accept that ours is a time when we have outgrown the institutions we have and are struggling to design new ones (Bartlett, 2017, p.194). As such, urban systems – insofar as they are deeply implicated in the division of society in space – and food systems – as they ensure a human basic need – may provide the basis for new conceptual frameworks which allow us to imagine different institutions able to respond more effectively and closely to the population and environment demands, across a variety of scales of space and governance (Webb et al, 2017:69).

The relation of this with urban form is also a critical point for the food system, although in many papers, the spatial dimension is under-stressed or even entirely overlooked. Urban form, understood as the configuration of fixed metropolitan elements, comprises several important features of cities, including density, compactness and land-use (Lo, 2016), the importance of which is very considerable within the food system.

With respect to urban agriculture, and specifically to the practices of guerrilla gardening, Richard Reynolds' handbook 'On Guerrilla Gardening – A hand book for gardening without boundaries' (2008) presents an overview of this movement, as well as several important notions – both theoretical and practical – of these illegal proactive actions.

Although urban agriculture is also being studied by itself as a social and even political movement, there are many reasons why it would be so stressed in food system literature. One important aspect is that the production phase of the food system is where most environmental implications are located, including land-use, soil degradation, water consumption and pollution, eutrophication, biodiversity loss, and introduction of hazardous chemicals (Reisch et al, 2013). Furthermore, it is also at the production phase of the food system where most of the financial implications are located, in particular in what concerns the land which is needs for such activity. This is mostly depended on land values which greatly depends on the speculative market.

On the other hand, industrial agriculture itself is a problem in terms of metabolism, as it is mostly dependant on non-renewable energy sources (Erb et al, 2016) with deep implication in Net Primary Production – energy fixed by autotrophic organisms – which is at the basis of heterotrophic food chains and accumulation of carbon stocks in soil (Erb et al, 2016). Discussions of urban agriculture are usually considered for themselves, with livestock being usually left out of any perspective for urban space (Reish et al, 2013; Brinkley, 2013). Furthermore, the general absence of the food system and urban agriculture from urban land

physically segregates consumption from production, leaving populations dependent on private-market food-outlets, and often adding to other social problems of poverty and access to land or housing (Purcell and Tyman, 2015; Cabannes and Raposo, 2013; Wekerle and Classens, 2015).

Moreover, from the perspective of labour challenges, since the 1970s, agricultural labour has been decreasing, to the point of near disappearance (Fischer-Kowalski, Haas, 2014). And with respect to architecture and urban planning, Viljoen and Bohn (2012) advance a new model for sustainable urbanism which prioritizes the creation of a 'productive multifunctional landscape' with spatial, social and environmental implications.

1.2. Methodology and structure of the article

This paper aims to clarify the important role which urban agriculture plays within the LMA. To do so, it confronts some of the problems stated in the Municipal Plans of the municipalities of LMA with actual initiatives that can be found on the territory. Our present analysis focus on three specific municipalities of LMA, namely Lisbon, Oeiras and Almada. For each municipality, we will analyse a specific urban agriculture initiative and identify what particular contributions they may provide for both improvement of urban structure and of urban socio-metabolism.

To do so, this paper is divided in four parts. After this introduction, section 2 presents a brief overview of Portuguese spatial planning, specifying the roles of the municipal and regional scales and observing how the food system is or is not present at these planning scales. The third section details the case-study of urban agriculture, confronting initiatives with spatial plans, but also with the issues identified in the above literature review. Section 4 includes the concluding remarks, as well as suggestions for how to acknowledge and incentivize the already existing initiatives analysed in the previous section.

2. Urban planning in Portugal

The current structure of spatial planning in Portugal has been fundamentally determined since the 1974 Revolution which overthrew a conservative dictatorship that had been in power since 1933. However, municipalities under the dictatorship had also produced spatial planning documents.

After the Revolution, the 1982 Law of Soils attributed to municipalities responsibility over their spatial planning, and two further Ground-Basis Laws for Spatial Planning were issued since, in 1998 and 2014. Within the structure of Portuguese spatial planning, the municipal level has a singular importance, since it is mandatory for each municipality to have an approved Municipal Plan, a *Plano Director Municipal* (PDM). This has been required since the first Portuguese Law of Soils was published in 1982. Since then, other planning scales such as the National, Regional, Intermunicipal and Interregional are also foreseen within the Ground Basis Law for Spatial Planning, but their preparation of approval is not systematic and sometimes are never fulfilled.

2.1. The Lisbon Metropolitan Area and its food system

The territory of the LMA comprises 18 municipalities – Mafra, Vila Franca de Xira, Sintra, Amadora, Lisbon, Odivelas, Loures, Oeiras and Cascais in the Northern Bank of Tagus river and Almada, Barreiro, Alcochete, Sesimbra, Seixal, Moita, Palmela, Setúbal and Montijo in

the Southern Bank of Tagus river. The Metropolitan Area is an administrative delimitation which was established in the early 1990s, extending for the Lisbon Region. Together, these municipalities totalize 3 015,24 km² and are home to 2 812 678 people, amounting to a population density of 935,8 hab/km². The Ground-Basis Law on Spatial Planning determines which soils must be classified as urban but also those that are rural. From the 18 municipalities of LMA, 17 include those both classifications of soil, while the Lisbon municipality comprises only the urban one.

In the transition from the 19th to the 20th century, the Lisbon municipality concentrated more than half of the population of the Lisbon Region, and at least 40% of its territory was agrarian, while the built environment amounted to only 16% (Niza et al, 2016). This territorial organization was not symmetrical to the social division of labour, as only 4% of the Lisbon population worked in agriculture, versus 17,3% who worked industrial jobs, and only 1% of Lisbon's food was produced within the city (Niza et al, 2016). Cereals, wine and olive oil, all important foodstaples of the Mediterranean diet, were all brought into the Portuguese capital from its surrounding municipalities (Niza et al, 2016). Also, within the Lisbon Region, about 1000 farms and about 200 gardens ensured the production of fruit and vegetables (Marat-Mendes et al, 2015).

The formation of the Municipal Plans dates back to the 1930s, when the Portuguese Government ordered new General Plans of Urbanization to organize the growth of cities with more than 2500 inhabitants. Nevertheless, a number of cities under such conditions, never witnessed the development of their plans. Furthermore, some regional plans would soon be drawn but not approved. A particularly important exception was the *Plano de Urbanização da Costa do Sol* (PUCS), a sub-regional plan which sought to develop the urban planning of the coast area located between Lisbon and Cascais. The PUCS infrastructure was designed by the French urbanist Alfred-Donat Agache in 1935-1936, including the first motorway built in Portugal, but it was Étienne de Gröer who would conclude the PUCS and design the Urban Plans for the urban centres along Costa do Sol, which would be concluded in 1946 and approved by the Portuguese Government in 1948 (Marat-Mendes, 2009). The PUCS remained active until the early 1990s (Pereira, 2009).

The strong relation between Lisbon and the remaining municipalities through the food distribution was indirectly acknowledged in the plans by Étienne de Gröer, within PUCS in particularly, at the neighbourhood scale, where Gröer applied the Garden City principles as proposed in England by the social reformer Ebenezer Howard (1902). The PUCS included urban settlements separated by rural belts, which included gardens and farms, all linked through a three-layered mobility system with motorway, highway and train (Marat-Mendes, 2009). Moreover, in his Masterplan for Lisbon, the *Plano Director de Urbanização da Cidade de Lisboa* (PDUCL), Gröer predicted the construction of council housing neighbourhoods, all designed by other architects and mostly inspired by the Garden City, but also by the Garden Suburbs designed by Raymond Unwin. In these Lisbon neighbourhoods, the preferred building type was the single-family detached house with a small front-lawn and a larger backyard meant for leisure and food-production (Marat-Mendes and Borges, 2019).

Although the PDUCL failed to be approved by the Portuguese Central State, a new Masterplan was prepared but also shared its unapproved fate. Such situation left Lisbon without an overall Planning instrument and driven by sporadic urban plans, for specific delimited isolated areas would govern Lisbon urban growth in a random manner (Marat-

Mendes and Borges, 2019). In the case of Lisbon, the 1950s and 1960s are a period of legal void in terms of planning, and the plans for further council housing start embracing the need for construction at a greater scale and with greater density. To this period correspond the urbanization plans for the Olivais area and for the Chelas Valley, both large-scale agrarian zones, converted into urbanized land (Marat-Mendes and Borges, 2019). Although all urbanization plans predicted the creation of green areas, these did not respond to any productive proposes, as they meant especially for landscaping and leisure of communities.

In the transition from the 20th to the 21st century, this situation changed dramatically, with a very significative increase of the urbanized land. This is closely related to the post-Revolution spatial planning structure, which established municipal planning, but left unresolved tensions between land-use regulations and private property rights (Mourão and Marat-Mendes, 2016). This has led to massive – and often unplanned – land-use conversions which translated into a significant loss of rural soils and a construction boom that eventually led to housing surplus and uncontrolled speculation (Mourão and Marat-Mendes, 2016). However, the LMA still comprises a significant amount of rural soil, and 740 000 tons of foodstuff were produced within it in 2015, against 3,7 million tons which are exported from other parts of Portugal and 5,4 million tons from other countries, mostly in Europe (Niza, 2017). To this, one may add that the LMA exports 4,7 million tons of foodstuffs for other parts of the country and 1,8 million tons for other countries (Niza, 2017). As such, the LMA is still a highly productive metropolitan area.

The dichotomy between productive and unproductive land has grown more polarized throughout, as green productive areas are classified as rural, but urban land in Lisbon can only comprise urban parks – essentially non-productive. This tendency responds to the paradigm inherent to the Ground-Basis Laws, which establish that urban land cannot be productive. As such, although urban agriculture has always existed within urban perimeters, including in Lisbon itself, its role is underacknowledged and its presence in urban planning is scant and difficult. Although most municipalities are creating urban agriculture parks, these are all small-scale and oriented towards leisure and landscaping, with few acknowledgements for its productive aspect (Marat-Mendes et al, 2018). Beyond these municipal initiatives, there are several examples of Guerrilla Gardens – both productive and unproductive gardens located in areas non designated for such activities (Reynolds, 2008) – in all LMA municipalities, the majority of which differ significantly from the municipal allotment gardens both in what regards their goals but also the design, showing that the role of agriculture within the urban land of the LMA may still be greater than previously acknowledged.

2.2. The municipal level

The PDM coordinates two lower scales for planning purposes, namely the Urbanization Plan, *Plano de Urbanização* (PU) and the Detailed Plan, *Plano de Pormenor* (PP). These lower scales must abide by the sets and rules of the PDM and are employed regularly for several kinds of construction work.

The PDM synthesizes the economic and social strategy for the development of a municipality in their spatial dimension. As such, it defines land-use partitions, areas for special programming, infrastructures and territorial management.

Although the PDM's were of strategic importance for the urban growth of Portuguese municipalities, the evolution of their implementation proved to be a difficult task. Although

each PDM should be rewritten every ten years, within the LMA, half of the current PDMs date back to the year 2000 and have not yet been revised. Moreover, contradictory interpretations of the relation between land-use regulations and private property have long allowed unplanned development in many Portuguese municipalities, the LMA included (Mourão and Marat-Mendes, 2016).

In spite of the Ground-Basis Law for Spatial Planning, PDMs in the LMA have been written throughout a wide timeframe, and thus they are meant to tackle local, territorial and socio-economic problems which may have changed greatly since their writing. Eight of the 18 PDMs are prior to the first Ground Basis Law (1998), five were approved in 2015, one year after the second Ground-Basis Law, leaving however unclear which Ground Basis Law have indeed guided them. Only one PDM was approved afterwards. While all municipalities include urban land, with the exception of Lisbon municipality, all include also other classes of land ranging from 'rural land' to other specifications such as agriculture, forestry, agroforestry, green protection and natural spaces.

Our analysis of the PDM's of the Municipalities has concluded that the food system is never directly mentioned in these planning instruments, although it is often implicit on dispositions related to rural land. Notably, most PDMs include agriculture where construction is not allowed; and natural spaces are placed in urban land, but essentially as a non-productive one.

In many PDMs, urban agriculture initiatives could be incepted into programmed reconversion of industrial facilities. Urban farms or gardens are mentioned in the PDM's of Lisbon, Cascais, Odivelas and Oeiras, but their value is never acknowledged as a productive one. Instead, it is regarded as a leisure outdoor activity.

The PDM of Oeiras indicates the allocation of spaces for biomass production in its Ecological Structure. In turn, the Vila Franca de Xira PDM, allows "industrial facilities for production, transformation and commerce of produces of agriculture, livestock and forestry" in some of its agricultural spaces. Commercial activities are usually allowed in urban land and often in industrial and forestry land. However, food-commerce is not distinguished from other types, although accounting for food-outlets would help municipalities keep track of food-access (Moudon et al, 2013) and identify where deficiencies are located.

Generally, urban farms are unacknowledged as opportunities for kickstarting a local short food-supply chain. Finally, there are abundant regulations for maintaining ecological balance and controlling the effects of automobility in public space, but no attention is given to the environmental benefits that could be drawn from such public and vacant spaces.

2.3. The regional level

As stated above, the regional level is predicted in the Portuguese spatial planning structure, but it is not mandatory. A further difference between the PDM and the *Programa Regional de Ordenamento do Território* (PROT) is that the former is binding for both public and private entities, while the latter only includes public entities. The first PROT for the LMA (PROT-AML) was written in 2002, but its revision never came to be approved.

Written in the early 2000s, PROT-AML aims to give the LMA an European and Iberian capital, taking advantage of the potentials of its geographic location for Euro Atlantic business (DGT, 2002), a goal which may have been interrupted by shifting political and financial conditions within the country from 2007 on.

The territorial strategy of the PROT-AML is based on reaffirming the central role of Lisbon within the metropolitan area, using its recently increased access to the Southern Bank of Tagus river to revitalize its critical areas. In the Northern Bank of Tagus river, the situation is more polarized, with the Amadora-Lisbon-Loures-Vila Franca de Xira belt in critical urban condition and the Lisbon-Oeiras-Cascais (former PUCS territory) in optimistic development. Extensive green areas are located in the more peripheral areas of Mafra, Sesimbra, Palmela and Montijo, countering the more densely urbanized areas (DGT, 2002). The PROT-AML also includes an Environmental Strategy, which acknowledges the quality of the metropolitan agrarian and forestry spaces, which are meant to be protected as a feature of local character against excessive urbanization or infrastructure needs (DGT, 2002). One way to ensure this protection is the Metropolitan Structure of Environmental Protection and Recovery, which must map and manage specific parts of the territory, but also promote adequate activities to integrate these areas into the remaining urban structure.

2.4. Food and urban planning – some questions

Despite the central importance of food in cities, its presence in spatial planning at both the regional and the municipal levels in LMA is indeed scant. Many municipalities have published specific programs which relate to the urban food system, including networks of urban allotment gardens, but these are not predicted in the PDMs and neither in the PROT for the LMA.

Given such absence, we submit that the best way to understand the role of the food system on a potential sustainable transition of the LMA territory is to ascertain how it relates to the needs and desires of local communities, many of whom have shown great resourcefulness and willingness to participate in food-production activities. Furthermore, we call for a recognition of the historical role of food in the territory and of how 20th century planning has determined the relations between urban spaces of consumption and rural spaces of production. As this polarization between urban and rural is implied in all PDMs of the LMA, but also on its PROT, we seek to confirm if this same polarization can be confirmed in particular places.

3. Urban agriculture

3.1. The Chelas Valley and the Condado Estate

The Chelas valley area, located in the Easter area of Lisbon Municipality, comprises a total of 510 ha of a territory, which was an agrarian area until the 1960s. At this point, the acute housing shortage felt in the city led the municipality to start an urbanization plan, whose final version would be coordinated by architect Francisco Silva Dias and concluded in 1964. This plan would be subject of a revision process throughout its implementation process, yet aspects such as infrastructure and public equipment came rather late and different from what had been originally planned, thus compromising its success (Heitor, 2001). Divided into six zones (two of which were subdivided in two), only Zones I, J and N2 were implemented according to the original plan, and the first two were occupied in the aftermath of the 1974 Revolution. Most occupants were immigrants from the former Portuguese colonies in Africa, and the Democratic State came to legalize their presence. However, without predicting the difficult social conditions that would result from fundamentally poor communities, instead of the mixed communities envisioned in the urbanization plan (Heitor, 2001).

From all the Zones in Chelas, Zone J was by far the most ill-reputed, associated with the anathemas of crime, unemployment and drug-trafficking (Heitor, 2001). The planners, Silva Dias and J.A. Lobo de Carvalho, conceived Zone J as a 'building-city', a megastructure based on a continuous plateau with services and commerce, above which housing slabs rose, designed by architects Tomás Taveira and Vítor Consiglieri. The whole estate included service areas, linked by pedestrian decks, which ensured a circulation system detached from the motorways.

Recently renamed as Condado Estate, the area underwent a rehabilitation project whose most important aspect was the demolition of the central slab in 2009. In the Chelas Valley, another important change was the creation in 2010 of the Chelas Valley Horticultural Park, which occupies an urban park between Zones N2 and N1. However, this Horticultural Park is much smaller than the large extensions of Guerrilla Gardens that remain within the Chelas territory.

The Condado Estate is surrounded by Guerrilla Gardens in its southwestern and north-eastern limits. They occupy the vacant areas meant to counterbalance the high-density of the housing slabs. With plots of varying size and generally structured in a very privatized and individualized manner, most are accessible from the outside, and there is very scant use of gated shared pathways between different plots. Limits between plots are very well established, including through wooden fences and walls constituted by recycled materials. Some fruit trees are scattered on the terrain, but they are not a dominant cultivation type here. Although some of the plots are generally abandoned, most of them are still in use, and their cultivation is especially of edibles.

The Condado Estate includes some commercial areas which sell foodstuffs, and it is nearby Zone O, which comprises the planned 'central area of equipment', also has supermarkets and other food venues. However, the Condado Estate is surrounded by large motorways with very few crossings and often without sidewalks. Pedestrian circulation is very difficult within Chelas itself, and also to the rest of the city. Moreover, given its high-density dynamics, the estate comprises a significant amount of public open space, but this is often used as parking space. Despite the presence of the gardens, and their proximity to some of the most difficult parts of the estate, urban agriculture was not contained in any rehabilitation programs.

Figure 1 The Condado Estate and its surrounding Guerrilla Gardens

3.2. Laveiras – multifunctionality, transportation

The Laveiras Housing Estate area is located in the Municipality of Oeiras. Its design was initiated in 1987 by Architects Pedro Viana Botelho and Nuno Teotónio Pereira and its construction ending dates from 1990. Comprising fifteen housing slabs with terraces on the ground- and first-floors, this neighbourhood was further on added to another estate, a set of seven housing towers designed by other group of architects. Separating the slabs from the towers is a commercial gallery on the ground floor of the eastern limit of the original estate. The whole neighbourhood is barely accessible from its western limit, where it is limited by a motorway with no sidewalk. Indeed, the only pedestrian link between Laveiras and the Oeiras centre (on the eastern side) is a single road cutting across neighbourhoods of single detached houses. The most acute problems with the Laveiras Estate are not related to the quality of housing or public space, but rather to accessibility issues. Inhabitants have no option but to move using car or bus, which links it only to the Oeiras municipality.

Furthermore, on its eastern and western limits, Laveiras is surrounded by green or vacant areas. It was in these free areas located in the western but mostly the eastern limit of Laveiras that Guerrilla Gardens have emerged. On the eastern limit, behind the south set of towers lies and defined by Estrada de Laveiras is the second and third set of gardens. The second comprises 12 metres wide plots which run until the creek further east. Plots are explored individually by families who live in Laveiras and are all cultivated and relatively dense. Separation between plots is mostly ensured through vegetation (sugar canes in

particular) and with reed skirting, sugar canes and assemblages of recycled wood and metal. Production is mostly for self-consumption and the land is owned by the Caxias Sports Association.

Another larger set of allotments starts behind the northern set of towers, with varied sized of plots, which are also explored by residents of Laveiras. Most plots are of rectangular form, perpendicular to the creek, but others have used the space located between the circulation pathway and the creek, which is usually narrow and long. Only a few plots are not cultivated, and most are cultivated with vegetables but also with fruit trees, especially in larger plots. Production is mostly for self-consumption and the land is privately owned and paid yearly between all the farmers/ gardeners who use it.

Figure 2 The Laveiras neighbourhood and its Guerrilla Gardens

3.3. Almada – access and renovation of the ecological structure

Almada is one of the LMA municipalities whose PDM was written prior to the Ground Basis Law, in this case in 1997. Although the next version of the PDM, which is currently under revision, is expected to devote an entire section to urban agriculture (Marat-Mendes et al, 2018), the current one does not mention urban agriculture at all. Specifically, the PDM is protective of Almada's green-fields but not attentive to agriculture.

Hortas de São João are a municipal allotment garden, implemented on land classified as channel-space for infrastructure. Around it, it has many housing blocks and detached houses

with gardens and yards of varying size. In all cases, these buildings are privately owned, as this is not a designated area for council housing. Also nearby is a large vacant space. As such, Hortas de São João are located in a very diversified urban context, ranging from high- to low-density, and in proximity to commercial activities and motorways. The allotments are owned and managed by the municipality, and the access of gardeners to such allotment requires a registration for a selection process. Then, each gardener whom have been granted authorization to work the allotment will be in charge to maintain its plot. Only biological agriculture is allowed, and the municipality provides workshops to inform about it. Fruit trees are not allowed in the plots, as these provoke shades. Therefore, a specific plot is designated for the cultivation of trees of all gardeners. Most gardeners are retired or unemployed, and the park includes some convivial areas and leisure spaces, meant for activities relatively dependant on the agricultural aspect of the initiative, like barbecues and picnics.

Unlike Guerrilla Gardens analysed so far, these plots are organized according to an orthogonal grid, a standardised composition unit and a properly installed irrigation network. The proximity to some housing blocks of different scales, from towers to cottages, has no particular impact in the design, although most farmers do live nearby.

However, it must be noted that plots here have varying size, ranging from 25 m2 and 125 m2, perhaps because a lot of them are attributed not to individuals but to families (Marat-Mendes et al, 2018). The rental value paid for each plot depends on its size, and plots are distributed firstly between candidates with financial difficulties. But, there are waiting lists of people wanting access to a plot that the municipality has not yet been able to respond to. However, the access conditions promote food security by prioritizing those whose access to food may decrease, but also promote socioeconomic variety by placing the park close to middle-class neighbourhoods. Almada has a long history of cooperative organizations, and the Municipality was run by a communist-leaning coalition between 1976 and 2013, which may explain the sensitivity of the municipality to the social role of urban agriculture.

Figure 3 – The São João Municipal Allotments in Almada

4. Discussion and concluding remarks

Planning instruments in Portugal generally understand agricultural activities as being rural ones, an idea which underlies the regional and all municipal plans within the LMA. The case-studies which we have here showed are only three of numerous examples within the urban perimeters of the LMA, many of which have already been documented (Cabannes and Raposo, 2013; Oliveira et al, 2017; Delgado, 2018; Dias, 2018; Marat-Mendes et al, 2018). Municipal initiatives have created horticultural parks whose focus is predominantly based on a leisure dimension, but which still provide a contribution for the recovery of productive space within cities. In the case of the examples we have here detailed, the productive activities are taking place on land where, less than a century ago, was of agricultural or forestry use.

Guerrilla gardens distinguish themselves for more adaptive and individualized appropriation of space, but they seem to play a particularly important role on social housing neighbourhoods whose regeneration is acknowledged in the PDMs, but also in general by the PROT-AML (Cabannes and Raposo, 2013; Marat-Mendes and Borges, 2019). The examples of the Condado Estate and the Laveiras neighbourhood do both refer to council housing areas, and even if the Guerrilla Gardens are a direct response to a sense of urban isolation and poor access to food, they still denote how citizens appropriate available space and, in doing so, may contribute to the sustainability and productivity role of the territory. In these areas, knowledge and practices typically associated with the rural realm re-emerge in

an urban context, changing the physical landscape. Furthermore, such knowledge and practices also change the social landscape, for they help inhabitants assessing their needs and struggling to be capable managers of urban space (Purcell and Tyman, 2015) and of the food system.

Such initiatives must also be acknowledged in terms of their environmental advantages, as they obviously bring people closer to the land and to the food production, a reality that has been long segregated from cities (Steel, 2008). They also help decrease dependency on the agri-food business and the access to fresh vegetables and fruit cultivated according to different knowledges (Cabannes and Raposo, 2013).

Urban agriculture examples must inform planning strategies, but more attention is needed to the productive dimension, rather than to the dominant leisure one, potential of it, as they bring advantages in terms of a more varied and food-secure city (Viljoen and Bohn, 2012). The existence of urban agriculture in the LMA, particularly considering the role of Guerrilla Gardens, must however be taken further, as a unique opportunity to conceive new conceptual frameworks that allow planning to come closer to societal demands (Webb et al, 2017).

In the LMA, there are several aspects of planning that can be changed towards a more sustainable model. In terms of metropolitan organization, the PROT-AML envisions a polycentric metropolitan area with compact centres. Agricultural and forestry activities are included in a Metropolitan Environmental Protection Structure, which despite its complexity presents no challenge to the urban-rural divide in most municipal plans – at the time and now. And while it proposes multimodal transportation systems, efforts are mostly directed at automobility.

Thus, despite its briefly stated commitment to sustainability, the PROT-AML seeks to develop the territory without calling into question the very opposition between urban and rural land. This however assumes an horizontal metabolism, with biomass entering urban perimeters from outside and with no use for waste agricultural activities. Our literature review (particularly Steel, 2008; Viljoen and Bohn, 2012; Reisch et al, 2013; Parham, 2016) would further suggest that a more sustainable approach (social and ecological one) would be indeed needed for cities to shorten their food systems and for production activities to move closer to urban areas, closing the gap between urban and rural. But so, would the three case-studies have described above. All are located in different contexts within the PROT – while the Chelas Valley is considered a critical urban area, both Oeiras and Almada are mover spaces of the region, indeed closer to the centre. Yet, the interest in urban agriculture in these three municipalities attest to an important degree of demand on the part of population who either rent an allotment from the municipality or create one for their own.

At the municipal level, a greater recognition is still needed for urban agriculture. Although many municipalities have advanced horticulture gardens programs, solutions are needed in terms of a greater variety of urban design solutions and land-use policy to optimize them and make more allotments available, but also to understand the role of Guerrilla Gardens play within specific urban areas. In isolated council housing neighbourhoods, they show a constructive approach from local communities to make better use of available space, while improving their own access to quality food. Policy on this subject must beware of the dubious implications of charging the urban poor with their own food security while

recognizing the contribution of urban agriculture to the sustainability of the territory by countering urbanization excess and adding new functionalities to specific areas.

There seems to be a gap between the aims and of Portuguese spatial planning instruments and some aspects of societal demand in the territory of the LMA. While PDMs and the PROT-AML all acknowledge the need for sustainable development, this seems to be only possible within a set of a-priori conditions. These include the maintenance of the urban-rural divide, by increasing density in already urbanized areas and controlling growth in rural peripheries who concentrate the majority of food-production activities. By finding ways to include food-production in urban perimeters, spatial planning would not only be responding to a societal demand, but also taking one step further into shortening the metropolitan food-supply chain, thus improving its social-ecological metabolism.

5. References

Bartlett, Jamie (2017) Radicals Chasing Utopia – inside the rogue movements trying to change the world, New York, Nation Books.

Brinkley, Catherine (2013) "Avenues into food planning: a review of scholarly food system research", International Planning Studies, Vol.18 No.2, 243-266.

Cabannes, Yves, and Isabel Raposo (2013) "Peri-urban agriculture, social inclusion of migrant population and Right to the City - Practices in Lisbon and London", City, Vol.17 No.29, 235–250.

Cohen, Nevin; Ilieva, Rositsa T. (2015) "Transitioning the food system: a strategic practice management approach for cities", Environmental Innovation and Societal Transitions, Vol.17, 199-217.

Delgado, Cecília (2018) "Contrasting practices and perceptions of urban agriculture in Portugal", International Journal of Urban Sustainable Development Vol.10 No.2: 170-185.

Dias, Ana M. (2018) The shape of food – an analysis of urban agricultural shapes in Lisbon's Greater Area, Unpublished MSc Thesis, Instituto Universitário de Lisboa – ISCTE, Portugal.

DGT – Direcção Geral do Território (2002) Plano Regional de Ordenamento do Território – Área Metropolitana de Lisboa PPROT-AML, Versão editada. In http://www.ccdr-lvt.pt/files/81360af5709e3ee6dc2e5860fd0869ff.pdf

Drago, Ana (2018) "This is what the democratic city is like: local democracy, housing rights and homeownership in the Portuguese constitutional debate", International Journal of Urban and Regional Research, Vol.41 No.3, 426-442.

Erb, Karl-Heinz; Fetzel, Tamara; Haberl, Helmut; Kastner, Thomas; Kroisleitner, Christine; Lauk, Christian; Niedertscheider, Maria; Ptutzar, Christoph (2016) "Beyond inputs and outputs: opening the black-box of land-use intensity", In Haberl, H.; Fischer-Kowalski, M.; Krausmann, F.; Winiwarter, V. (eds). Social ecology – society-nature relations across time and space, Switzerlans, Springer, 93-124.

Fischer-Kowalski, Marina; Haas, Willi (2014) "Exploring the transformation of human labour in relation to socio-ecological transitions", In Beblavý, M; Maselli, I.; Veselková, M (eds) Let's get to work! The future of labour in Europe – vol.1, Brussels, Centre for European Policy Studies, 56-84.

Fischer-Kowalski, Marina, and Weisz, Helga (2016) "The Archipelago of Social Ecology and the Island of the Vienna School", In Haberl, H.; Fischer-Kowalski, M.; Krausmann, F.; Winiwarter, V. (eds) Social Ecology, Switzerland, Springer, 3-28.

Heitor, Teresa Valsassina (2001) A vulnerabilidade do espaço em Chelas, Lisbon, Gulbenkian.

Howard, Ebenezer. 1902. Garden cities of to-morrow. London: Swan Sonnenschein.

Krausmann, Fridolin; Weisz, Helga; Eisenmenger, Nina (2016). "Transitions in sociometabolic regimes throughout human history", H. Haberl, M. Fischer-Kowalski, F. Krausmann, V. Winiwarter (eds) Social Ecology, Switzerland: Springer.

Lo, Alex Y. (2016) "Small is green? Urban form and sustainable consumption in selected OECD metropolitan areas", Land Use Policy, Vol.54, 212-220.

Marat-Mendes, Teresa (2009) "O PUCS e os vazios planeados. Novas oportunidades para o ordenamento sustentado da Costa do Sol". In Margarida Pereira (ed) O Plano de Urbanização da Costa do Sol - Uma visão inovadora para o território, Oeiras, Câmara Municipal de Oeiras, 92-122.

Marat-Mendes, Teresa (coord), Mourão, Joana; Bento d'Almeida, Patrícia; Niza, Samuel (2015). Water and Agriculture Atlas: Lisbon Region in 1900-1940, Lisbon, Instituto Universitário de Lisboa – ISCTE/ DINAMIA'CET-IUL.

Marat-Mendes, Teresa; Borges, João Cunha; Dias, Ana Mélice; Lopes, Raul (2018), Food system and Spatial Municipal Planning - analysis of its integration in the 18 municipalities of the Lisbon Metropolitan Area', presentation at Dinâmicas socioeconómicas e territoriais contemporâneas IV - ISCTE, Lisbon, December 17th.

Marat-Mendes, Teresa; Borges, João Cunha (2019). The urban planning transition history of the Lisbon Metropolitan Area, Proceedings of ASEOP 2019 Congress, Venice, July 10th.

Moudon, Anne V., Adam Drewnowski, Glen E. Duncan, Philip M. Hurvitz, Brian E. Saelens and Eric Scharnhorst (2013) "Characterizing the food environment: pitfalls and future directions", Public Health Nutr Vol.16 No.7, 1238-43.

Mourão, Joana, and Marat-Mendes, Teresa (2016) "Urban planning and territorial management in Portugal – Antecedents and impacts of the 2008 financial and economic crisis." In Jörg Knieling and Frank Othengraffen (eds) Cities in Crisis – Socio-Spatial Impacts of the Economic Crisis in Southern European Countries, London, Routledge, 157-171.

Niza, Samuel (2017) " O sistema alimentar no contexto do metabolismo urbano da Área Metropolitana de Lisboa", In Oliveira, R.; Amâncio, S.; Fadigas, L. (eds) Alfaces na avenida. Estratégias para (bem) alimentar a cidade, Lisbon, Universidade de Lisboa, Colégio Food, Farming and Forest, 42-47.

Niza, Samuel; Ferreira, Daniela; Mourão, Joana; Bento d'Almeida, Patrícia; Marat-Mendes, Teresa (2016) "Lisbon's womb: an approach to the city metabolism in the turn to the twentieth century", Regional Environmental Change Vol.16 No.6, 1725-1737.

Oliveira, Rosário; Amâncio, Sara; Fadigas, Leonel (eds) (2017) Alfaces na avenida. Estratégias para (bem) alimentar a cidade, Lisbon, Universidade de Lisboa, Colégio Food, Farming and Forest.

Parham, Susan (2016) Food and urbanism – the convivial city and a sustainable future, London, Bloomsbury.

Pereira, Margarida (2009) "O Plano de Urbanização da Costa do Sol – o pioneirismo de um plano sub-regional" In Margarida Pereira (ed) O Plano de Urbanização da Costa do Sol - Uma visão inovadora para o território, Oeiras, Câmara Municipal de Oeiras, 24-41.

Pothukuchi, Kamershwari; Kaufman, Jerome L. (2000) "The food system – a stranger in the planning field", Journal of the American Planning Association, Vol.66, No.2, 113-124.

Purcell, Mark, and Shannon Tyman (2015) "Cultivating food as a right to the city", Local Environment Vol.20 No.10, 1132-1147.

Reisch, Lucia; Eberle, Ulrike; Lorek, Sylvia (2013) "Sustainable food consumption: an overview of contemporary issues and policies", Sustainability: Science, Practice and Policy, Vol.9, No.2, 7-25.

Reynolds, Richard (2008) On Guerrilla Gardening - A Handbook for Gardening Without Boundaries, London, Bloomsbury.

Rogers, Richard (1997) Cities for a small planet, London, Basic Books.

Sonnino, Roberta (2019) "The cultural dynamics of urban food governance", City, Culture & Society, Vol.16, 12-17.

Steel, Carolyn (2013 [2008]) Hungry City – how food shapes our lives, London, Vintage Books.

United Nations. 2015. The 2030 Agenda for Sustainable Development - http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (Accessed 21-01-2019).

United Nations. 2016. Habitat III – New Urban Agenda - http://habitat3.org/wp-content/uploads/NUA-English.pdf (Accessed 21-01-2019).

Viljoen, André; Bohn, Katrin (2012) "Planning and designing food systems, moving to the physical", In Viljoen, A.; Wiskerke, J.C.S. (eds) Sustainable food planning: evolving theory and practice, Gelderland, Wageningen Academics.

Webb, R.; Bai, X.; Smith, M.S.; Costanza, R.; Griggs, D.; Moglia, M.; Neuman, M.; Newman, P.; Newton, P.; Norman, B.; Ryan, C.; Schandl, H.; Steffen, W.; Tapper, N.; Thomson, G. (2017) "Sustainable urban systems: Co-design and framing for transformation", Ambio, Vol.47, 57-77.

Wekerle, Gerda R. and Classens, Michael (2015) "Food production in the city: (re)negotiating land, food and property", Local Environment Vol.20 No.10, 1175-1193.

Winiwarter, Verena; Schmid, Martin; Haberl, Helmut; Singh, Simron (2016) " Why legacies matter: merits of a long-term perspective", In Haberl, H.; Fischer-Kowalski, M.; Krausmann, F.; Winiwarter, V. (eds) Social Ecology, Switzerland, Springer.

Wolman, Abel (1965) The metabolism of cities. Scientific American, Vol.213 No.3, 179-190.

Case Study Paper

URBAN POPULATION GROWTH AND THE GROWTH OF TOWNS AND CITIES IN INDONESIA

The Challenge of Non-Statutory Town Development

Fadjar Hari MARDIANSJAH, Department of Urban and Regional Planning, Universitas Diponegoro; Semarang, Indonesia

Paramita RAHAYU, Department of Urban and Regional Planning, Universitas Sebelas Maret; Surakarta, Indonesia

Deden RUKMANA, Department of Urban Studies, Savannah State University; Georgia, the USA

Abstract

This study examines the emergence of new tendencies in the current Indonesian urbanization process. The process is characterized by not only the development of large cities and mega-urban but also rapid development of many smaller cities and urban concentration. The latter includes the non-statutory towns in the territory of kabupaten. The rapid growth of towns and population, in addition to the huge number of accumulated urban population in kabupaten suggest that this type of urban concentration will play a more significant role in the future of urbanization and urban development in Indonesia. The development of these small towns and cities will also bring significant implications and challenges for central as well as local governments, including the government of the urbanized kabupaten, especially in improving the capacity to manage such emerging characteristics of development.

Keywords

Urban Growth, Urbanization, Non Statutory Town, Indonesia

1. Introduction

Urban population growth in developing countries has been one of the most important phenomena that bring very big challenges since the second half of the twentieth century (Cohen, 2004; McGranahan & Satterthwaite, 2014; UN, 2014; Jedwaba, et al., 2017). Very earlier study urbanization, suggest that the analysis of the urban population growth lead to the analysis on the process of urban concentration and development (Tisdale , 1942). Later, the study of urbanization became larger as the analysis of concentration then moved into regional or national development context (Friedmann, 1973).

Urbanization is favored because urban status tends to poses higher economic development potential and investment opportunity (Sircar, 2017; see also Ye and Xie, 2012). Urbanization has offered opportunities for economic development, welfare and quality of life for cities and regions, since the process play roles as transformative processes that brings about higher productivity to cities and strengthen the spatial structure of cities and regions in both internal and external context (UN-Habitat, 2016).

Some scholars argue that due to this positive affect of urbanization, this process is often established by government policies (Fan, 2013; Ye and Xie, 2012; Anderson and Ge, 2004). For example, rapid urbanization in India is claimed influenced by how the government intensively defined area as urban. In addition to statutory town like municipal cities that possess governing body, there are outgrowth or a dense settlements growing outside the boundary of statutory town; and census town (CT) or urban area on the basis of three criteria: total population, density, and percentage of male workforce in non-agricultural sector (Sircar, 2017). Census Town (CT) boosts the number of urban areas in India (Sircar, 2017).

Through different perspective, rapid urban growth, such as extended urbanization brings in social, economic, ecological, and governance conflict due to disparity of those aspects appear between the core city and the extended urban areas (Shatkin, 2019). Urban population growth particularly in the South has been also associated with concerns such as unemployment, poverty, disparities, inadequate infrastructure and housing. Obtaining a transformative role of the process requires a good capacity to manage the process, not only at the local level, but also regional and national level (Center for Strategic and International Studies/CSIS, 2015). With this regard, regional urbanization is argued as one way to understand regional disparity (Zhang and Han, 2009).

One of the problem of disparity between the core and the peripheral or extended urban areas is due to directive urbanization or urbanization because of re-classification. It is explained by the phenomenon of Census Town in Indian context (Pradhan, 2013). The conflict is due to the CT is governed by the rural government that possess different characters with the CT. Linking the CT with their urban core is proposed solution to deal with the disparity problems (Pradhan, 2013).

To benefit from such process, in-depth analysis is required. Furthermore, Soja (2011) also emphasized the importance of regional analysis of urbanization especially in recognizing the challenge of reconfiguration of metropolitan and regional modes of urbanization process, including their intercity connectivity and integrations to the global activities. Such analysis is also important to understand the spatial influence of regional urbanization to increase equal opportunities for the cities and the inhabitants. In this context, the study of urbanization has also linked to efforts in improving the roles of cities and other urban concentrations in creating welfares, better quality of life and performing sustainable development (UN-Habitat, 2016).

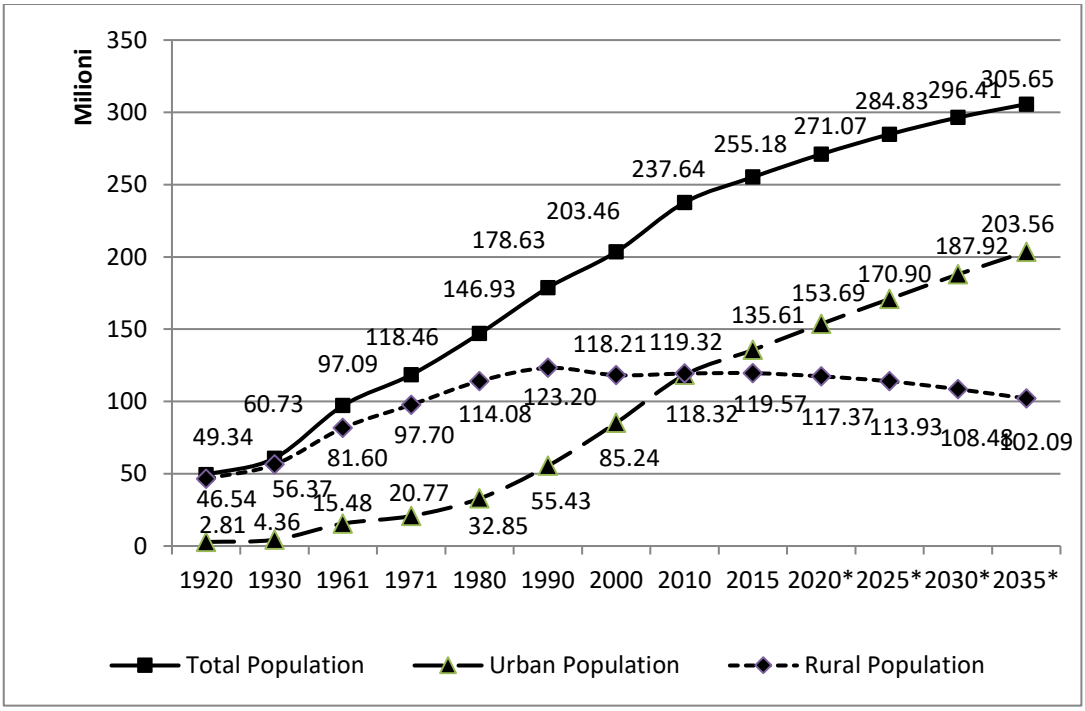
Similar to the global trend of urban population exceed 50% of the global population for the first time in history (UN, 2015), Indonesia experienced the same milestone in 2012 (Jones and Mulyana, 2015). Indonesian society has started predominantly urban. Today, the Intercensal-census 2015 shows that Indonesia is predicted to have 136.44 million urban populations that represent 53.1% of urbanization level (BPS, 2016). The number is about 50 times higher than 100 years ago. In the future, urban population in Indonesia is expected to increase rapidly with more than 203 million urban populations in 2035 with the level of urbanization about 66.6% (BPS, 2013).

Indonesia has also become a member of group of countries that have more than a hundred millions of urban population since the early year of the 21st century, with China, India and Japan in Asia(see UN, 2015). These figures show the great challenges in the future of urbanization processes in Indonesia. This article aims at examining urban population growth in Indonesia and its implication to Indonesian urbanization challenges. The analysis emphasizes on the urban population growth and its distribution among regions as well as among types of cities in Indonesia. The study applies statistical descriptive analysis, with statistical data withdrawn from national censuses. In doing so, the Indonesian territory will be divided into macro regions: Java, Sumatra and other regions.

The paper consists of five parts. Following the introduction, the concept of urbanization and global urban process as well as their challenges and implications will be discussed. The third part will discuss urban population growth in Indonesia as the case study. Subsequently, the important challenges of Indonesian urbanization process will elaborated. This section will be divided into four subsections: the rapid and significant increase, the spatial distribution, the increasing number of small towns and cities, and the increasing roles of non-statutory towns and cities in *kabupaten*. Finally, the paper will provide some conclusions.

2. Urban Population Growth in Indonesia and its Challenging Issues

Indonesia has experienced significant population growth since the last century. Between 1920, the first census in the Dutch colonial era in 1920, and 1961, the first national population census in the independence era, the population in Indonesia has been double from 40.34 million to 97.07. Later, according to the result of the 2000 national census, the population has been double again to 203.46 million. The last national population census in 2010 shows that the population was about 237.64 million and today according to the result of the 2015 intercensus population survey it is predicted to be 255.18 million with about 135.61 million urban populations in 2015 (see Figure 1). The latest number represents 53.1% of Indonesian population. definition, Indonesia is now an urbanized country (Poston and Bouvier's , 2010). With 3.5% annul urban population growth, Indonesia has experienced a much more rapid urban population growth than the world, Asia and Southeast Asia which have 2.05%, 2.50% and 2.53% of annual urban population growth rate respectively in 2010-2015 (UN, 2014). Bappenas (the National Development Planning Board of Indonesia), BPS (Biro Pusat Statistik or the National Bureau of Statistics of Indonesia) and the UNFPA have also projected that Indonesian will have more than 200 million urban population in 2035 (BPS, 2013).



Sources: Calculated from census data.

*Note: * = Calculated based on the results of Bappenas, BPS and UNFPA Population Projection in BPS, 2013*

Figure 1 Total urban and rural populations in Indonesia, 1920-2010 and 2015

Zhang and Deng (2016) argue that the Indonesian urbanization process has exceeded its peak after 1980s by defining the period of 1980s as the stage of extraordinary urbanization and the period of 1990s as the stage of urbanization adjustment. This paper argues that the period after 1980s and the later periods, after 1990s is more complicated considering the absolute number of urban dwellers will reach to nearly 3.5 million in 2000s and between 2010 and 2015. It is predicted that the period of 2010s is the decade when Indonesia will have the biggest number of additional urban population annually with more than 3.5 million per year from 2011 to 2020.

Indonesia will be expected to experience to have an average of 2.69 million of additional urban populations annually from 2010 to 2050 (UN, 2014). In this context, it can be considered that urban population growth and urbanization process in Indonesia is distinct and very important, since there are not many countries that have more than a million new urban populations annually, especially for decades. Indonesia places the fourth of thirteen countries, after India, China, and Nigeria, which have the kind of pressure at least until 2050.

The enormous number of additional urban inhabitants that need to be taken care of, has made Indonesia seems to have to build a large metropolitan every year in the coming decades. Certainly, Indonesia needs to develop urban infrastructure and services for its cities that most of them are still lacking. The development is not only important to respond the growing needs of the additional urban population, but also for the present and the future urban population and activities. The failure in responding these consequences will not only creates constraints in providing effective service deliveries as well as in performing economic growth (Lewis,

2014), but also will increase the slum formation in the rapid urbanization process that is not associated with economic growth and development (Quintana, 2016).

2.1. Uneven Spatial Distribution of Population Growth in Indonesia: The dominant concentration in Java

The population in Indonesia is not distributed evenly throughout the country. The results of the SUPAS or *Survey Penduduk Antar Sensus* (Inter-census Population Survey) in 2015 shows that Java remains the main concentration of the population. According to the latest census, there were 136.6 million or nearly 60% of the total populations live in Java. Sumatra and the other regions represents only about 20% of the total population. In terms of density, with an average of 136.8 people per square kilometer in 2015, Indonesia also has a high degree of heterogeneity too. Java has become the densest populated island with and an average population density of 1,120.3 people/km^2, while Papua has the lowest density with a density of 9.6 people/km^2. The second densest populated region is the Islands of Bali and Nusa Tenggara, with 717.7 people/km^2 as the density of Bali and 192.8 people/km^2 as the average density of the region. Meanwhile Sumatra, the second largest concentration in Indonesia, is only counted as the third densest populated region with an average density of 114.8 people/km^2. This considerable imbalance of spatial pattern of Indonesian population density shows that the magnitude of Indonesian population strongly remains in Java Island.

Province	Area (km2)	Urban Population	Urb. Pop Share	Total Population	% Urban	Pop. Density (inhab./km^2)
Java	129,438	90,825,696	67.0%	145,013,573	62.6%	1,120.3
Sumatra	480,793	22,848,775	16.8%	55,198,752	41.4%	114.8
Sulawesi	188,522	6,892,367	5.1%	18,702,298	36.9%	99.2
Kalimantan	468,682	6,864,938	5.1%	15,320,017	44.8%	31.3
Bali & Nusa Tenggara	73,070	5,998,627	4.4%	14,091,466	42.6%	192.9
Papua	418,708	1,191,056	0.9%	4,011,907	29.7%	9.6
Maluku	78,897	991,627	0.7%	2,844,131	34.9%	36.1
Indonesia	***1,965,709***	***135,613,086***	***100%***	***255,182,144***	***53.1%***	***129.8***

Sources: Calculated from SUPAS data, 2015

Table 2. Distribution of urban and total populations in Indonesia, 2015

Java keeps its share of 66 % of Indonesian urban population as it has been since four decades ago (see Table 5). What had been changed for Java is that the very rapid urbanization process in 1970s and 1980s increased the urbanization level of Java from merely 18 % to 25 % and it keeps on increasing afterwards. . The result of the 2000 population census indicated that Java has 49% for its urbanization level in 2000, while the other regions were still less than 35% at the time. Java is much more urbanized than other regions with a 62.6% of urbanization level in 2015 as the highest among regions in the country A more detailed comparison of Java and other island is shown in Table 2

Year	Java	Sumatra	Other Region	Indonesia
Number of Urban Population (people)				
1971	13,727,869	3,700,235	3,337,168	20,765,272
1980	22,926,377	5,481,488	4,437,964	32,845,829
1990	38,335,297	9,291,747	7,762,127	55,389,171

Year	Java	Sumatra	Other Region	Indonesia
2000	59,229,340	14,581,448	12,791,062	86,601,850
2010	79,949,854	19,787,628	18,582,774	118,320,256
Share of Urban Population (%)				
1971	66.1	17.8	16.1	100
1980	69.8	16.7	13.5	100
1990	69.2	16.8	14	100
2000	68.4	16.8	14.8	100
2010	67.6	16.7	15.7	100
Level of Urbanization (%)				
1971	18	17.7	15.4	17.5
1980	25.1	19.6	15.8	22.3
1990	35.7	25.5	22	30.9
2000	48.8	33.7	30.7	42
2010	58.5	39.1	36.9	49.8

Sources : Calculated from census data of 1971, 1980, 1990, 2000 and 2010.

Table 3. Distribution of urban population in three macro regions in Indonesia, 1971-2010

Regions	1971 - 1980		1980 - 1990		1990 - 2000		2000 - 2010	
	people	share	people	share	people	share	people	share
Java	1,022,056	**76.10%**	1,540,892	**68.40%**	2,089,404	**66.90%**	2,072,051	**65.30%**
Sumatra	197,917	**14.70%**	381,026	**16.90%**	528,970	**16.90%**	520,618	**16.40%**
Others	122,311	**9.10%**	332,416	**14.70%**	502,894	**16.10%**	579,171	**18.30%**
Indonesia	***1,342,284***	***100%***	***2,254,334***	***100%***	***3,121,268***	***100%***	***3,171,841***	***100%***

Sources: Calculated from census data of 1971, 1980, 1990, 2000 and 2010.

Table 4. Distribution of new urban dwellers in three macro regions in Indonesia, 1971-2010

These situations have lead Java can still keep its major share of urban population in Indonesia. It also could be predicted that Java will still got million new urban populations annually for the near future.

2.2. The Increasing Number of Cities, especially small size cities

The urbanization process in Indonesia has also increases the number of cities and towns. Table X indicates that the number of cities has increased from 50 cities in 1980 to 94 cities in 2010, while Table Y shows the order of cities more than 500,000 populations in Indonesia according to their inhabitants. The cities with less than 500,000 populations are not included in the Table Y since they are very dynamic and have many members. It is interesting to recognize that the increasing number of cities has been occurred especially after 2000. It influenced by to the opportunities introduced by the implementation of new decentralization scheme brought by the local government law no. 22/1999.

Type of cities	Number of cities and their population				Additional Population	Annual Growth
	1980	1990	2000	2010		
Large cities of 5 million or more	1 cities 6,503,449	1 cities 8,259,266	1 cities 8,384,853	1 cities 9,588,198	3,084,749	*1.30%*
Cities of 1 to 5 million	4 cities	5 cities	9 cities	10 cities	12,893,034	*3.94%*

Type of cities	Number of cities and their population				Additional Population	Annual Growth
	1980	1990	2000	2010		
	5,896,176	8,668,522	14,605,297	18,789,210		
Cities of 500 000 to 1 million	3 cities 2,008,005	5 cities 3,412,728	8 cities 14,605,297	16 cities 11,331,711	9,323,706	*5.94%*
Cities of 300 000 to 500 000	5 cities 2,035,601	8 cities 3,102,478	8 cities 3,301,576	8 cities 2,883,195	847,594	*1.17%*
Cities of 100 000 to 300 000	17 cities 3,264,373	23 cities 3,922,840	30 cities 5,685,731	48 cities 8,887,299	5,622,926	*3.39%*
Cities smaller than 100 000	20 cities 1,324,294	9 cities 565,092	7 cities 433,914	11 cities 745,581	-578,713	*-1.90%*
Total	50 21,031,898	51 27,930,926	63 47,016,668	94 52,225,194	31,193,296	*3.08*

Sources: Calculated from census data of 1980, 1990, 2000 and 2010.

Table 5. Number of cities and their population in Indonesia, 1980 to 2010

All of the cities in the list, except the DKI Jakarta, the largest city in Indonesia that has a status of a province of special region, are the cities with a status of *daerah kota*, the Indonesian term for cities with decentralized authorities. *Daerah kota*, which often call just as *kota* in daily practices in Indonesia, is one of the two Indonesian administrative divisions as the local autonomous regions at the lowest level, i.e. *daerah kota* and *daerah kabupaten* (or *kabupaten*). *Kota* is an Indonesian word which normally has the meaning of "city". Nonetheless, in the sense of the administrative division of Indonesian territory, it also has the meaning of "municipality", that is to say as the local Indonesian regions designated for the urban area. As an autonomous region, *daerah kota* that is ruled by *walikota*, or mayor, who is elected by the inhabitants of the city for five years, also has local parliament called the DPRD Kota (*Dewan Perwakilan Rakyat Kota*) whose members are also elected by the inhabitants for five years as well. Meanwhile, *kabupaten* is another local Indonesian region designated for non-urban constituencies, as most of their territory is non-urban land. The *kabupaten* is ruled by the *bupati* or the head of *kabupaten*, who is also elected by the inhabitants of the *kabupaten* for five years. As the local representatives, the *kabupaten* has an elected parliament, called the DPRD *Kabupaten* (*Dewan Perwakilan Rakyat Kabupaten*), whose members are also elected by the inhabitants for five years too. Yet, even if the *kabupaten* is designated for a non-urban area, there are many *kabupaten* who also have towns in some particular areas in their territory, as the result of development and urbanization process in their area.

Thus, in terms of urbanization discourse, both *kota* and *kabupaten* have their urban populations and activities reside in their territory. However, in contrast to the *kota* that has their own government institutions in order to take care of their authorities, including in dealing with the needs of urban development management, the towns in the *kabupaten* can be considered as non-statutory towns since they do not have any authorities as well as any institutions as their own, including the urban development institutions. So their need for urban development management is provided by any institutions belong to the government of the *kabupaten*. It is a pity that we do not have any supported data that can show the development of the number of the towns in the *kabupaten*, especially in a time serial manner, so the development of such number could not be figured out precisely as the development of cities that is presented in the Table 5.

One important feature of the Indonesian *kota* is that most of them could be categorized as small or medium size cities. Among 94 *kota* in 2010, there were only 11 cities categorized as cities with more than one million, and 16 cities of 500,000 to one million populations. Eight out of the eleven millionaire cities are located in Java, including five of them: Jakarta, Bekasi, Tangerang, Depok and Tangerang Selatan (plus Bogor that nearly have one million populations) are located in the Jabodetabek or Megaurban Jakarta, while six out 16 cities in the next size are located in Java.

The increasing number of cities, in terms of the creation of new *kota* (newborn cities) as new local governments is considered as an administrative and political process that is also part of the country's democratization process (Fitrani et. al., 2005). This reason is also happen for the new *kabupaten*. Therefore most of the new *kabupaten* and *kota* are created after 2000, the starting year of new decentralization era and democratization process in Indonesia. Meanwhile for towns it is mostly influenced by the Indonesian urbanization process that has been taking place at the regional level.

The process of the creation is known as *pemekaran* that is literally means 'blossoming' (Fitrani et. al., 2005), but Anne Booth (2011) prefers to call it as 'splitting' since the creation of new *kota* or *kabupaten* can be considered as a 'splitting' the new *kabupaten* or *kota* from their *kabupaten induk* ('mother kabupaten'). The number of local government in Indonesia increase from 259 consisted 49 *kota* and 210 *kabupaten* (exclude Irian Jaya or Papua) in 1961 to to 292 in 1998, and 434 in the end of 2004. In 2009, the number has become 495 consisted 98 *kota* and 397 *kabupaten* (Booth, 2011), and today the number has increased to 514 consisting 98 *kota* and 416 *kabupaten*. Most of the new local governments are located outside Java. Java has the least significant increase of the number of *kota*, from 20 in 1971 to 30 in 2010, while Sumatra from 20 became 34 in the same period. The outer region (the region outside Java and Sumatra) was the region that experienced the most rapid increase, from 10 to 30.

In Java, most of new *kota* created were big cities with more than 500 thousands and even more than 1 million population at the time they are initially created. Then, it is also interesting to know that all of the big and cities are located in western part of Java, surrounding the Jakarta area, the densest populated region, which consists of the Provinces of DKI Jakarta, Jawa Barat and Banten. In contrast, most of the new *kota* outside Java consist of less than 200 thousands populations cities, when they were created. These phenomena have also shown the high influence of Java, especially Jakarta, into the characteristic of urbanization process in Indonesia that creates uneven urban growth among Java and the rest of the islands in Indonesia.

1980	1990	2000	2010
Large cities of 5 million or more			
DKI Jakarta	DKI Jakarta	DKI Jakarta	DKI Jakarta
Cities of 1 to 5 million			
Surabaya	Surabaya	Surabaya	Surabaya
Bandung	Bandung	Bandung	Bandung
Medan	Medan	Medan	Bekasi
Semarang	Semarang	Bekasi*	Medan
	Palembang	Palembang	Tangerang
		Semarang	Depok
		Tangerang*	Semarang

1980	1990	2000	2010
		Depok*	Palembang
			Makasar
			Tangerang Selatan*
Cities of 500 000 to 1 million			
Palembang	Makasar	Malang	Batam*
Makasar	Malang	Bogor	Bogor
Malang	Bandar Lampung	Bandar Lampung	Pekanbaru
	Padang	Padang	Bandar Lampung
	Surakarta	Pekanbaru	Padang
		Banjarmasin	Malang
		Denpasar*	Denpasar
		Samarinda	Samarinda
			Tasikmalaya*
			Banjarmasin
			Balikpapan
			Pontianak
			Serang*
			Cimahi*
			Jambi
			Surakarta

Sources: Calculated from census data of 1980, 1990, 2000 and 2010.
Note : The asterisk indicates the city was a newborn city

Table 6. List of Cities of more than 500 populations in Indonesia from 1980 to 2010

Among the six types of Indonesia cities according to their population, the cities of 500,000 to one million, cities of 1 to 5 million and cities of 100,000 to 500,000 populations seem to be the types of cities that have rapid growth of their population (see Table X). The first type of cities has grown from four cities in 1980 into ten cities in 2010 with nearly 13 million additional populations and an average rate growth of 3.94% annually. In fact, among the six new member of this type of cities, there were only Palembang and Makasar (see Table Y) that have grown and promoted from the cities of less than 1 million in the previous period, while the other four cities were newborn cities that are created from the *pemekaran* from its *kabupaten*, i.e. Kota Bekasi from the part of *Kabupaten* Bekasi in 1997, Kota Tangerang and Tangerang Selatan from *Kabupaten* Tangerang in 1993 and 2008 respectively, and Kota Depok from *Kabupaten* Bogor in 1999. All of these cities created from the main urban areas of their *kabupaten*. One important feature of these *pemekaran* is all of the newborn cities were cities of more than 1 million populations just when the cities created. So, their influence to the population growth as well as the additional population to the type of cities were very important, as if the influence of the newborn cities is excluded from the calculation then the annual population growth of this type of cities will only become 1.35% per year and the additional dwellers only about 2.9 million urban population, a similar level to those of the large city of Jakarta in the same period. Similarly, the type of cities of 500,000 to 1 million has also influence from the creation of newborn cities (see Table Y), as Kota Batam was created in 1999, Denpasar in 1992, Tasikmalaya in 2001, Serang in 2007 and Cimahi in 2001, and only nine cities that have grown from the cities of less than 500,000 populations. In this regards, their urban population growth was only 1.98% annually without the influence of these newborn cities.

The same influence of the presence of newborn cities has also happen in other types of cities. Even the cities of 100,000 to 300,000 populations has the biggest number with 25 newborn cities, while the cities of 300,000 to 500,000 have only four newborn cities, and the cities with less than 100,000 populations have only six newborn cities. Therefore if we do not count the influence of the presence of the newborn cities, we will have different figures of which type of cities that have more rapid urban population growth than others. The analysis shows that the cities of 100,000 to 300,000 population is the type of cities with the most rapid growth with an average rate of 2.77% per year, and the cities with less than 100,000 populations is the next with an average of 2.65% per year, while the cities of 300,000 to 500,000 is the slowest grown with an average of 1.18% per year. These figures show that the small cities with less than 300,000 populations could be said as the type of cities that grown fastest.

3. The Formation of Urban Region

In addition to increase the number of cities, particularly the smaller size of cities, urban population growth in Indonesia has also triggered complex spatial processes that lead into the formation of urban regions. In Java, the most densely populated region that also the place where Indonesian urbanization process is concentrated, the formations are not only occurred in the very big cities like Jakarta, Bandung and Surabaya as the main urban concentration in the island. The formations are also happened in some much smaller cities, as is shown by the Table 7 and Table 8. In addition to the very big urban region of Megaurban Jabodetabek that has nearly 30 million urban populations today, Java has also some large metropolitan, i.e., Metropolitan of Bandung Raya and Metropolitan Surabaya that has more than five million urban populations each, four metropolitans with 2 to 5 million urban populations each (Semarang, Malang, Surakarta and Yogyakarta), four metropolitans with 1 to 2 million urban populations, five urban regions with 500,000 to 1 million urban populations, and two urban regions with less than 500,000 urban populations

Region	Urban Population (people)				Urban Growth (%)	Share (%)	
	1980	1990	2000	2010	1980-2010	1980	2010
1. Megaurban Jabodetabek	***7,782,469***	***13,096,673***	***18,167,494***	***25,923,037***	***4.09%***	***100,0***	***100,0***
In the core areas (DKI Jakarta)	*6,480,654*	*8,227,746*	*8,361,079*	*9,607,787*	*1.3%*	*83.3%*	*37.1%*
In the peripheries	*1,301,815*	*4,868,927*	*9,806,415*	*16,315,250*	*8.8%*	*16.7%*	*62.9%*
- the west peripheries (Bekasi Areas)	228,162	1,520,837	3,266,664	5,413,132	11.1%	2.9%	20.9%
- the east peripheries (Tangerang Areas)	188,668	1,152,883	2,631,542	4,443,001	11.1%	2.4%	17.1%
- the south peripheries (Bogor Areas)	884,985	2,195,207	3,908,209	6,459,117	6.9%	11.4%	24.9%
2. Metropolitan Badung Raya	***2,099,892***	***3,349,995***	***4,792,806***	***6,548,327***	***3.9%***	***100,0***	***100,0***
In the core areas	*1,461,407*	*2,058,122*	*2,136,260*	*2,394,873*	*1.7%*	*69.6%*	*36.6%*
In the peripheries	*638,485*	*1,291,873*	*2,656,546*	*4,153,454*	*6.4%*	*30.4%*	*63.4%*
3. Metropolitan Surabaya	***2,581,984***	***3,660,295***	***5,297,677***	***6,316,557***	***3.0%***	***100,0***	***100,0***
In the core areas	2,017,527	2,473,272	2,599,796	2,765,487	*1.1%*	*78.1%*	*43.8%*
In the peripheries	564,457	1,187,023	2,697,881	3,551,070	*6.3%*	*21.9%*	*56.2%*
4. Metropolitan Semarang	***1,289,008***	***1,746,977***	***2,256,867***	***2,891,293***	***2.7%***	***100,0***	***100,0***
In the core areas	*1,024,957*	*1,250,971*	*1,348,803*	*1,520,481*	*1.3%*	*79.5%*	*52.6%*
In the peripheries	*264,051*	*496,006*	*908,064*	*1,370,812*	*5.6%*	*20.5%*	*47.4%*
5. Metropolitan Malang	***704,975***	***1,130,034***	***1,693,709***	***2,157,237***	***3.8%***	***100,0***	***100,0***
In the core areas	*510,906*	*695,089*	*742,263*	*820,243*	*1.6%*	*72.5%*	*38.0%*
In the peripheries	*194,069*	*434,945*	*951,446*	*1,336,994*	*6.6%*	*27.5%*	*62.0%*
6. Metropolitan Surakarta	***772,129***	***1,176,365***	***1,834,189***	***2,130,073***	***3.4%***	***100,0***	***100,0***
In the core areas	*469,532*	*504,176*	*490,214*	*499,337*	*0.2%*	*60.8%*	*23.4%*
In the peripheries	*302,597*	*672,189*	*1,343,975*	*1,630,736*	*5.8%*	*39.2%*	*76.6%*
7. Metropolitan Yogyakarta	***570,853***	***1,235,182***	***1,697,581***	***2,148,223***	***4.5%***	***100,0***	***100,0***
In the core areas	*398,192*	*412,392*	*396,744*	*388,627*	*-0.1%*	*69.8%*	*18.1%*
In the peripheries	*172,661*	*822,790*	*1,300,837*	*1,759,596*	*8.1%*	*30.2%*	*81.9%*

Sources : Calculated from census data of 1980, 1990, 2000 and 2010

Table 7. Urban population growth in large urban regions in Java from 1980 to 2010

Region	Urban Population (people)				Urban Growth (%)	Share (%)	
	1980	1990	2000	2010	1980-2010	1980	2010
1. Metropolitan Cirebon	***459,918***	***868,330***	***1,354,999***	***1,883,821***	***4.8%***	***100,0***	***100,0***
In the core areas	*223,504*	*254,477*	*272,263*	*296,389*	*0.9%*	*48.6%*	*15.7%*
In the peripheries	*236,414*	*613,853*	*1,082,736*	*1,587,432*	*6.6%*	*51.4%*	*84.3%*
2. Metropolitan Tegal	***502,061***	***1,012,893***	***1,543,807***	***1,800,862***	***4.3%***	***100,0***	***100,0***
In the core areas	*131,440*	*229,713*	*236,900*	*239,599*	*2.0%*	*26.2%*	*13.3%*
In the peripheries	*370,621*	*783,180*	*1,306,907*	*1,561,263*	*4.9%*	*73.8%*	*86.7%*
3. Sukabumi Urban Region	***324,370***	***453,714***	***760,679***	***1,279,379***	***4.7%***	***100.0%***	***100.0%***
In the core areas	*109,898*	*119,938*	*252,420*	*298,681*	*3.4%*	*33.9%*	*23.3%*
In the peripheries	*214,472*	*333,776*	*508,259*	*980,698*	*5.2%*	*66.1%*	*76.7%*
4. Cilegon Urban Region	***139,984***	***269,096***	***753,523***	***1,224,477***	***7.5%***	***100,0***	***100,0***
In the core areas	nd	nd	294,936	360,125	*2.0%*	*58.0%*	*29.4%*
In the peripheries	139,984	269,096	458,587	864,352	*6.3%*	*60.9%*	*70.6%*
5. Kediri Urban Region	***301,201***	***469,179***	***761,834***	***949,221***	***3.9%***	***100,0***	***100,0***
In the core areas	*221,636*	*249,538*	*244,519*	*268,507*	*0.6%*	*73.6%*	*28.3%*
In the peripheries	*79,565*	*219,641*	*517,315*	*680,714*	*7.4%*	*26.4%*	*71.7%*
6. Pasuruan Urban Region	***258,404***	***408,697***	***677,415***	***847,996***	***4.0%***	***100,0***	***100,0***
In the core areas	*93,366*	*152,075*	*162,521*	*186,262*	*2.3%*	*36.1%*	*22.0%*
In the peripheries	*165,038*	*256,622*	*514,894*	*661,734*	*4.7%*	*63.9%*	*78.0%*
7. Pekalongan Urban Region	***270,883***	***432,983***	***618,151***	***708,369***	***3.3%***	***100,0***	***100,0***
In the core areas	*132,413*	*242,874*	*262,272*	*274,839*	*2.5%*	*48.9%*	*38.8%*
In the peripheries	*138,470*	*190,109*	*355,879*	*433,530*	*3.9%*	*51.1%*	*61.2%*
8. Probolinggo Urban Region	***159,696***	***283,151***	***432,133***	***567,142***	***4.3%***	***100,0***	***100,0***
In the core areas	*100,152*	*176,906*	*156,657*	*196,957*	*2.3%*	*62.7%*	*34.7%*
In the peripheries	*59,544*	*106,245*	*275,476*	*370,185*	*6.3%*	*37.3%*	*65.3%*
9. Blitar Urban Region	***152,626***	***271,087***	***379,242***	***554,531***	***4.4%***	***100,0***	***100,0***
In the core areas	*78,381*	*118,933*	*119,372*	*131,968*	*1.8%*	*51.4%*	*23.8%*
In the peripheries	*74,245*	*152,154*	*259,870*	*422,563*	*6.0%*	*48.6%*	*76.2%*
10. Magelang Urban Region	***221,462***	***291,110***	***398,438***	***449,731***	***2.4%***	***100,0***	***100,0***
In the core areas	*123,358*	*123,213*	*117,531*	*118,227*	*-0.1%*	*55.7%*	*26.3%*
In the peripheries	*98,104*	*167,897*	*280,907*	*331,504*	*4.1%*	*44.3%*	*73.7%*
11. Madiun Urban Region	***206,522***	***246,802***	***314,830***	***364,431***	***1.9%***	***100,0***	***100,0***
In the core areas	*150,260*	*170,050*	*163,956*	*170,964*	*0.4%*	*72.8%*	*46.9%*
In the peripheries	*56,262*	*76,752*	*150,874*	*193,467*	*4.2%*	*27.2%*	*53.1%*

Sources: Calculated from census data of 1980, 1990, 2000 and 2010.

Table 8. Urban population growth in smaller urban regions in Java from 1980 to 2010

Firman (2016) argues that the period of 1980s to 2000s are the period of mega-urbanization of Java with the phenomena of development of the Megaurban Jakarta, Bandung and Surabaya. The high population density that make the concentrated urbanization possible to be happened in Java and the enormous annual absolute increase bring fundamental basis for

the occurrence of the development of urban region formation that have based on not only in big cities in the form of megaurban or large metropolitan formation, but also in some much smaller cities in the form of small and medium size metropolitan. The development of urban region formation has shift many of urban activities, especially residential, manufacturing and services, from the cores into the fringe areas that brought a great expansion of the urban areas, that later also brought some urban environmental and also issues like traffic jams, flood problems, high intention of ground water utilizations, the appearance of urban heat problems, as well as crimes, poverties, social exclusions and other inequalities in the urban life of every urban region.

Most of the processes are influenced by the limited ability of the core areas in providing space for activities to the growing population and urban activities in these urban areas. The limited provision of spaces in the core areas resulted in high prices of land in the areas, which encouraged many growing activities, especially housing and industrial activities, tend to move out of the city to find cheaper land prices. In the small city-based urban region formation, the development of these formations are also influenced by the narrowness of the administrative area of the city that play as the urban core, which is supported by the availability of regional roads that provide good access for the growing activities outside the city boundaries. As the result, the urban areas expanded beyond the city's boundaries into the peripheries, which are usually the jurisdiction of neighborhood *kabupaten*, which is followed by the formation of small towns and cities in the territory of the *kabupaten*. Even, in the case of Jakarta and Bandung, the process has also created newborn big or millionaire municipalities. In this regard, thus, the formation process of urban region could also be seen as one of the influential factor for the urbanization process in many *kabupaten*.

It is also interesting to know that the development of urban region formation outside Java is not strong as its appearance in Java yet, as today they are only appear in Medan Metropolitan Region in North Sumatera, Metropolitan Makassar in South Sulawesi, and Metropolitan Denpasar in Bali. Meanwhile in Java, their emergence is relatively evenly distributed, as the two largest urban regions, i.e. Jabodetabek and Bandung, are located in western part of Java, and the third and fifth largest, i.e., Surabaya and Malang, are located in eastern part, and the other three large metropolitan, i.e., Semarang, Surakarta and Yogyakarta, are located in central part of Java. In addition, in term of coastal and inland area, even though two out of the three largest, i.e. Jabodetabek and Surabaya, are located in the coastal area, there is Bandung that is located in an inland area. Moreover, three out of four other large urban regions (Malang, Surakarta and Yogyakarta) are located in inland areas, and six out of eleven smaller urban regions are also not in coastal areas.

4. The Increasing Roles of Non Statutory Towns and Cities in *Kabupaten*

Another important feature in recent Indonesian urbanization process is the increasing roles of the *kabupaten* in welcoming urban population growth. As shown in Table 9, the high increase of the number of *kota* or municipalities was not followed by the increase of their share in accommodating urban population in their areas. Instead of increasing, the role of municipalities has declined. The role has decreased from 71.5% of the national urban population in 1971 to only 44.2% in 2010, even though the number of *kota* or municipalities has been double in the periods and the number of urban population of municipalities has also

increased from 15.9 million to 52.3 million. The decreasing role of the municipalities was, in fact, due to the more rapid increase of the urban population in *kabupaten, which* increased from 5.9 million (28.5%) in 1971 to 66.1 million (55.8%) in 2010 (see Table 4). In this context, it indicates that the process of urbanization in Indonesia brings urban areas in *kabupaten* have become the main place for urban population growth in Indonesia.

Year	*Kabupaten*	Share (%)	Kota	Share (%)	Total	Number of Kota	% Urban
1971	5,912,294	**28.5**	14,852,978	**71.5**	20,765,272	**50**	**17.5**
1980	14,048,324	**42.8**	18,797,505	**57.2**	32,845,829	**50**	**22.3**
1990	29,267,080	**52.8**	26,122,091	**47.2**	55,389,171	**51**	**30.9**
2000	49,083,721	**56.7**	37,518,129	**43.3**	86,601,850	**63**	**42**
2010	66,059,240	**55.8**	52,261,016	**44.2**	118,320,256	**94**	**49.8**

Source : Calculated from census data of 1971, 1980, 1990, 2000 and 2010

Table 9. Distribution of urban population and among kabupaten and kota, 1971 – 2010

The increasing urban population in *kabupaten* has led to the increasing the number of urbanized *kabupaten*. According to the result of the national census 2010, there were 33 *kabupaten* in Indonesia that more than half of their populations reside in their urban places that consist of 21 *kabupaten* in Java and 12 *kabupaten* outside Java. Moreover, there were also three *kabupaten* (Garut of West Java, and Malang and Jember of East Java) that have more than one million urban population although their urbanization level were still less than 50%. Kabupaten Bogor could be considered as the biggest urbanized kabupaten since it has more 3.8 million urban population in 2010, followed by *Kabupaten* Bandung (2.7 million), Tangerang (2.3 million), Bekasi (2.1 million), Sidoarjo (1.7 million), Cirebon (1.6 million), Deli Serdang of North Sumatra (1.4 million), Karawang (1.3 million), and so on. The existence of the very big number urban population in their territories could be seen as important reason that makes them, as well as other urbanized *kabupaten*, need to have good effort in managing their urbanization process.

It is also interesting to know that there were 11 *kabupaten* that have very high urbanization level with more than 75% of urbanization level that consist of nine *kabupaten* in Java and two *kabupaten* outside Java. The western part of Java, which consists of the DKI Jakarta, West Java, and Banten Provinces, is the micro region where the urbanization process has much more been concentrated. This region has biggest number of very high urbanization level *kabupaten* with more than one million urban populations, i.e., Bogor, Bekasi and Tangerang that play as the peripheries of DKI Jakarta, and Bandung and Bandung Barat that play as the peripheries of Metropolitan Bandung. In fact, these *kabupaten* have spawned newborn big or even millionaire municipalities. Moreover, this region has also other *kabupaten* Cirebon, Karawang and Garut that have also more than one million urban populations each. Kabupaten Karawang could be regarded as part of the large corona in the Megaurban Jabodetabek, since it is located adjacent to *Kabupaten* Bekasi that is being a part of the peripheries in the megaurban. Meanwhile, Kabupaten Garut is part of the large corona in the Metropolitan Bandung as its location adjacent to *Kabupaten* Bandung, the peripheries in the metropolitan, and *Kabupaten* Cirebon is the periphery of *Kota* Cirebon, in which both of them form Cirebon Metropolitan.

Kabupaten	Urban Population	Percentage Urban	Number of *Kecamatan*	Number of Urban *Kecamatan*	Range of Population	
					Smallest	Largest
West Java Province						
- Bogor	3,770,213	79.0%	40	31	40,013	309,918
- Bandung	2,673,499	84.1%	31	27	36,529	220,762
- Bekasi	2,108,130	80.1%	23	16	37,253	417,008
- Cirebon	1,587,432	76.8%	40	36	12,888	72,036
- Karawang*	1,268,086	59.6%	30	12	38,817	145,215
- Garut*	1,043,517	43.4%	42	15	25,142	117,726
- Bandung Barat	938,778	62.2%	16	8	53,619	147,797
- Purwakarta*	458,599	53.8%	17	6	29,314	165,447
Banten Province						
- Tangerang	2,324,209	82.0%	29	23	38,437	227,634
Central Java Province						
- Tegal	811,372	58.2%	18	10	40,094	109,035
- Banyumas*	807,607	52.0%	27	12	27,894	233,951
- Klaten	759,450	67.2%	26	18	15,233	57,958
- Jepara*	656,570	59.8%	16	8	28,842	98,054
- Pemalang*	636,977	50.5%	14	7	24,201	147,087
- Sukoharjo	632,367	76.7%	12	8	15,348	127,886
- Kudus*	600,965	77.3%	9	7	54,208	99,466
- Pekalongan	433,530	51.7%	19	8	20,435	79,797
Yogyakarta Province						
- Bantul	761,396	83.5%	17	12	26,228	120,015
- Sleman	998,200	91.3%	17	16	18,534	181,490
East Java Province						
- Malang	1,166,046	47.7%	33	14	19,861	140,403
- Jember	1,018,122	43.6%	31	10	23,695	116,032
- Sidoarjo	1,772,043	91.3%	18	18	31,373	228,818
- Jombang*	746,272	62.1%	21	12	25,980	137,233
- Gresik	703,912	59.8%	19	8	22,340	112,755

Source : Calculated from result of 2010 census.

Note : The asterisk indicates that the kabupaten is not adjacent of any city.

Table 10. Urban population and it concentrations in urbanized kabupaten in Java, 2010

The regional urbanization process taken place into the *kabupaten* has also triggered many town formations in the territory of *kabupaten*, as results of the population densification as well as the nonagricultural activities development that lead to rural-to-urban reclassification process of villages in the *kabupaten*. Although Firman (2003) argued that the growth of the urban population in Indonesia has strongly influenced by the growth of large cities in the predominantly agricultural regions in the corridors of the regional roads that connect the large cities of Java, the rural to urban reclassification processes are not only happened in villages of the *kabupaten* located in adjacent to large cities but also in villages in the *kabupaten* around

much smaller size of cities, including in those that are not adjacent to any cities like in Karawang, Garut and Purwakarta of West Java Province, in Banyumas, Jepara, Pemalang and Kudus of Central Java Province, and Jombang of East Java Province. The densification process as well as the development of urban activities changed the previously rural areas into more urbanized areas and form urban areas in the *kabupaten*'s territory, in both small and large size. Firman (2016) said that in Java alone, the number of villages classified as urban village has increased from 7510 villages in 2000 to 9239 villages in 2010.

Kabupaten	Urban Population	Percentage Urban	Number of Kecamatan	Number of Urban Kecamatan	Range of Population	
					Smallest	Largest
Region of Sumatra						
Deli Serdang of North Sumatera	1,355,844	75.7%	22	11	38,201	340,844
Bengkalis of Riau	249,446	50.1%	8	2	37,577	183,567
Belitung of Bangka Belitung	90,557	58.1%	5	1	86,031	86,031
Belitung Timur of Bangka Belitung	62,448	58.7%	7	4	7,042	28,922
Karimun of Riau Archipelago	130,443	61.4%	9	4	20,855	39,190
Bintan of Riau Archipelago	86,331	60.7%	10	4	10,633	37,197
Region of Other Islands						
Badung of Bali	443,699	81.7%	6	5	52,017	104,934
Gianyar of Bali	322,025	68.5%	7	5	27,021	87,680
Klungkung of Bali	87,651	51.4%	4	2	23,016	46,605
East Lombok of NTB	555,562	50.3%	20	10	24,707	76,741
Berau of East Kalimantan	89,688	50.1%	13	2	14,141	62,725
Mimika of Papua	123,425	67.8%	12	2	10,662	106,529

Source : Calculated from result of 2010 census.

Table 11. Urban population and it concentrations in urbanized kabupaten outside Java, 2010

In terms of town formation, a detail study using three rapidly urbanized *kabupaten*, i.e., Kabupaten Tegal, Malang and Purwakarta show that all of the urban villages in a *kabupaten* will not agglomerate into single urban area (Mardiansjah, 2013). The wide area of the *kabupaten*'s territory, where the agricultural land is often still dominating the land have made the reclassification process only occurred in some particular villages that mostly are influenced by two factors, i.e., the history of the villages as service centers and the potential of the villages as the place of development. Most of the villages that reclassified as the initial urban villages are the villages that play role as the place of service center like the market place or other services like educational or health services. Meanwhile, the availability of regional road that connecting the villages to the surrounding urban centers as well as its distance, and the availability of potential economic activities are parts of the potential of the villages as the place of development. Therefore, instead of to be agglomerated into single urban area, in most cases, urban villages of the *kabupaten* agglomerated into some town (urban areas) with varying sizes of tows.

Table 10 and Table 11 show the number of urbanized *kecamatan*, a territorial subdivision of kabupaten, with the range of population size in every urbanized *kecamatan* for every urbanized *kabupaten*. In fact, the number of urbanized *kecamatan* is not the same with the number of town formed in the *kabupaten*. For example *Kabupaten* Tegal that has 10 urbanized

kecamatan (see Table 10) has five towns in the territory, since six *kecamatan* agglomerated into two relatively big towns with a population of about 200,000 and 300,000 respectively, and other two other *kecamatan* agglomerated into one town with 80,000 populations and the rest two *kecamatan* form their own town; *Kabupaten* Malang that has 14 urbanized *kecamatan* has nine small and medium sized towns (30,000 to 200,000 dwellers); and *Kabupaten* Purwakarta that has six urbanized *kecamatan* has two small and medium sized tows ((60,000 and 210,000 respectively). Nevertheless, the number of urbanized *kecamatan* could be seen as an indicator that most of urbanized *kabupaten* have several towns formed in their territory with varying size but significantly comparable to the population of many cities in Indonesia.

4.1. Some Important Challenges of Urbanization of *Kabupaten* in Indonesia

Previous discussion argues that urban population and urbanization process in Indonesia has not only intensified the urban challenges in large cities but also emerge the in much smaller size town and cities. The challenge in the small and medium cities is coming from the rapid growth of its population as well as increasing number of the type of cites, in both types: cities of 100,000 to 300,000 populations and cities with less than 100,000 populations. Especially for those located in Java, these type of cities has also experienced a process of urban region formation, in which the urban population growth take place beyond the city's border and go to the surrounding *kabupaten* that lead into a rural-to-urban reclassification process in some particular villages where the urban population growth of *kabupaten* took place. In these regards, Firman (2016) argues the process is a kind of urban conurbation process of the large cities that has led the urban population growth occurred not only in the city core area but also extended to the peripheries, the territory of *kabupaten*. Firman (2016) also argued that the rapid growth of urban population in the *kabupaten* was the part of the mega-urbanization process in Indonesia (or in Java) that similar to other large cities in Asian countries. However, the presence of the rural to urban reclassification process has not only occurred in some *kabupaten* adjacent to large cities, but also in many *kabupaten* adjacent to much smaller cities and even in some *kabupaten* that are not adjacent to any cities, in Java and outside Java.

The different characteristic of Java to other regions, i.e., a very high population density, has led into different characteristics of urbanization processes from those outside Java. In Java, the urban conurbation processes have been occurred in both small and large cities, and even happened in some particular not-adjacent-to-any-cities *kabupaten*. These phenomena have also shown the different characteristics of urbanization in Java as an urbanization process that has been appeared in a regional level, which then brought significant differences in the number of urbanized *kabupaten* as well as in the urban population size among urbanized *kabupaten* among in Java and in other regions. In Java, the number of urbanized *kabupaten* is much bigger than those outside Java; and also the urban population size (see Table 10 and Table 11).

In these phenomena, later the role of cities in accommodating urban population growth has been decreasing. Their role that was receiving more than 70% of urban population until 1971 has decreased into less than 50% in the late of 1980s. In the opposite, the role of *kabupaten* in accepting urban population has increased from less than 30% in 1971 to more than 50% starting 1990, even though it was slightly deceased from 2000 to 2010 as there were some *pemekaran* some *kabupaten* into *kota* that also reclassified some urban dwellers of *kabupaten* into those of *kota*. Today, there are more than 66 million people live in towns in *kabupaten*, while about 52 million people reside in cities in Indonesia.

The increasing role of *kabupaten* is considered to bring some important challenges in the urbanization process. The first challenge is coming from the large number of urban population involved in urbanization process in the *kabupaten*, which is not only in terms of the total number of urban population living in *kabupaten*, but also in terms of the number of urban population in some particular *kabupaten*. According to the result of the 2010 census, there are ten *kabupaten* (nine *kabupaten* in Java and one *kabupaten* in Sumatra), which have more than one million urban inhabitants. Some of them have more than two million urban inhabitants, like *Kabupaten* Bogor with 3.8 million urban dwellers, *Kabupaten* Bandung (2.7 million), Kabupaten Tangerang (2.3 million), and Kabupaten Bekasi (2.1 million). There are also 21 *kabupaten* that have around 500.000 to one million urban inhabitants in their territory. These figures indicate that many *kabupaten*, especially those located in Java, could also have big challenges in dealing with their urbanization process in their territory in order to respond their urban population growth.

The second challenge comes from the spatial characteristic of urban population concentration in *kabupaten* that is different from urban concentration in municipalities. Urban population in most *kabupaten* rarely concentrated in a single urban concentration, but commonly in more than one urban concentration with varying size that each of them is significantly comparable to that of the municipality. Most of them consist of the capital of the *kabupaten* and other urban concentrations, which are developed from existed rural centers (Mardiansjah, 2013). The large number of urban concentrations in *kabupaten* will also bring challenges for the *kabupaten's* institutions since they should take care of many towns in their territory in addition to their obligation in managing their regional as well as rural development processes.

The last important challenge comes from the nature of *kabupaten* that is designated as the local government for non-urban region as the complementarity of *kota* (municipality) that is designated for the urban region. As the implication, most of the government of *kabupaten* is not well prepared to implement well management of urban development processes as well as their implications. It is indicated by the absent of some institutions or services that specifically dedicated for managing urban development process such as city planning department/services, building control and supervision institution, and fire department in many *kabupaten* including in the urbanized *kabupaten*. Usually the functions of the absent institutions are performed by a division or even a section of certain institution. Thus, most of the functions are not run well since they are implemented by a lower echelon that means with smaller staffs, smaller financial resources, smaller technical capacities and also smaller decision powers.

These challenges come from the nature of towns in *kabupaten* that can be classified as non-statutory ones. Since towns in *kabupaten* are the part of the *kabupaten*, they do not have their own authorities as well as their own resources, including human, financial, tools as well as decision powers, as all of the resources and authorities belong to the *kabupaten*. Therefore, all of the towns highly depend on the *kabupaten*'s institutions that should also take care of the *kabupaten*'s regional development as well as the rural development as most of *kabupaten* have non-urban areas as the majority of their administrative territory.

5. Conclusion

Located in the place where global urbanization grows rapidly, the Indonesian urban population growth and urbanization process become one of the significant processes that should be better understood and managed in order to take benefit from the inevitable process. The approach developed in this study provides insights into the importance of Indonesian urbanization process that has potential to be experienced by other developing countries in the south: the significant number of urban population involved, the spatial concentration of urban growth that remains to be concentrated in the main region, and the small towns and cities, including those the non-statutory, that should be given more serious attention in order to bring better management in their urban development process.

Although the pace has eased in the last few decades, the challenges brought by the urbanization process in Indonesia could not be considered to have diminished as well. Instead, the challenges will be greater in the future, since the number of annual number of new urban population involved continues to increase until the next decade and will only slightly decrease in the next few decades. This will bring some important changes in the country, as it has changed the population of the country into a predominantly urban society and has led Indonesia to become a member of group of countries that have more than one hundred million urban populations.

In addition to increase the size of some main urban agglomerations, like Jakarta that has grown as the Jabodetabek or the Jakarta Metropolitan Region (JMR), the megacity with a population of more than 25 million of urban inhabitants, including in both in the core and in the peripheries, there is a great tendency that urbanization process in Indonesia takes also place in much smaller town and cities that also developing, reforming, and reproducing small towns in the territory of *kabupaten*. These phenomena will lead into new challenges in urban future in Indonesia, as the phenomena do not only involve enormous number of population, but also large number of *kabupaten* as well as the number of the towns. The solution is considered will not only involve a capacity building for the *kabupaten* in managing their urban development process, but also need a fundamental political will for political and administrative rearrangement that provide better authorities, tools and mechanisms, especially for the urbanized *kabupaten*, in dealing with their urbanization process and urban growth. Furthermore, the solution is considered to need spatial affirmative policies that can accelerate a more balance development and urbanization processes throughout regions in Indonesia.

6. References

Anderson, G, and Ge, Y. (2005) “The size distribution of Chinese cities”, Regional Science and Urban Economics, Vo. 35 Issue 6 (November).

Cohen, B. (2004) “Urban Growth in Developing Countries: A Review of Current Trends and a Caution Regarding Existing Forecasts”, World Development, Vol. 32 Issue 1 (January).

Fan, C.C. (1999) “The Vertical and Horizontal Expansions of China's City System”, Urban Geography, Vol. 20 No. 6. (August).

Jedwaba, R., Christiaensen, L., Gindelskya, M. (2017) “Demography, urbanization and

development: Rural push, Urban Pull and… Urban Push?", Journal of Urban Economics. , Vol. 98 (March)

McGranahan, G., Satterthwaite, D.(2004) Working Paper : Urbanisation Concepts and Trends, London :IIED.
http://pubs.iied.org/10709IIED

Pradhan, K.C.(2013) Unacknowledged Urbanisation: The New Census Towns of India. Munich Personal RePEc Archive. New Delhi: Centre For Policy Research.

Shatkin, Gavin (2019) "The Planning of Asia's mega-conurbations: contradiction and Contestation In Extended Urbanization",International Planning Studies, Vol. 24 No. 1 (January).

Sircar, S. (2017) "'Census Towns' in India and what it means to be 'urban': Competing epistemologies and potential new approaches", Singapore Journal of Tropical Geography Vol. 38 No. 2 (March).

United Nations (2015) World Urbanization Prospects: The 2014 Revision *(ST/ESA/SER.A/366)*, New York: Department of Economic and Social Affairs, Population Division.
https://esa.un.org/unpd/wup/publications/files/wup2014-report.pdf

Ye, X and Xie, Y. (2012) "Re-examination of Zipf's law and urban dynamic in China: a regional approach",The Annals of Regional Science, Vol. 49 No. 1 (August)

Zhang, Li and Han, Sun Sheng (2009) "Regional disparities in China's urbanisation An examination of trends 1982–2007", International Development Planning Review. Vol. 31 (December)

Case Study / Project

The Smaller Town

as Component of an Urban Settlement Cluster

Derry O'CONNELL

Abstract

In Ireland rejuvenated town clusters gather together interactive settlements in a rapidly emerging metropolitan alternative to either the city or the rural lifestyle. A similar trend is observable in many countries where quality of life in a settlement of smaller scale can exceed that in the city. The concept of nucleated settlement has made planning sense for centuries, but where unique individual settlements can be related and co-ordinated with efficient connection, by recent advancements in rapid sustainable transportation, there may now be a clear role for the smaller settlement and its defined hinterland. Traditional settlements carry the advantage of place-rich heritage, identity, proximity to the natural environment and human scale. Modern transportation systems now give them connection to the essential shared services of other places. While the traditional town which serves this cluster concept brings the stability of established place, evidence now shows however that it must adjust to develop a different operational structure in the service of its role within a broader settlement framework.

This paper draws on a five-year study of sixty-six urban settlements in Ireland illustrating how the structure, layout and operation of the traditional settlement is adjusting to become a modern part of a semi-dispersed settlement network. Each town is taking a place in this route-linked strategy, each having a function and identity in a composite framework which is now bonded across distance by an emerging hierarchy of efficient connections. Reworking of the fabric of towns towards a new role has introduced a range of new relationships between modern operational structures and traditional urban frameworks. Findings have revealed such details as the inverting relationship between street and block, as towns collectively adjust to new scales of use, particularly in a changing global retail interface. The research has taken a morphological approach using such techniques as cartographic regression (Kropf 2017) and review of development activity, relating towns to each other by comparing their timelines of change (Field and Morse 1985). The work has also embraced significant engagement with municipal authorities.

Research Paper

AN ANALYSIS OF THE CHANGING ROLE OF ISTANBUL AS A MEGACITY IN THE WORLD

Muhammed Ziya PAKÖZ (Gebze Technical University, Faculty of Architecture, Department of City and Regional Planning, mzpakoz@gtu.edu.tr); Turkey

Ahmet BAŞ, (Abdullah Gül University, Faculty of Architecture, Department of Urban and Regional Planning, ahmet.bas@agu.edu.tr); Turkey

Fatih EREN (Konya Technical University, Faculty of Architecture and Design, Department of City and Regional Planning, feren@ktun.edu.tr); Turkey

Abstract

Istanbul is a unique part of the world because of not only its history, but also its function as a bridge from the point of economic, social and cultural interrelations. There are many cities, which are settled near a water source; however, Istanbul is the only city that is settled between two continents and two seas. All these features create some opportunities and threats for the city in terms of hinterland relations and the spatial structure.

This paper aims to find out the economic, social and cultural impact of globalization on the spatial structure and the hinterland relations of Istanbul while discussing the city's contradictory positions as an edge of Europe and as a bridge between the East and the West. Within this scope, we made a multiscale analysis considering inter-regional and inter-urban relations and their socio-spatial imprints within the boundaries of the city. Firstly, we made a comparative analysis to understand the changing position of Istanbul in the world in the 21st century by using global and regional indexes. Secondly we examined the change in the hinterland relations of the city by investigating the flows of people, goods, services and ideas between other regions / cities and the city of Istanbul in time. Thirdly, we traced the spatial imprints of these flows and interactions within the city in terms of relocations and displacements.

Our study shows the growing importance of the city not only as a part of Europe but also as a node and bridge for the globalized world while emphasising socio-cultural and socio-economic tensions within the city as a result of this process.

Keywords

Istanbul, globalization, global city indexes, spatial structure, hinterland relations.

1. Introduction

Istanbul is one of the fastest-growing metropolitan areas not only in its region but also in the world. It functions as a bridge in terms of social, economic and cultural flows and transitions between continents as well as the cradle of human civilization.

Despite the changing of the capital from Istanbul to Ankara in 1923, Istanbul achieved to sustain its role as "the nation's industrial and business centre, greatest port, the focus of transportation network and the centre of cultural and intellectual life" (Göymen, 2008). For

the last decades, Istanbul attracts millions of people from different regions in Turkey as well as from the other near and far countries from Asia to Africa (Table 1).

Table 1: Population change in Istanbul, the Marmara Region and Turkey from 2000 to 2018 (TurkStat, 2019).

	2000	2005	2010	2015	2018
Istanbul	11,076,840	12,128,577	13,255,685	14,657,434	15,067,724
Marmara Region	17,829,639	19,467,417	21,285,696	23,403,950	25,034,570
Turkey	64,729,501	68,860,539	73,722,988	78,741,053	82,003,882

Istanbul is located in the middle of the Asia, Africa and Europa. Just in a three hours flight, it could be reached 1.5 billion people. Besides Turkish Airlines (THY) widens its hinterland and starts to flight more than 350 destinations in the world. This makes Istanbul more accessible from any point of the world.

On one hand, Istanbul is an *"avantgarde"* city for Turkey and its region. Economic impact of Istanbul is very high. According to the Turkish Statistical Institute (TurkStat), 43% of the total taxes are collected and 55% of economic activities are produced in Istanbul. Together with adjacent cities (Kocaeli and Tekirdağ) in the metropolitan region, this ratio reaches more than 50% of taxes and 65% of economic activities in Turkey. Additionally, more than 13 million tourists visited the city in 2018.

On the other hand, not only the city of Istanbul and the rural towns within the boundaries of the city, but also other cities in Turkey and near countries such as Balkan and Middle East as well as Africans, which play an essential role supporting and providing resources of foods, labour, industrial activities, raw materials and so on to the city of Istanbul.

As well as economic situation, social and cultural transition between the different groups makes the city unpredictable core of the region. Different ethnic/religious groups and immigrants live in the city together. Beyond all that, Istanbul is a big exporter of the Turkish TV series to the neighbours of the country especially in the Middle East and the Balkans.

In this paper, we examined how globalization process affected the city's socio-economic and socio-political position within the world, and how this change influenced socio-spatial processes within the city. In the second chapter following the introduction, the most popular global city indices including Istanbul were picked and the changing position of Istanbul in the world has been scrutinized. In the third chapter, changing hinterland relations of the city in terms of flows of people, capital, goods, services and ideas/cultures; and their socio-spatial imprint within the city were discussed.

2. The Changing Position of Istanbul in the World

Istanbul is included in almost all international studies comparing world cities. The main cities where Istanbul is compared in various categories in the Global City Indices are New York, London, Tokyo, Paris, Frankfurt, Zurich, Dubai, Beijing, Seoul, Hong Kong, Bangkok, Singapore, Sydney, Vancouver and Los Angeles. These cities both share and compete with each other in the world city network.

Istanbul attracts people from almost every point of the world. The recognition of a global city encourages international organizations to think and produce new projects in that city. According to the Global Power City Index (2018), cities like Doha, Dubai, Beijing and Bangkok make great efforts to attract people's attention, while Istanbul can naturally attract people without special effort. Istanbul is the 34th most powerful city in the world, with high global accessibility and a preferred stopping point for international travel (MMF, 2018). Istanbul is an advantageous transfer and maintenance point in terms of location for both air passengers and airline companies in long-distance transfer flights in the east-west and north-south axis in the world. Istanbul has a strong transportation and communication infrastructure. Ongoing and planned large-scale regional transport projects strengthen the infrastructure and renewal of Istanbul and neighbouring cities. The city has something to appeal to everyone in the world. According to Kearney's Global Cities 2019 Report, Istanbul ranks 26th among 135 most influential global cities (Kearney, 2019).

The business world in Istanbul is very active and lively. The indices reveal that Istanbul can attract qualified people from Turkey and abroad. This is a very important feature for Istanbul, because the performance of global cities is rapidly increasing when it can attract a qualified young population from the world to live and work. According to the JLL Global 300 Cities Index, Istanbul ranks 17th in terms of population, 13th in terms of economic size and 19th in terms of commercial attractiveness among 300 global cities (JLL, 2019).

Istanbul's foreign trade volume is around 195 billion dollars (TurkStat, 2016). According to the data of the Ministry of Commerce, Istanbul exported USD 34 billion and imported USD 57 billion in 2018 (Ministry of Commerce, 2018). With these characteristics, Istanbul is one of the 20 most important business and trade cities in the world according to the 2016 Commercial Attraction Index. In addition, for many years, Istanbul has been shown as one of the leading investment cities by all credit rating agencies. According to World Bank 2015 data, with an economic size of 349 billion dollars, Istanbul has a larger economy than 130 countries in the world (for example, Pakistan, Chile, Ireland, Finland, Portugal and Greece). Having a stock exchange in global city indices is shown as an element that reveals the economic impact power of a global city. In this context, the presence of BORSA İSTANBUL adds a great strength to the economic attractiveness and image of the city. The cost of living in Istanbul is relatively low compared to many global cities (eg Dubai, New York, etc.). In the 2018 survey of the Mercer company, which ranked 209 global cities according to the high cost of living, Istanbul was ranked 154th. According to UN Habitat Urban Data 2016 data, food and clothing prices, urban transportation costs, urban utility bill costs and leisure time costs are among the factors that reduce the cost of living.

The quality, speed and environment of hospital services in Istanbul are better than all other global cities (Numbeo, 2019). The number of visitors to the city to receive qualified health services and treatment has increased in recent years. Compared to many global cities, there are many historical and natural areas to visit in Istanbul (and nearby neighbouring cities). These features make Istanbul stand out in the global competition and make it strong.

According to the global city index data, there are two important issues that have left Istanbul weaker in global competition. First, Istanbul is not yet able to produce sufficiently effective projects and projects on environment, energy and waste. There is a need to make strong moves in the city in terms of clean energy, environment and recycling, not only in order to

be ahead of the economic race, but also to make Istanbul a liveable place for both people and other living things. Evaporation increases, scarce ground and surface water resources decrease, water quality decreases, vegetation cover changes, and seasonal imbalances in temperature and rainfall amounts occur due to global climate change and global warming. Like many other world cities, Istanbul is also affected from changing environmental conditions. Protecting natural resources and nature should be kept on the agenda as much as economic development in Istanbul in order to prevent Istanbul from being affected by climatic changes and global warming in a longer term. Turkey has its signature under the international agreement on global climate change. Therefore, the country must adopt a strong attitude on this issue. The lack of open and green spaces in the city and the intense structuring in Istanbul are the major factors that downgrade Istanbul in global city indices.

Second, Istanbul (including patent, utility model, trademark, industrial design and registration) is unable to produce enough original information and manage the global flow of information. According to the Networked Society City Index 2016, which researches the sustainable development of global cities in the information and communication sector, Istanbul is the 22nd most integrated city in the global network and its performance in this area is rapidly increasing (Ericsson, 2016). The inability to keep the circulation of useful information around the world is the biggest obstacle for Istanbul to become a leading and efficient city in the world in terms of R & D studies and patents.

Istanbul, whose transportation and communication infrastructure has been renewed, strengthened and expanded year after year, has the potential to be a central city that manages all global flows between the three continents. Anatolia and Turkey's European territory of the new road, sea, rail and air are connected with the new projects. This facilitates and accelerates the flows of people, goods, services, information and finance between Europe, Asia and Africa.

Not only in terms of land transportation, but also in terms of air transportation, Istanbul has a great importance both at national and international level (Eren, 2018). Turkey's air cargo operations are mainly carried out via Istanbul and Marmara region. Istanbul Atatürk Airport ranks 30th in the airport rankings according to cargo traffic in the world. Due to its location, Istanbul can reach most of the continents of Asia, Europe and Africa within a short flight distance of three hours. Istanbul New Airport will make Istanbul the centre of both the country and the region in terms of air cargo logistics. With an annual cargo capacity of 6 million tons, the new airport crosses Hong Kong, Memphis, Shanghai, Seoul, Dubai, Tokyo and Frankfurt airports in terms of volume. The fast connection of the new airport by road and sea, and the strong integration of transportation in the city are of great importance in terms of the international competitiveness of the new airport.

There are many large-scale transportation and infrastructure investments in Istanbul. These investments increase the interaction and trade relations of Turkey with Asia, Middle East, Mediterranean and the European countries and relieve Istanbul's urban transport and traffic. Istanbul is a consumption and distribution focus where 53% of the production of logistics activities occurs in Turkey. These activities contribute 32 billion TL annually to the national economy (IBB, 2017). Therefore, Istanbul is the most important locomotive city in the development of trade, industry, finance and tourism sectors.

With the Istanbul Stock Exchange, Istanbul is Turkey's main financial centre. However, the city aims to become an international financial centre. This objective is clearly emphasized in the 2009 Strategy and Action Plan, the Vision 2023 document and the 10th Development Plan. In line with this objective, the international financial centre, which has a physical infrastructure in Ataşehir, is expected to provide new jobs for 30,000 people. In 2016, 104,000 people are employed in finance and insurance activities in Istanbul. Therefore, there are 7 jobs per 1000 people in the financial sector in Istanbul. This ratio is below the average standard in international financial centres. Therefore, the financial sector in the city needs to be expanded by following a special strategy. If the financial and insurance sector in Istanbul grows by 4.7% each year, in 2036 a total of 261,000 people will become employable in the sector. When Istanbul's capacity in the financial sector increases, this will also help the growth of other sectors in the country.

Istanbul has the potential to become a headquarters for financial investors in the Arabian Peninsula, the European Union and Russia. This can be achieved by creating the most advanced technological infrastructure in Istanbul, facilitating access to innovative technology and reducing costs.

For foreign investors, Turkey is considered as a country that is difficult to do business. The World Bank Ease of Doing Business Index based on 2017 data, Turkey is ranked 69 among 190 countries. Unfortunately, the new investment incentive system does not include incentives for the rapid growth and internationalization of high value added sectors such as finance and IT in Istanbul.

Istanbul is a national and international trade centre. 69 out of every 1000 people in the city are employed in wholesale and retail trade sector. This ratio shows that Istanbul is behind Dubai (94) but ahead of Hong Kong (68) and Singapore (63) to become a global commercial centre. Istanbul is also very close to its competitors in the food and beverage sector. In 2016, 284,000 people are employed in this sector in Istanbul. Therefore, 19 out of every 1000 people work in this sector. 25 out of every 1000 people in Singapore and 29 out of 1000 people in Dubai are employed in this sector. Istanbul has the potential to attract many more international students in the higher education sector. Today, 25,000 teaching staff is employed in this sector.

To sum up, Istanbul has a number of strong points/advantages to compete with other global cities such as its location, transport infrastructure, young population, and lower costs of living while it has some weaknesses to eliminate such as its environmental conditions, quality of life and lack of innovations to lead the world.

3. The changing hinterland relations and socio-spatial organization

3.1. Flows of people: Demographic transition

Turkey was mostly “a country of emigration” during the second half of the 20th century. From the beginning of the 21st century, the country has become a cross-road point not only for irregular migrants from Asian countries such as Afghanistan, Pakistan, Bangladesh, Iraq, Iran but also for EU specialist and retirees and regular/irregular migrants from the former Soviet Bloc countries.

Turkey signed Convention Relating to the Status of Refugees in 1951. Today, Turkey, known as migration and asylum country for many years due to policies, are faced with difficulties. However, Turkey's traditional immigration policy nowadays, nation-building concerns, and maintaining a homogeneous national identity was largely shaped by efforts. Turkey's immigration policy in recent years, necessitate the replacement of traditional policies (Kirişçi, 2007).

In 1923 (the proclamation date of the Turkish Republic) the city of Istanbul had a nearly 700.000 population. Its growth continued relatively until the 1970s, when it reached about two million (TurkStat, 2018). After that, accelerated economic development, which fuelled strong internal migration especially from the middle and eastern Black Sea and Eastern Anatolia regions of Turkey, led to a rapid expansion of both population and built-up area. By the end of 2018, the city had a population of more than 15 million on a territory that covers 5.461 km^2. Currently, about two-thirds of the population (9 million) live on the European side, and one-third (6 million) across the Bosporus on the Anatolian side (TurkStat, 2018).

While there were 20 universities and 198.612 students (associate-bachelor-master-doctorate) in Istanbul in the 2000-2001 education period, the number of universities increased to 57 and the number of university students to 774.350 in 2018-2019 (YOK, 2019). The number of university students in Istanbul corresponds to 41% of the total number of university students in Turkey (1.888.557 in total). In the 2017-2018 period, the number of foreign students studying at the universities in Istanbul is 35,735 which refers the 28.5% of all foreign students in Turkey (YOK, 2019).

According to the TurkStat, 46.509.314 tourists and sojourners have visited Turkey in 2018. Of these, 18.643.175 visited Istanbul as a tourist/visitor (TurkStat, 2019a). There are 1.013.618 foreigners with a residence permit in Turkey, and 517.997 foreigners (51.1% of total foreigners) are located in Istanbul (DGMM, 2019a). Similarly, there are 3.62 million Syrians under temporary protection in Turkey; and 547.535 Syrians (15% of total Syrians in Turkey) are settled in Istanbul (DGMM, 2019b).

While the number of international immigrants migrating to Istanbul in 2000 was 54.644, as of the end of 2017, this number reached 166.044. Of the 166.044 people who came to Istanbul in 2017 by international migration, 148.722 were foreign nationals. In 2017, international net migration to Istanbul was 90.195 (TurkStat, 2019b). As it is seen, Istanbul has attracted 35% of all international immigrants (466.333 all over Turkey) in 2017. In addition, 42.4% of international net migration was realized in Istanbul.

In terms of internal migration, the opposite is the case. In 2015-2018, the emigration from Istanbul is higher than immigration to the city. In this period, net migration was realized as -287.600 (TurkStat, 2019b).

Table 2: The population / visits and the share of Istanbul in Turkey

	(Year, Source)	Istanbul	Turkey	%
Population	(2018, TurkStat)	15067724	82003882	**18,37**
University Students	(2018-2019, YOK)	774350	1888557	**41,00**
International Tourists / Sojourners	(2018, TurkStat)	18643175	46509314	**40,08**
Temporary residents	(2019, DGMM)	517997	1013618	**51,10**

International Immigrants	(2017, TurkStat)	166044	466333	**35,61**
International Net Migration	(2017, TurkStat)	90195	212693	**42,41**
Temporary Protection (Syrians)	(2019, DGMM)	547535	3626820	**15,10**
Domestic Passengers (Airports)	(2018, DHMI)	41795577	112911108	**37,02**
International Passengers (Airports)	(2018, DHMI)	60780029	97587056	**62,28**

As can be seen from the Table 2, the gravity of Istanbul, which hosts 18% of Turkey's population, is much higher than its population. The city has become a centre of attraction for university students, tourists, sojourners, international immigrants and refugees. This attraction has dramatically changed the demographic structure of the city. In the central areas of the city, some of the dwellings inhabited by local residents have been converted into motels / pensions / dormitories, and some have been converted into dwellings where students and refugees reside. The fact that housing stock in the central areas of the city is older than the peripheral areas while the rental and sales values are higher in addition to the parking and security problems in these areas influenced the preferences of the local people, who can find new apartment buildings or reside in gated communities in the peripheral areas. As a result, the demographic structure that emerges in the central areas of the city causes the alienation of the citizen to the city.

The number of universities in the city has increased rapidly in the last 15 years and most of the new universities are concentrated in Fatih, Beyoğlu, Beşiktaş, Şişli, Üsküdar, Kadıköy districts, where can be described as the historical core of the city (Figure 1). Fatih district is also the most preferred area for international immigrants and Syrians under temporary protection. Fatih and Beyoğlu are also the centres of touristic activities.

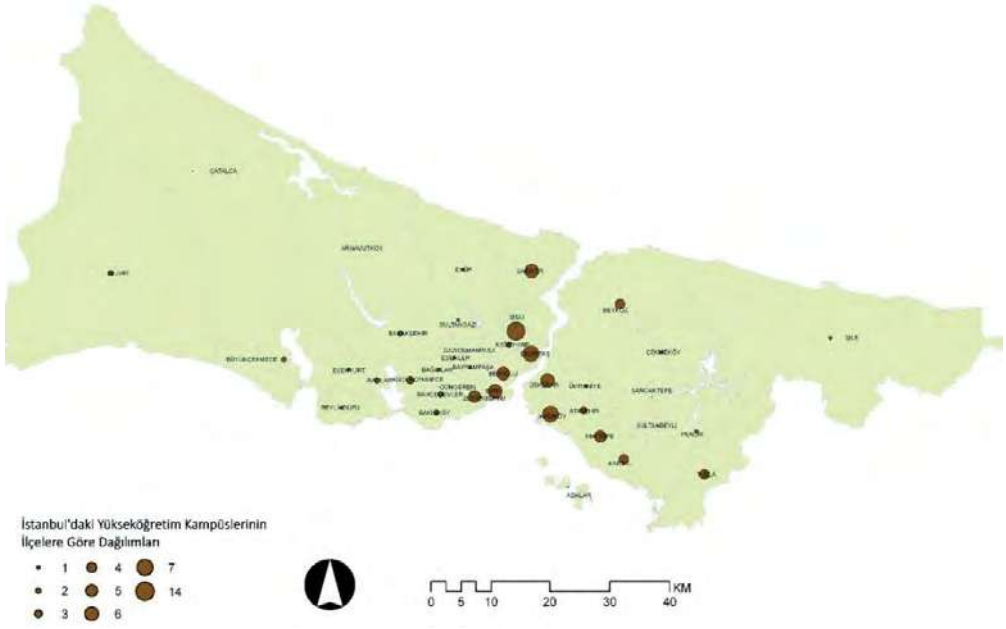


Figure 1: Distribution of Higher Education Campuses in Istanbul by District-2015 (Arlı, 2016a).

In addition, gentrification zones have started to be formed in the central areas of the city, especially in some districts of Beyoğlu, Şişli and Beşiktaş. The transformation in these regions also resulted in the displacement of the old inhabitants of the city.

In summary, Istanbul's adventure of being a centre of attraction and a global city on an international level has led to a change in the demographic structure of the city. The movement of the city dwellers from the centre to the periphery and out of the city, increasing visibility of tourists, students, expats, intellectuals, single white-collar employees in the central areas of the city. In addition, low-quality houses in the central areas of the city, where have not yet been transformed, has become a shelter for the Syrians under temporary protection.

3.2. Flows of capital, goods and services: spatial re-organization

Despite numerous headwinds, unsuccessful military coup and adverse shocks, "Turkey's real GDP has grown by more than 34% over the past 5 years, faster than any other OECD country except for Ireland and only slightly less than China and India"(OECD, 2019). Turkey's business sector showed one of the highest investment rates in the OECD countries. However, even there is a big economic fluctuation in the second part of 2018, which triggered a recession in the second half of the year (Figure 2), strong fiscal and quasi-fiscal stimulus have moderated the contraction in early 2019.

Istanbul is the capital of economy in Turkey informally. All financial centres, banks, insurance companies etc. are located in the city. It has provided more than 40% of Turkish taxes and nearly 55% of economic activities in Turkey (IBB, 2017).

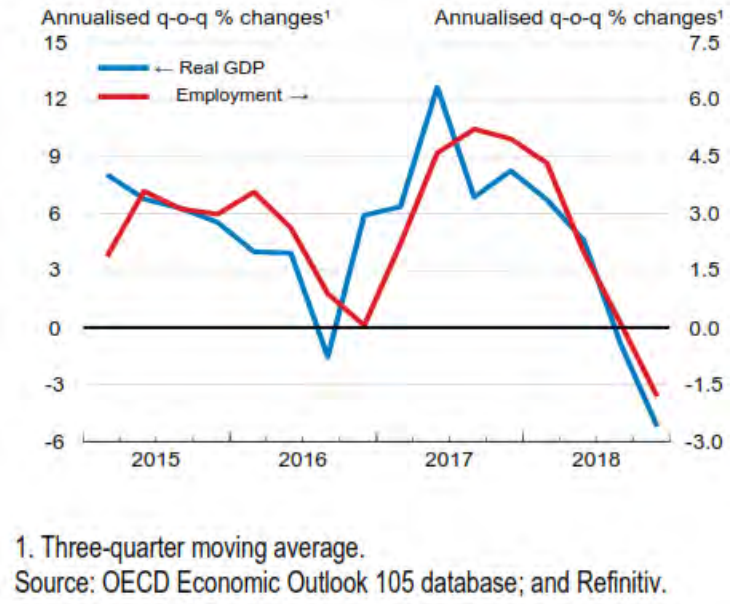


Figure 2: Turkeys' real GDP and employment distribution between 2015 and 2018.

Thanks to rapid economic growth, numbers of immigrants from all parts of Turkey and from neighbour countries migrated to Istanbul in one of the world's fastest migration rate. This flow of migrants put the physical infrastructure of the city under great pressure and caused great congestion costs. As Göymen points out in his study, the generally unqualified waves of migrants continued to come to Istanbul, putting pressure on housing stocks and physical and social infrastructure; Increased congestion forces the environmental bearing capacity to its limits. (Göymen, 2008).

Istanbul is also one of the main cities of media and cinema industries in Turkey. The ongoing boom period, which remains largely unknown to the majority of casual viewers in the West,

began in 1999. Since then, Turkish drama serials have been seen across the rest of the world by billions of people. To put this surge into context, in 2004 Turkish TV exports were worth $10,000. That figure grew to $350 million by 2017. The aim is to hit the eye-watering sum of $2 billion by 2023 with TV dramas expected to make up over half that total (Looch, 2019).

Human movements and demographic changes in the city have progressed in parallel with goods, services and capital flows. These trends have led to significant changes in the spatial organization of the city.

The traditional business centre of the city (Historic Peninsula-Beyoğlu) first expanded northward (Şişli-Levent-Maslak); later, a financial centre was established on the Anatolian side of Kadıköy-Ataşehir-Kozyatağı axis. As a result of the expansion of the traditional centre and the formation of new centres, the number of skyscrapers has started to increase rapidly in the central areas of the city and sub-centre areas. On one hand, newly constructed skyscrapers have an impact that strengthens Istanbul's global urban image. On the other hand, they have been criticized for their negative impact on the city's historical skyline, as well as the traffic load it brings to the city and deepening the socio-spatial differentiation in the city. The rapid increase in the number of skyscrapers brought about the Dubaization / Manhattanization discussions.

Global brand chains spread from the centre to the peripheral areas thanks to the rapidly increasing number of shopping malls in the city. The number of shopping centres in the city, which was 25 in 2004, reached 80 in 2014. Şişli, Beylikdüzü and Esenyurt on the European side, Ataşehir and Ümraniye on the Anatolian side were the most preferred districts of the new shopping malls (Çakır Zeytinoğlu et al., 2016).

The fact that this trend and increasing land values in the city started to put pressure on the industrial areas within the city resulted in the decentralization of the industry in the east-west direction (Kocaeli-Bursa-Tekirdağ). As an important industrial axis of the city, Basin Ekspress Road today is mostly used with services such as shopping centres, hotels, offices and residences.

The symbols of change and transformation in the integration process of Istanbul to the global world appear as “mega projects”. Yavuz Sultan Selim Bridge (the 3rd Bosporus Bridge), which was completed in 2016, the Istanbul Airport, which was put into service in 2018, and Kanal Istanbul (the waterway project) planned to be constructed as an alternative to the Bosporus are the three most important and most debated mega projects in this period. All three projects were supported by advocates of economic integration with the global world and criticized for increasing the pressure on the city's natural resources and shifting the direction of development towards forest areas in the north. These projects have become important platforms in which socio-political tensions in the city have come to light (Baş et al., 2018).

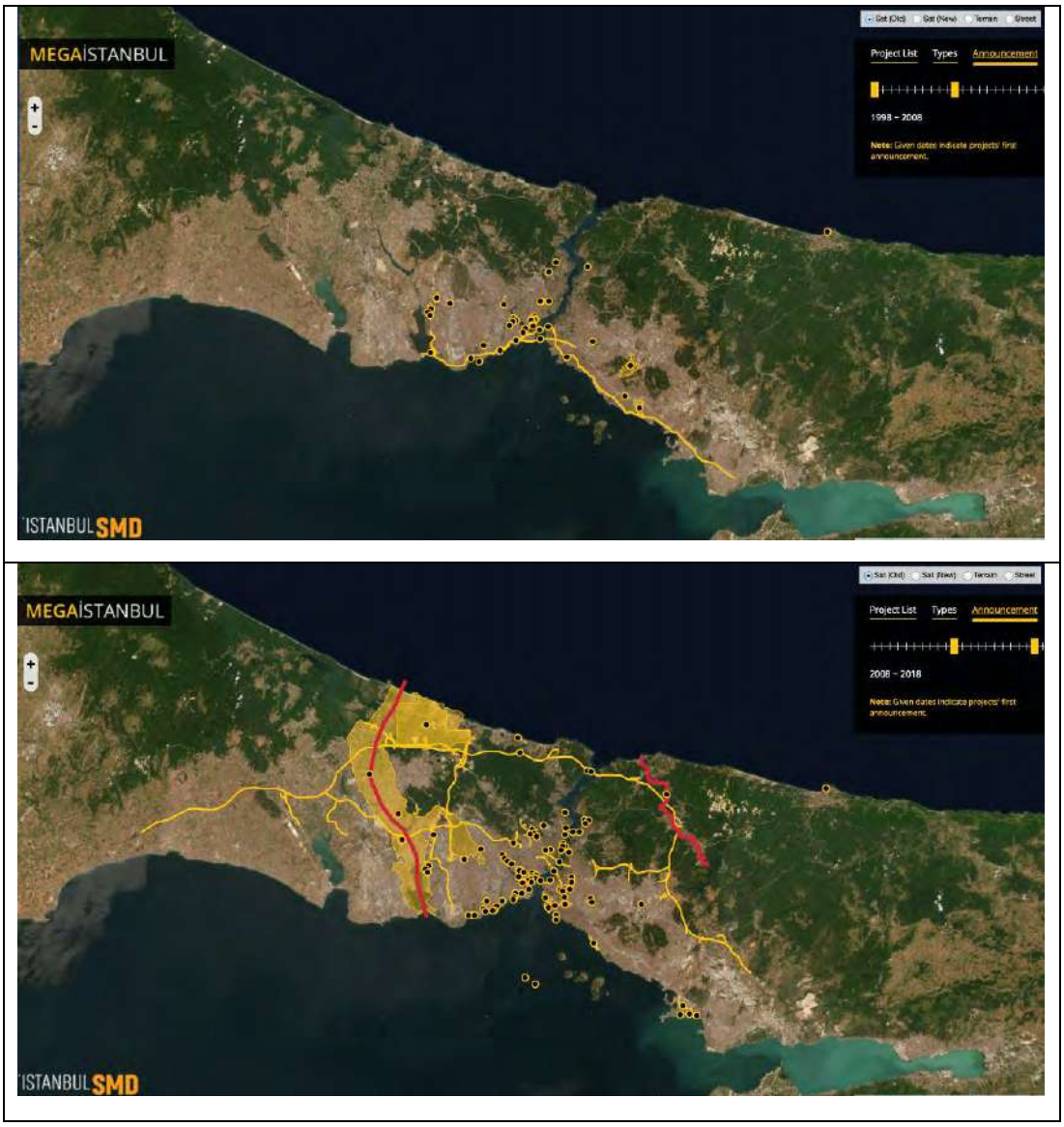


Figure 3: Planned / Announced mega projects in Istanbul between 1998-2008 (above) and 2008-2018 (below) (IstanbulSMD, 2019).

The mega projects announced to the public between 1998 and 2018 are shown on the map of Istanbul (Figure 3). In the first decade, mega projects envisaged both in the centre of the city and on the east-west axis. However, the number of these projects has boomed as the integration process into the global world has accelerated; and the location of these projects, both growing in number and area, shows that the direction of development of the city has also changed.

It is also possible to follow the rapid development and change of the city through the land use data of CORINE (Coordination of Information on the Environment) shared by the Ministry of Agriculture and Forestry. It can be read from the 2018 data that mobility started with the new airport and highways / bridges in the north of the city (Figure 4).

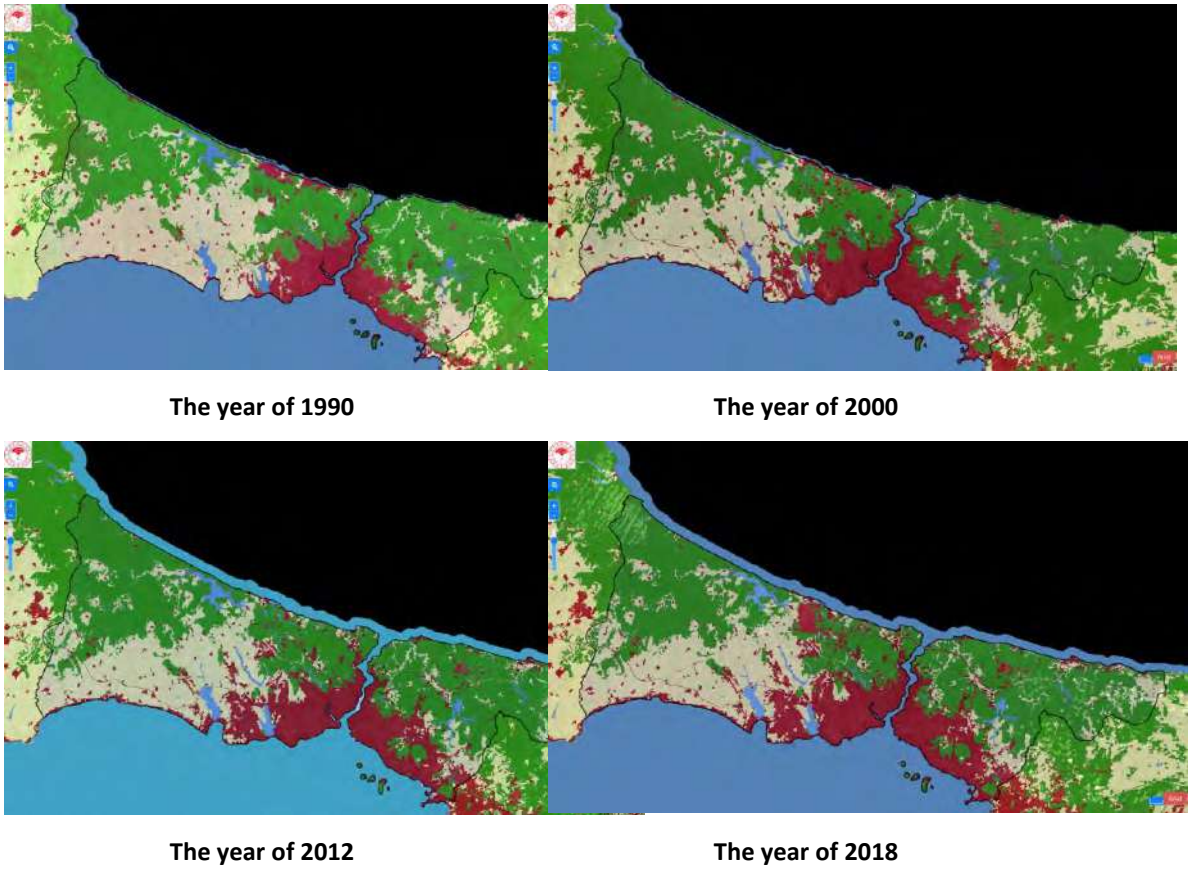


Figure 4: The changing land use of Istanbul between 1990 and 2008 (CORINE Land Use Data) (TOB, 2019).

To sum up, Istanbul's integration with the global world has led to socio-spatial transformations in the central areas of the city, and to the expansion of the city in the east-west and north directions and forcing natural thresholds.

3.3. Flow of cultures and images: socio-cultural transition

In addition to the flows of people, goods, capital and services, it is seen that Istanbul is on its way to becoming the centre of the cultural industry and expanding its area of influence. Cultural interaction has occurred in two ways. First, a mutual cultural exchange has become possible through numerous cultural events, exhibitions, festivals and congresses; and second, thanks to the Turkish TV series, a cultural hinterland has been formed in a wide geography especially in the Balkans, the Middle East and Latin America.

Turkish TV series have created a cultural hinterland in the geographies where they are exported, and the interest and curiosity of the audience watching the series has increased. According to Ozcan and Anaz, Turkish TV series and films have positively impacted Turkey's visibility abroad (Ozcan and Anaz, 2016). Moreover, there are some touristic organizations organized only to visit the sets (Melamed, 2019; Gürmen, 2016; Sobecki, 2010).

Turkish TV series are also very effective in the Middle East and the Asian countries. For instance, A study conducted in Pakistan revealed that exposure to foreign culture by watching its series and programs, had a profound impact on Pakistani youth, thus affecting cultural identity, norms and values. (Raza, 2015).

Magnificent Century (Muhteşem Yüzyıl), an epic historical drama launched in 2011, that found audiences beyond Latin America and the Middle East. At its peak the series, which tells the story of 16th century Ottoman sultans, was broadcast in over 40 countries with more than 200 million viewers worldwide (Looch, 2019). Ertugrul Resurrection (Diriliş Ertuğrul) is one of the most popular Turkish TV series all over the world. It has shown in more than 50 countries as well as in Netflix.

The city was selected as the European Capital of Culture in 2010. According to the International Congress and Convention Association (ICCA), Istanbul is one of the most important destinations that host international congresses. Although Istanbul, one of the top 10 cities hosting the most international community in the world in 2008-2012, declined by ten places as a result of the terrorist incidents and coup attempt in 2013-2017 period, the city has still an important attraction power (Table 3).

Table 3: Number of international meetings per city between 1963 and 2017 (ICCA, 2018).

Rank	Country	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-02	03-07	08-12	13-17
1	Paris	90	95	125	152	178	261	299	393	605	885	**1,079**
2	Vienna	60	41	72	92	119	182	231	280	536	760	**950**
3	Berlin	19	21	38	66	96	148	169	278	485	683	**945**
4	London	88	108	110	143	162	167	176	273	383	657	**945**
5	Barcelona	12	24	19	31	68	121	189	280	458	750	**918**
6	Singapore	2	10	21	46	88	114	159	234	432	638	**795**
7	Madrid	26	35	53	62	97	131	127	200	314	493	**782**
8	Lisbon	8	11	12	26	52	91	139	209	358	521	**692**
9	Seoul	4	8	17	28	55	103	154	231	383	586	**691**
10	Prague	33	29	24	25	30	81	153	227	399	536	**688**
11	Amsterdam	29	49	73	84	100	172	190	257	344	550	**652**
12	Copenhagen	46	32	65	75	105	131	222	266	335	543	**631**
13	Brussels	29	47	56	79	113	121	129	161	225	483	**585**
14	Beijing	0	0	0	5	38	91	137	197	428	644	**582**
15	Hong Kong	2	12	8	27	41	82	153	209	312	461	**580**
16	Dublin	14	29	28	46	62	74	104	126	271	369	**563**
17	Rome	39	43	34	49	76	99	117	211	314	490	**560**
18	Budapest	18	35	26	54	97	149	220	216	381	481	**558**
19	Istanbul	8	15	11	9	18	41	95	114	281	598	**557**
20	Buenos Aires	5	19	31	33	65	90	100	165	276	466	**531**
	Other	1,197	1,906	3,004	4,434	6,265	8,768	12,055	18,195	28,213	42,655	**51,282**
	Total	**1,729**	**2,569**	**3,827**	**5,566**	**7,925**	**11,217**	**15,318**	**22,722**	**35,733**	**54,249**	**65,566**

4. Conclusion

Istanbul is a city with high recognition in the world. Today, Istanbul has a certain positive brand value that has naturally emerged in the fields of geography, finance, services, trade and tourism. The city has some important advantages and disadvantages compared with other global cities. The main advantages of the city are its location/accessibility, historical background, cultural heritage, transport infrastructure, young population, cost of living, and healthcare services. The main disadvantages of the city are environmental conditions, lack of open spaces and green areas, and insufficient R&D studies and patents. In addition, the most obvious realities of the city, overcrowded construction, crowded population and traffic congestion create a very strong negative image and perception among the people who look at the city from outside and make the city's many positive features and beauty unnoticeable.

> *Istanbul after the year of 2000 is a city whose global integration tendencies are getting stronger but consequently its internal tensions increase* (Arlı, 2016b).

These internal tensions are leading to the dichotomy of global integration/local segregation. Human mobility in Istanbul is a good example of these tensions, and it shows social relocation and displacements within the city. While domestic immigrations to the city have always been higher than emigration from the city until 2015, there has been a reverse trend since 2015. In the last three years, the city's residents tend to migrate to other metropolises and cities in the country. However the city remains a point of attraction for students, international immigrants, tourists, sojourners and refugees.

The presence of international immigrants means for Istanbul to hold global labour power. The fact that international immigrants prefer Istanbul is a positive contribution to the global attractiveness of the city. It is useful to consider in detail how global labour power can be exploited in the upper and lower levels of Istanbul. While establishing a population policy for Istanbul, it should be taken into consideration that the city would always be a point of attraction for international immigrants. In this context, regular scientific researches/measurements on the qualifications and capabilities of permanent/temporary refugees should be carried out and the social integration policies pursued in the city should be sustained. Following such an approach on international migrants will bring about improvement in the socio-economic structure of the city.

As pointed in the previous chapters, Istanbul's efforts to be integrated with the global world have also triggered socio-spatial transformations in the central areas of the city, and to the expansion of the city in the east-west and north directions towards natural thresholds. The city needs to empower its position among other global cities without destroying its social fabric and transcending its natural thresholds.

5. References

Arlı, Alim (2016a) "Yükseköğretimde Büyüme, Farklılaşma ve Reorganizasyon: İstanbul Örneği (1980-2015)", Sosyoloji Konferansları, Vol.54, pp. 199.

Arlı, Alim (2016b) Dünya Ölçeğinde İstanbul, in Antik çağdan XXI. yüzyıla Büyük İstanbul Ansiklopedisi, Kültür A.Ş., İstanbul.

Baş, Ahmet, Paköz, Muhammed Ziya and Eren, Fatih (2018) The Economic and Environmental Impact of Istanbul's Grand Airport Project on the Urban Structure and Behaviour of Istanbul. Young Planners Workshop 2018. Paris, FRANCE: "European Council of Spatial Planners (ECTP-CEU)". p.38-52. ISBN:978-2-9601363-5-7

Çakır Zeytinoğlu, Filiz, Uydacı, Mert, Çağlayan Akay, Ebru, Değerli, Başak and Karabıyık Yerden, Nevin (2016) "İstanbul'daki Alışveriş Merkezleri Üzerine Bir Araştırma: Kümeleme Analizi", Social Sciences Research Journal, Vol.5 No.1.

DGMM (2019a), "Residence Permits", available at: https://www.goc.gov.tr/icerik6/ikamet-izinleri_363_378_4709_icerik (accessed July 5, 2019).

DGMM (2019b), "Temporary Protection", available at: https://www.goc.gov.tr/icerik6/gecici-koruma_363_378_4713_icerik (accessed July 5, 2019).

DHMI (2018), "Airports Passenger Statistics 2018", available at: https://www.dhmi.gov.tr/Lists/IstatistikList/Attachments/339/YOLCU.pdf (accessed July 1, 2019).

Eren, Fatih (2018) "Top government hands-on megaproject management: the case of Istanbul's grand airport", International Journal of Managing Projects in Business, Vol. ahead-of-print, No. ahead-of-print DOI: https://doi.org/10.1108/IJMPB-02-2018-0020

Ericsson (2016), "Networked Society City Index", Networked Society Insights, available at: https://www.ericsson.com/en/trends-and-insights/networked-society-insights/city-index (accessed July 6, 2019)

Göymen, K. (2008) "Istanbul: Mega City Straddling Two Continents", Urban Research & Practice, Vol.1 No.3, pp. 266-275.

Gürmen, E. (2016), "How Turkish Soap Operas Took Over The World", The FADER, available at: http://www.thefader.com/2016/03/01/turkish-soap-operas (accessed May 8, 2019).

IBB (2017), "National and Regional Synthesis Report", Istanbul Metropolitan Municipality, 1/100.000 Istanbul Master Plan and 1/25.000 Development Plan Research and Application Project, Istanbul.

ICCA (2018), "A Modern History of International Association Meetings – Update 1963 2017", available at: https://www.iccaworld.org/knowledge/benefit.cfm?benefitid=5230 (accessed June 15, 2019).

İstanbulSMD (2019), "Istanbul's Mega Projects", available at: http://en.megaprojeleristanbul.com/ (accessed July 2, 2019).

JLL (2019), "Global 300 Map", Cities Research, Jones Lang LaSalle, available at: http://cities-research.jll.com/cities-research/cities/global300map (accessed July 7, 2019)

Kearney (2019), "Global Cities Report 2018", available at: https://www.atkearney.com/documents/20152/1136372/2018+Global+Cities+Report.pdf/21839da3-223b-8cec-a8d2-408285d4bb7c?t=1527106649606 (accessed July 3, 2019)

Kirişçi, Kemal (2007), "Turkey: A Country of Transition from Emigration to Immigration", Mediterranean Politics, *Vol.*12 No.1, pp. 91-97.

Looch, Cassam (2019), "The Rise and Rise of Turkish TV", available at: https://theculturetrip.com/europe/turkey/articles/the-rise-and-rise-of-turkish-tv/ (accessed July 9, 2019).

Melamed, Ariana (2019), "The Turks Are Back, and They've Got All of Israel Addicted", Haaretz, available at: https://www.haaretz.com/israel-news/.premium.MAGAZINE-the-bride-of-istanbul-turkey-back-in-israel-and-they-ve-got-everyone-addicted-1.6896105 (accessed May 11, 2019).

Ministry of Commerce (2018), "Foreign Trade Data by Provinces", Istanbul, available at: https://www.ticaret.gov.tr/istatistikler/dis-ticaret-istatistikleri/dis-ticaret-istatistikleri-ocak-mayis-2019/illere-gore-dis-ticaret (accessed June 28, 2019)

MMF (2018), "Global Power City Index", Institute for Urban Strategies. The Mori Memorial Foundation, available at: http://mori-m-foundation.or.jp/english/ius2/gpci2/index.shtml (accessed July 9, 2019)

Numbeo (2019), "Cost of Living in Istanbul", available at: https://www.numbeo.com/cost-of-living/in/Istanbul (accessed June 15, 2019)

OECD (2019), " OECD Reports", available at: https://www.oecd.org/turkey/publicationsdocuments/reports/ (accessed July 9, 2019).

Ozcan, Ceyhun & Anaz, Necati (2016) Geography of Turkish Soap Operas: Tourism, Soft Power, and Alternative Narratives, in Egresi, Istvan (ed), Alternative Tourism in Turkey: Role, Potential Development and Sustainability, Springer (eBook).

Raza, Syed Hassan (2015), "Cultural impacts of Turkish Dramas on Life style of Pakistani House wives", Journal of Culture, Society and Development, Vol. 33.

Sobecki, Nichole (2010), "Turkish soap opera Noor brings tourist boom to Istanbul", the Guardian, available at: https://www.theguardian.com/world/2010/aug/13/soap-opera-noor-tourist-boom-turkey (accessed May 8, 2019).

TurkStat (2018) Turkish Annual Statistical Book, Ankara: TÜİK.

TurkStat (2016), "Foreign Trade Statistics", TÜİK Website, available at: http://www.tuik.gov.tr/PreTablo.do?alt_id=1046 (accessed July 5, 2019)

TurkStat (2019a), "Tourism Statistics", available at: https://biruni.tuik.gov.tr/medas/?kn=74&locale=tr (accessed June 20, 2019).

TurkStat (2019b), "Migration Statistics", available at: http://www.tuik.gov.tr (accessed June 11, 2019).

TOB (2019) "CORINE Land Use Data", available at: https://corinecbs.tarimorman.gov.tr/ (accessed July 3, 2019).

YOK (2019) "Higher Education Information Management System", available at: https://istatistik.yok.gov.tr/ (accessed July 4, 2019).

Case Study / Project

Settlement Development Analysis of Malang City peri Urban Area

and Its Conformity with the Regional Spatial Plan

Mirza PERMANA

Abstract

The development of Malang City has consequently led to an upturn of new residential, trade and industrial centers in the suburbs area. Settlements rise massively in a number of suburban areas due to attractions of economic centers and accessibility easiness. This study, locating in Malang City. The research aims are: (1) to determine the characteristics of settlements in peri-urban area, (2) to analyze conformity to the regional spatial plan (RTRW), and (3) to establish development direction. Descriptive and comparative analysis were used through both qualitative and quantitative approaches. Settlement intensiveness ranges from low to moderate. The densest is in Pakishaji District (57 percent) while the lowest one is in Tumpang District (17 percent).

The result of visual analysis on land use map in 2018 shows that 70 percent of settlements close to city grew following the main road network in the pattern of ribbon development. The biggest increase of settlement in peri-urban region indicated by the highest number of population, is seen in Singosari District. The farther from the city, settlement spread formed leapfrog pattern by 30 percent. During period of 2008-2018, built-up land increase by 12 percent while agricultural land in a declining trend. Significant changes occurred in Singosari, Pakishaji, and Karangploso Districts, especially in 2008-2013. Based on overlay between suitability map of residential areas and current spatial plan of the city (RTRW) of 2010-2030, 208 hectares or 0.5 percent of settlements is not in accordance with the RTRW. Such settlement areas were mostly built on the land designated for agriculture either wetland or dryland. Directions for the development of settlement in peri urban areas following the regional spatial plan without conversion of agricultural land.

Research Paper

Analysis on Integration Path of Urban and Rural Industries Based on Economic Data Model

A Case Study of Strategy Planning of Taiyuan Rural Revitalization

Huimin QI, Shanghai Tongji Urban Planning & Design Institute Co., LTD. ; China

Abstract

In the background of ongoing urbanization in China and prominent "dualistic" contradiction between urban and rural areas, rural revitalization is extremely urgent. Currently, common problems concerning industry, ecology and humanities exist in rural areas. This paper attempts to figure out the causes for differences in industrial development in rural areas on the basis of macro data analysis and industrial spatial distribution.

Given the lack of quantitative analysis of the relationship between urban and rural development and industrial structure, this paper adopts SPSS statistical software to conduct regression analysis on the statistical data of Taiyuan City in the past ten years. Based on the relationship between industrial proportion and urban-rural income ratio, this paper proposes how the adjustment of urban industrial structure promotes the industrial development in surrounding rural areas and the narrowing of urban-rural income gap.

From the perspective of rural industry undertaking or complementation with urban industry, this paper then puts forward the idea of undertaking the transfer industry within the scope of ensuring the aggregation effect of the city center and the carrying capacity of the ecological environment, proposing an industrial development path from agriculture to processing industry and then to culture, tourism and recreation industry for the villages in Taiyuan.

Keywords

Regression analysis, Industrial structure, Urban-rural integration, Taiyuan path

1. Introduction

1.1. Urban-rural dual system

Under the past 40 years of reform and opening up policy, China's industry has developed rapidly. The population gathering brought about by the spatial clustering of the industry has caused the rapid expansion of the city. Rapid urbanization has led to a prominent problem of urban-rural dual structure. Since ancient times, urban and rural areas have been born out of a relationship of natural conditions and economic structure. A series of urban-rural dual policies, such as industrial priority development in the planned economy of New China, have

led to a strict separation of urban and rural social and economic structures (Yifu Lin, 2002), resulting in severe restrictions on the flow of production factors between urban and rural areas. It was not until the implementation of the reform and opening up policy that the urban-rural dual structure was loosened. Engels said: "All urban problems are caused by poverty in the countryside." Therefore, the common development of urban and rural areas is the mission of an era. The development of urban and rural integration is inseparable from the economic development driven by industry. The development of industry cannot be separated from the support of construction space.

1.2. Urbanization

Since World War II, Western scholars have begun a lot of research on urbanization, and international scholars have never stopped discussing urban-rural relations. Since the 1980s, with the acceleration of the globalization process, the theory of coordinated urban and rural development has become the main direction of discussion. The proliferation of large cities from the top down, the rural industrialization from the bottom up and foreign direct investment drive the development of rural to semi-urban. There is a lack of management in the semi-urbanized areas in rural areas (Ruoxiang Jia et al., 2002; Shenghe Liu et al., 2004). The global capital allocation, market, talents, technology recombination and allocation caused by economic globalization have brought in a large influx of foreign capital. With the rapid development of processing and manufacturing, a large number of rural semi-urban areas have been created. With the acceleration of China's urbanization process, China's urbanization rate has reached 60% by 2017. Industrialization since the 1980s has accelerated the disappearance of rural areas, and a large number of small and medium-sized cities and small towns have developed. The growth of GDP has a significant correlation with urbanization, and the development of the economy has driven the development of urbanization. In the early days of reform and opening up, the development of industrialization accelerated urbanization and brought about a significant improvement in the national economy. In the 20th century, China's economic development entered a period of transition. The agglomeration of industry led to the difference of space economy, accompanied by a large number of labor pools, which led to the typical urban dual structure problem. What followed was the central government's proposal to build a series of financial support policies, such as characteristic small towns, urban-rural integration, and beautiful villages, in an attempt to narrow the gap between urban and rural areas through urban reincarnation. In 2003, Professor Xie elaborated on a series of urban problems brought about by the development of urbanization, and proposed the road of new urbanization 4 (Zhiqiang Xie, 2003), which triggered the thinking of urban scholars, sociologists and politicians. . Scholars in economics believe that cities should be aggregated and cannot reverse the laws of industrial, labor, capital and other factors. With the development of industrialization, China began a large-scale land development process. Since the 1990s, large-scale development zones, industrial parks, and high-tech parks have been built. The following picture shows the urban and rural development trends of Chinese cities from 2004 to 2017. The data of Figure 1 as bellow was missing urban area data in 2004-2007, and noted that the urban area is the area of the city proper before 2006

(Source from National Bureau of Statistic of China).

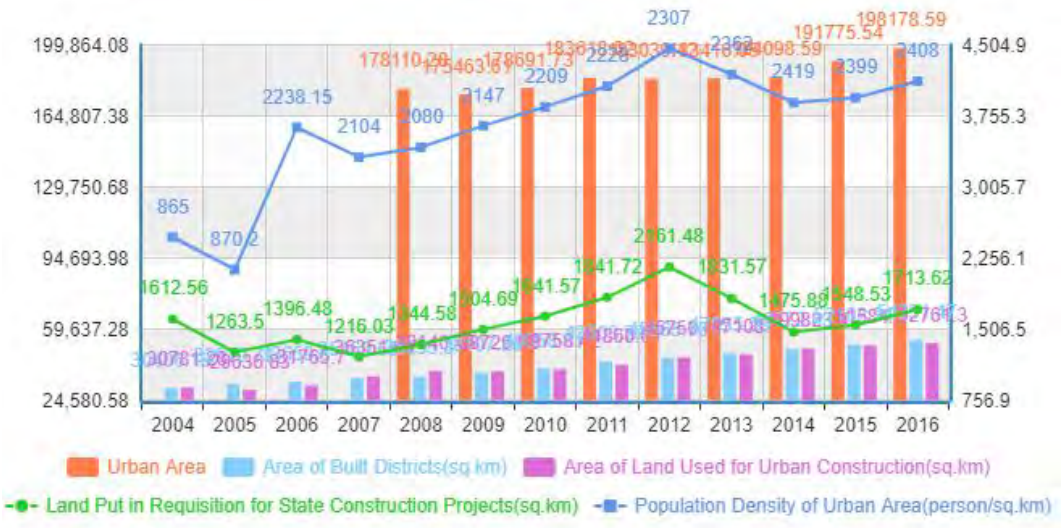


Figure 1 China's urban expansion trend chart

It can be seen from the table that the speed of urban construction area expansion in China has been positively correlated with the rate of population agglomeration, and there is no significant increase in urban population density. A series of urban and rural development issues that followed have entered the vision of the planning industry, academic circles and political circles. The expansion of industrial land has led to the spread of construction land, and the economic development and urbanization brought about by industrialization have allowed China to develop rapidly. Under the background of the gradual disappearance of the demographic dividend, Zhao Min and other scholars proposed that the development of rural space should adhere to the "smart contraction" view. 5 Zhang Li discussed the deterioration of the demographic dividend and the qualitative transformation of urbanization. The land expansion brought about by rapid urbanization has led to the local government's high dependence on land finance. How should China's urbanization and construction land development develop in the context of the current transformation of development mode? Does industrial development, which is a pillar of the national economy, play a major role in promoting urbanization? What is the strategic guiding significance of the relationship between urbanization and industrial development and the development of land use for its rural development? How to develop the industrial economy of Taiyuan's countryside in the context of industrial transformation and development?

2. Methodology

2.1. Objective

This paper attempts to use the econometric method to conduct regression analysis on historical statistical data. The research goal is to use quantitative methods to find out the relevant factors affecting urban agglomeration in urban and rural development, and to use satellite remote sensing images of land construction and expansion to Taiyuan. An objective analysis of land use in the past 15 years. In the 40 years of reform and opening up, China's urbanization rate has doubled (Figure 2), which is nearly double the time of the UK's urbanization rate (Figure 3).

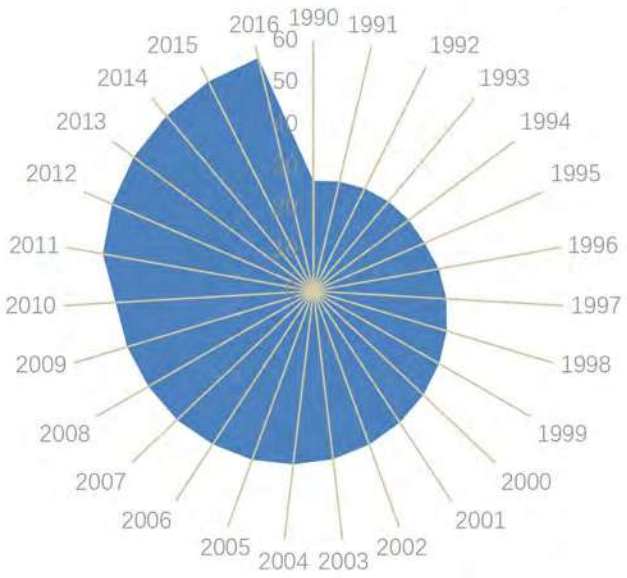


Figure 2 Mainland-China's average urbanization rate

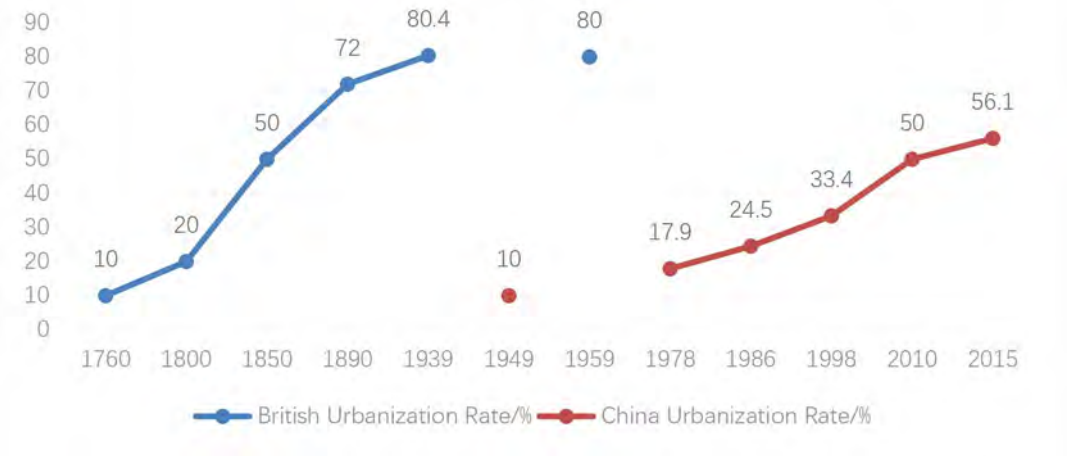


Figure 3 Time-varying chart of urbanization rate between British and China

In economic geography, the spatial aggregation index system was extensively studied by Western scholars in the 1970s. So far, no ideal spatial aggregation index system has been established (Masahisa Fujit et al., 2005; Pierre-Pilippe Combes et al.,2008). According to years of data collection and observational research, the factors that cause population aggregation to form spatial imbalance development are labor productivity, transportation costs, and trade costs. Based on the degree of data acquisition, this paper establishes an incomplete model of urbanization rate research model, showing in Figure 4 as bellow.

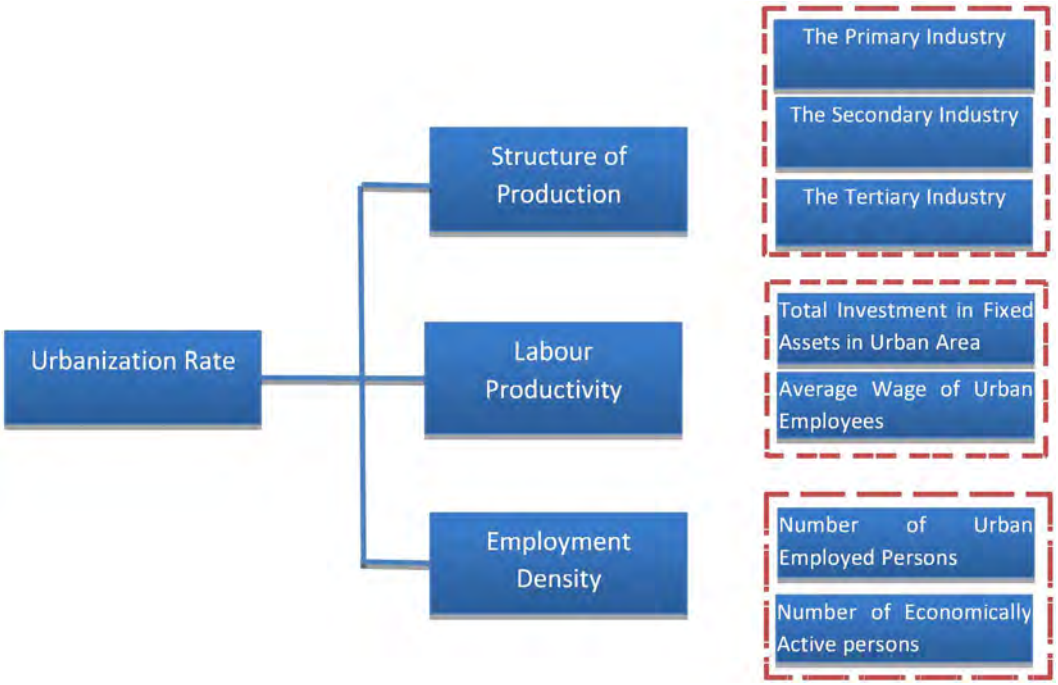


Figure 4 Research framework model (the author self-painting)

2.2. Model hypothesis

The SPSS software was used to analyze the urbanization rate and independent variables of the dependent variables. Before doing the regression analysis, the relationship between the independent variable and the dependent variable is depicted in a scatter plot (Fig 5) to find the relationship between each dependents. According to the observation analysis, the general linear regression model is established as follows:

$y = \alpha_i + \Sigma\beta_i x_i + \varepsilon$ (Equation 1)

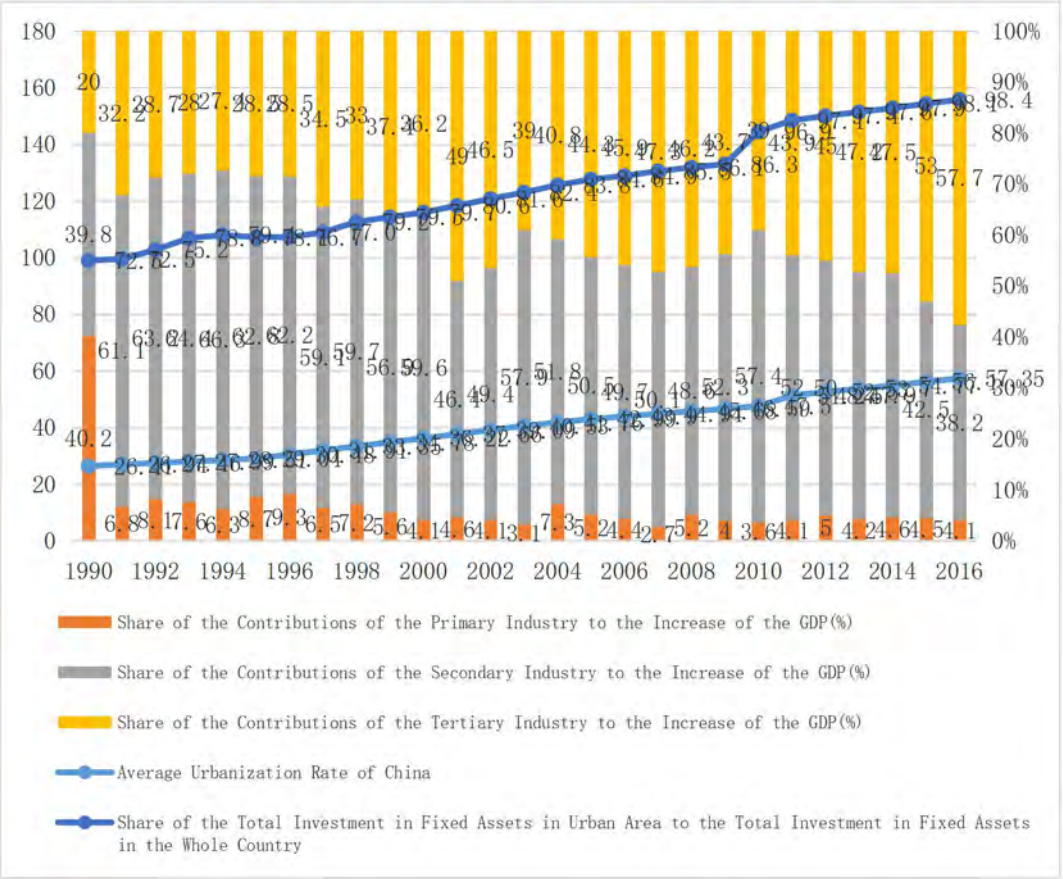


Figure 5 Urbanization rate related variable icon

2.3. Data selection and processing

According to the research framework established in the research method, the whole country is studied as the whole geospatial target, and each city is where the space gathers. Therefore, the data indicators corresponding to the elements in the corresponding research framework are searched, and the data model is established by SPSS software for regression analysis (Xiaojun Huang et al., 2008; Chenggu Li et al., 2004). Looking for statistics from 1990 to 2016 from the China City Statistical Yearbook, the year was chosen in 1990 because the implementation of the 1989 reform and opening up policy promoted the development of the market economy. By the year 2016, it was considered the international trade elements in the latest year data available, and also 2016 is the year in which US sanctions against China's international trade began. The data indicators were selected: the national average urbanization rate, the contribution of the primary industry to GDP, the contribution of the secondary industry to GDP, the contribution of the tertiary industry to GDP, the gross domestic product (nominal GDP), and the investment in fixed assets of the whole society (100 million yuan), urban fixed assets investment (100 million yuan), employed persons (10,000 people), primary industry employed persons (10,000 people), secondary industry employed persons (10,000 people), tertiary industry employed persons (10,000 people), Fourteen data indicators for urban employed persons (10,000 people), rural employed persons (10,000 people), and economically active population (10,000 people).

Considering the magnitude of the data and the homogeneity of the samples, I processed some of the data. The specific treatment method is: calculating the ratio of the contribution of the primary industry to GDP, the contribution ratio of the secondary industry to GDP, the contribution ratio of the tertiary industry to GDP, the ratio of urban fixed assets investment to the fixed investment of the whole society, and the first production. The ratio of employed persons, the ratio of employed persons in the secondary industry, the ratio of employed persons in the tertiary industry, the ratio of employed persons in urban areas, the ratio of employed persons in rural areas, and the proportion of employed persons in economically active population. There are 10 independent variables entering the regression equation in the model.

3. Model analysis

3.1. Data out-put

General linear regression was performed using SPSS, and a stepwise regression method was used to establish the model. The modeling path given by the stepwise regression modeling method is shown in Figure 6. The coefficient is as shown in the table column “B”: the proportion of urban employment is a variable that significantly affects the urbanization rate, followed by the tertiary industry to urbanization. The rate plays a small positive effect. In the second model, the independent variable of the tertiary industry's GDP is tested by the reliability coefficient of 0.01, and the three coefficients of the model are all tested by the reliability coefficient of 0.05. However, in Model 3, which is the most stable one, the proportion of second-employed workers is obviously a negative correlation to the urbanization rate. Bring the regression coefficient into Equation 1, and get the general linear regression equation: $Y=3.045+113.305X_1+0.12X_2-39.071X_3+\varepsilon$ (Equation 2), where X_1 is the independent variable urban employment ratio, X_2 is the independent variable third. The contribution rate of industry to GDP, X_3 is the proportion of employed persons in the secondary industry of independent variables, ε is the error term, and Y is the urbanization rate of the dependent variable.

系数[a]

模型		非标准化系数		标准系数	t	Sig.
		B	标准 误差	试用版		
1	(常里)	-.962	1.120		-.859	.398
	城镇就业人员(万人)占比	110.700	2.921	.991	37.902	.000
2	(常里)	-2.332	.882		-2.644	.014
	城镇就业人员(万人)占比	95.038	4.019	.851	23.650	.000
	第三产业对GDP的贡献率(%)	.182	.039	.167	4.628	.000
3	(常里)	3.045	2.650		1.149	.262
	城镇就业人员(万人)占比	113.305	9.342	1.015	12.128	.000
	第三产业对GDP的贡献率(%)	.120	.047	.110	2.580	.017
	第二产业就业人员(万人)占比	-39.071	18.302	-.126	-2.135	.044

a. 因变里: 全国平均城镇化率

Figure 6 SPSS model coefficient table

Anova[d]

模型		平方和	df	均方	F	Sig.
1	回归	2544.378	1	2544.378	1436.553	.000[a]
	残差	44.279	25	1.771		
	总计	2588.657	26			
2	回归	2565.258	2	1282.629	1315.559	.000[b]
	残差	23.399	24	.975		
	总计	2588.657	26			
3	回归	2569.127	3	856.376	1008.560	.000[c]
	残差	19.529	23	.849		
	总计	2588.657	26			

a. 预测变量: (常里), 城镇就业人员(万人)占比。

b. 预测变量: (常里), 城镇就业人员(万人)占比, 第三产业对GDP的贡献率(%)。

c. 预测变量: (常里), 城镇就业人员(万人)占比, 第三产业对GDP的贡献率(%), 第二产业就业人员(万人)占比。

d. 因变量: 全国平均城镇化率

Figure 7 Model stability coefficient table

模型汇总

模型	R	R 方	调整 R 方	标准 估计的误差
1	.991[a]	.983	.982	1.33085
2	.995[b]	.991	.990	.98741
3	.996[c]	.992	.991	.92147

a. 预测变量: (常里), 城镇就业人员(万人)占比。

b. 预测变量: (常里), 城镇就业人员(万人)占比, 第三产业对GDP的贡献率(%)。

c. 预测变量: (常里), 城镇就业人员(万人)占比, 第三产业对GDP的贡献率(%), 第二产业就业人员(万人)占比。

Figure 8 Model summary table

From the bellowing figure 7, the stability of the model is shown. The residual coefficient of Model 3 is the smallest, the stability is gradually increased, and the P values are all less than 0.01, so the model is statistically significant.

The autocorrelation analysis of the model is carried out, and the residual histogram and scatter plot are drawn. The distribution of residuals does not show obvious regularity, indicating that there is no autocorrelation in the data of this problem.

3.2. Model analysis

From the regression analysis of statistical data from the year 1990 to 2016, it is concluded that increasing the proportion of urban employed population is a positive factor in the process of urbanization. The proportion of employed persons in the secondary industry is negatively related to urbanization. The industry has moved beyond urban areas to non-urban areas. Therefore, in today's urban-rural integration development, how to promote the development of rural areas is not to increase the number of jobs in the countryside, but to take advantage of the advantages of the countryside to promote the development of rural characteristics. There should be a concentrated central city and regional economy to promote the common development of surrounding towns and villages, stop the rough development of the construction of land for large-scale demolition and construction, and

turn to intensive and efficient development. The accumulation of urban population and industry is an inevitable trend of economic development.

4. Case study of Taiyuan

4.1. Analysis of industry and urbanization

Taiyuan belongs to the capital city of central China. In recent years, the economic aggregate has increased steadily. In 2017, the city's GDP reached 338.218 billion yuan, accounting for 22.6% of the province's GDP, a year-on-year increase of 14.43%, and a three-product structure ratio of 1.2:37.6:61.8 (Source from the city Statistical bulletin). However, due to the geographical location and development conditions, the development of districts and counties is uneven. Compared with the six districts of Taiyuan City, Gujiao, Loufan, Qingxu and Yangqu are the suburbs of Taiyuan City. The rural characteristics are obvious. In 2017, the total GDP of the three counties and one city was only 23.553 billion yuan, accounting for only Taiyuan City. The total economic output is 7%, of which Loufan County has a minimum of 2.11 billion yuan.

As of 2017, the city's permanent population in the city of Taiyuan reached 4.38 million, of which the rural population was 670,000, the overall urbanization rate has reached 84.7%, ranking third in the provincial capital cities (data from local cities' statistics bulletin). However, the level of urbanization development in districts and counties is obviously different. The average level of urbanization in Liucheng District is above 90%, and the highest is 97.57% in Wanbai District. The average level of urbanization in the three counties and one city is only 45%. The lowest is Qing. Xu County 33.55%.

According to the China Urbanization Quality Report (2013) jointly issued by the Chinese Academy of Social Sciences and the China Economic Weekly, the total urbanization quality of Taiyuan City is 0.52, ranking 80th in the country and 4th in the six central provinces. The disposable income of GDP and urban residents is second to last and the first in the six provincial capitals of the central region. As a heavy industrial city, Taiyuan has long been a high-energy, high-pollution extensive industry as its economic development path, and its resource environment has been severely challenged (Yongzhen Duan, 2017). The master plan of the city of the year 2004, showing that Taiyuan's is going to transform into a high-tech and technology-intensive industrial city.

4.2. Analysis of land use

According to recent pictures of Taiyuan city remote sensing satellites, land use data is extracted. The land use in 1999, 2004 and 2011 was classified and the land use type was analyzed by satellite remote sensing images as the year of 1999, 2004 and 2011.

By collecting and sorting the land area of different land types according to the year, the table 1: statistical classification table of land use is obtained. The data from 1999 and 2004 were from the land use analysis and identification of satellite remote sensing images. It can be seen from the analysis that after years of land use control and industrial structure adjustment, the area of industrial land and the land area of the mining industry have been effectively controlled, and the scope of living and residential land is constantly expanding.

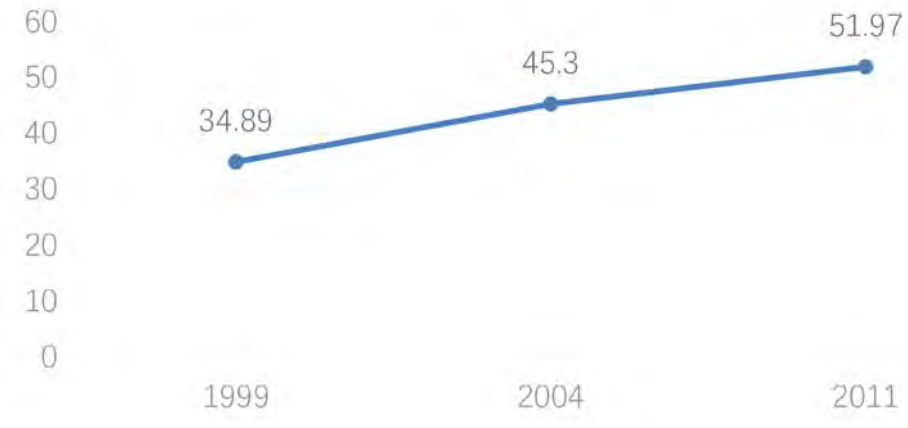


Figure 9 Industrial land share as the year 1999, 2004, 2011

Indicators	Year of 1999 (Remote sensing images) KM²	Year of 2004 (Remote sensing images) KM²	Year of 2011 (Remote sensing images) KM²
Industrial Area	34.87	45.3	51.97
Living Area	634.38	783.85	838.85
Mining sites	38.07	33.14	33.34
Total area(industrial land, residential land, etc..)	1428.09	1928.40	3527.66

Table 1 Statistics of land use table

After the remote sensing image is processed by the GIS software, the data and visualization of the classified land are analyzed. In this article, I use yellow plots as living and habitat area, brown for industrial use, and blue for mining. From this point of view of time evolution, mining land is gradually decreasing, and distributed in the periphery of the mining area, and after the adjustment of industrial structure, part of the mining land has been converted into industrial land. Through the ecological restoration work in mining subsidence areas in recent decades, the ecology of the mining area has been greatly restored.

From the perspective of the layout of urban industrial land, it is mainly distributed along the Weihe River and the main traffic trunks. The distribution of living and residential land is relatively scattered. The urban area is mainly concentrated in the plain area of the central part of the Weihe River, and the land is continuously spreading to the surrounding areas, and the rural residential areas are scattered. Among them, the land surrounding the mining area has been converted from mining land to industrial land, and a large amount of residential land is distributed around the industrial land. With the transformation of heavy industry and the adjustment of industrial structure, combined with the increase in the area of urban land development and construction, the economic benefits of urban land are at the

bottom. At present, the per capita land area of Taiyuan City is higher than that of other big cities in China. The main reason is that the skeleton is large, the layout is scattered, and the national defense industry is more. The industrial, warehouse and protective land accounts for 50% of the total land area, while the main land in urban land. Part of the living and residential land is only 30%.

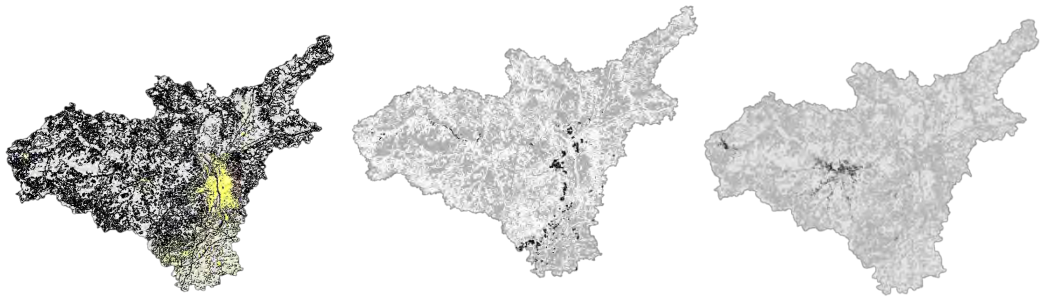


Figure 10 Distribution map of residential land, industrial land and mining land in Taiyuan City in 1999

Figure 11 Distribution map of residential land, industrial land and mining land in Taiyuan City in 2004

Figure 12 Distribution map of residential land, industrial land and mining land in Taiyuan City in 2011

4.3. Summary

The total construction land of Taiyuan City has an average annual growth rate of 587.6 hectares, with a small average annual growth rate, which is equivalent to that of Shijiazhuang, far smaller than cities such as Hohhot, Zhengzhou, Xi'an and Hangzhou.

The demand for construction land in Taiyuan City is spatially different, among which Xiaodian District and Qingxu County are growing rapidly. Among all types of construction land, the growth of independent industrial and mining land is the fastest, the growth of urban construction land is slow, and the land for rural settlements is not decreasing.

From 1998 to 2006, the total construction land in Taiyuan's central urban area showed a growing trend, with an average annual growth rate of 11 square kilometers, and the growth rate increased year by year. From 2001 to 2006, the annual construction land in Taiyuan City increased by 3.92 square kilometers, far less than the annual growth of construction land in the central city. It shows that the future growth of urban construction land in Taiyuan City is mainly due to the construction land demand in the central city.

Taiyuan is the city that in the stage of centralized urbanization now. And the central city tends to be excessively intensive. The marginal area is extensively used. The urban expands strictly big with low efficient land use. In the future, through the transformation of the old city and the increase of investment in the new district, the main urban area will be promoted from excessive intensive to rational and intensive development, while promoting the peripheral area from extensive to intensive use.

Based on the land price perspective, the evaluation of the current residential, industrial and commercial land will promote the central position of the urban area. As the same time, it should demonstrate the land rent benefit of the urban land to fully exploit and realize the economic value of the land, in order to optimize the spatial structure of the city, and revitalize the old city. About 321 hectares of residential land and 267 hectares of industrial land do not meet the location and land rent conditions, and propose adjustments.

5. Research enlightenment

5.1. Economy of Industrial

Development ideas and objectives adhere to the general principle of “taking the town with the township”, guide the development of the “small town group”, and build a “central city-small town group-township-village” linkage development situation to realize the “City Belt Township and Township Belt”. The organic linkage development system of villages and villages (Big villages) with villages (Small villages) will complement the short-term economic development of districts and counties, guide the development direction of towns and villages. Sorting out and improving the urban and rural spatial development strategy, and strengthen the equalization of urban and rural service facilities. Promote rural revitalization and development by region, sub-type and echelon. The village should retain its own characteristics, such as the distinctive culture, the social structure of “acquaintances”, the unique way of life, and the characteristic buildings and production tools left over from history, to develop the rural cultural tourism industry. Protect the ecology, support the scale of agriculture and industrial cluster development.

5.2. Land use efficiency

The urban growth boundary should be strictly controlled to improve the economic benefits of urban production space and ensure the aggregation effect of large and medium-sized cities. Let the tertiary industry with high efficiency in land production such as innovation and technology and productive services return to the city center to lead the city's new round of economic development. Through rural revitalization, we will promote a more rational distribution of production factors in urban and rural areas and large areas, and improve the efficiency of the use of economic resources. The government-led land development path should be transformed to allow more market economies to participate in rural revitalization. Considering that not all rural areas can participate in the division of labor in the market

economy, rural revitalization should have a focus. In China, where resources are scarce, what is more needed is to adopt a smart growth strategy in areas with outstanding development advantages.

Taiyuan City has entered the mature period stage of urbanization. Now the land use of the central urban area tends to be excessively intensive, the marginal area uses extensive land, and the city expands rapidly. In the future, through the transformation of the old city and the increase of investment in the new district, the main urban area will be promoted from excessive intensive to rational and intensive development, while promoting the peripheral area from extensive to intensive use.

5.3. Labor

From the perspective of urbanization rate, the urbanization rate under the resident population statistics is much higher than the urbanization rate under the household registration population. To a certain extent, the household registration system has hindered the free flow of labor across regions. Due to the regional differences in rents and the continuous migration of industries to the periphery of the city, the labor force from rural to urban areas mainly gathers outside the city center to make a living. With the continuous development and changes of the market and technology, the existing labor force needs to constantly update the knowledge structure to adapt to changes in market demand and to have a place to live in the city. Therefore, the development of science, technology, transportation and the rising cost of urban living are also factors that limit the increase in urbanization rate.

5.4. Future research

In the middle of this paper, the study of urbanization rate is analyzed from the perspective of national urban data. While the provincial-level super-large city as the growth pole of regional development, Gucheng Li and etc. have carried out the economic support model for the regional economy of China's urbanization. The analysis made a qualitative analysis from the aspects of urbanization rate, built-up area, urban economic density and regional economy, and found out the data represented by each development factor. In the follow-up study, the provincial cities will be separated from the megacities such as Beijing, Shanghai, Shenzhen and Guangzhou according to the type of international cities, and they will be studied as independent urbanization processes in large and medium-sized inland cities. The agglomeration of industry leads to the difference of space economy, accompanied by a large number of labor gathering, which leads to the typical urban dual structure problem.

6. References

Brian J. L. Berry (1981) Comparative Urbanisation Divergent Paths in Twentieth Century.

Changhong Miao (1998) “New Rural Spaces: The Impact of Rural Industrialization on Rural-Urban Transition in China”,Scientia Geographica Sinica, Vol.18(5), 409-417.

Chenggu Li, Wensheng Zheng and Peixiang Li (2004) ”Modeling Analysis of Regional Support on Chinese Urbanization”, Scientia Geographica Sinica Vol. 24 (1), 1-6.

Jingxiang Zhang, Zhendong Luo (2013) New China Urban and Rural Planning Thoughts, Southeast University Press.

Li Zhang (2009). “Transformation of Population Structure and the Second Transformation of Urbanization in China”, City Planning Review, Vol.33;No.263(10), 35-44.

Lie You (2019) “Shrinking cities or village in China? A view of Human Residential Space Changing Model”,

Masahisa Fujit, Paul Krugman, Anthony J. Venables (2005) Space economics cities, regional and international trade cities, regions, And international trade, Renmin University of China Press, 2005: 468.

Min Zhao, Lie You and Chen Chen (2015) “Smart Shrinkage of Rural Human Settlements and Its Planning Strategies”, Urban Planning, Vol.(7), 9-18.

Pierre-Pilippe Combes, Thierry Mayer, Jacques-Francois Thisse (2008) Economic Geography: The Integration of Regions and Nations, Princeton University Press.

Ruoxiang Jia, Yi Liu (2002) “A preliminary study on the problem of semi-urbanization in China”, Urban Development Studies, (02),19-23.

Shenghe Liu, Tian Chen and Jianming Cai (2004) “Peri-urbanization in China and Its Major Research Issues”, ACTA Geographica sinica,Vol 59(z1), 101-108.

Xiaojun Huang, Chenggu Li and Xin Huang (2008) “The Research of Service Location Factors System”, Economic Geography, Vol 28(1), 55-58.

Yongzhen Duan, Jianbang Jing and Naiming Zhang (2017) “Analysis on the Coordination of Population, Resources, Environment and Economic Development in Shanxi Province, Ecological Economy, Vol. 4 (April)

Zhiqiang Xie (2003,2003-07-03) “New Urbanization: A New Choice for Urbanization in China”, Social Science, 2.

Research Paper

Deciding Where to Live in The Suburb:

Linking Utility-Maximization and Residential Mobility in Polycentric Urban Region Context

Erie SADEWO, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung; Indonesia

Delik HUDALAH, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung; Indonesia

Ibnu SYABRI, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung; Indonesia

PRADONO, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung; Indonesia

Abstract

In a polycentric urban structure, the commuting pattern which was traditionally directed from the suburban to CBD, is becoming more complex with increasing reverse- and cross-commuting activities. This paper is aimed to provide empirical evidence which validating the importance of utility-maximizing parameters, derived from the monocentric model, in the context of post-suburbanized polycentric urban region. It questioning to which extent of different residential mobility between municipalities could be linked to the variation of such parameters. Focusing on the frontier areas of Jakarta Metropolitan Area (JMA), Indonesia, each municipality within the region is treated as a Decision-Making Unit which intend to maximizing co-location between residential and employment uses. Using the data from the 2017 National Socio-Economic Survey (SUSENAS), the analysis was simply taken by comparing the aggregative-mean of income, housing-cost and transportation cost data from each municipal in JMAs periphery. The Data Envelope Analysis (DEA) was used for measure how these utility-maximizing parameters related with inter-suburban migration flows. The results show that housing cost is the only utility which still has significant impact in polycentric setting. Moreover, the area with lowest utility value tends to be the most efficient in attracting in-migrant. It implies that residential mobility within suburban areas does not motivated by lower housing or transportation cost, nor to get near to major employment location. Thus, workers heterogeneity and behavioral aspect may have played bigger role in residential mobility of polycentric urban setting.

Keywords

residential mobility, polycentric, suburban, utility-maximization, Data Envelope Analysis

1. Introduction

Globalization has transformed what previously known as suburban into some new different urban forms. The decentralization of employment to suburb has created multiple attractive

sub-centers, where residential and economic activities were mixed together. This process, termed as post-suburbanization, could be found globally with some variation between countries (Phelps and Wu, 2011). In the United States, post-suburbanization mainly involving the decentralization of service, driven by private sectors (Fishman, 1987; Kling, Olin and Poster, 1995). In The Continental European region, the decentralization of service is strongly controlled by government's policy and planning (Bontje, 2004). In China, government control become the most prominent trait, especially on manufacturing sectors de-concentration from its main metropolis (Wu and Phelps, 2008). In Indonesia, economic decentralization was largely occurred in manufacturing sectors, marked by the establishment of several industrial complexes (Hudalah and Firman, 2012). Lack of government control has been used by private sectors to took the control of new independent settlement development outside the urban core to support the industrial complex, creating post-suburbia (Firman and Fahmi, 2017). Post-suburbanization could be used to explain the variety of urban transformation process in global metropolitan periphery. Nevertheless, distinguishing feature between different regional outcome, may laid on how variety economics base and institutional background affected their urban development.

Different post-suburbanization pattern would create differ urban forms and population consequences. In the United States, declining suburban out-commuting has been followed by the decrease on its population (Lucy and Phillips, 1997). Increasing suburban economies has stimulate inter-suburban commuting dominance (Lee, Seo and Webster, 2006). In Continental Europe, post-suburbanization marked by balanced core to suburban migration (Tzaninis and Boterman, 2018) and high non-urban population growth (Champion, 2001). Post-suburbia served as a reverse and cross-commuting destination, while many suburbanites still made traditional commuting to the urban core (Bontje, 2004). In China, the liberalization in housing market has encouraging the middle class to relocate to the periphery, as well as increasing long distance traditional commuting volume (Zhao, Lü and de Roo, 2010; Hu, Sun and Wang, 2018). In Indonesia, peripheral urban transformation was reflected in the massive growth of urban localities in the outskirt, and the rise of reverse-commuting volume (Firman, 2011). The existence of some new sub-center has attracted industrial workers from adjacent municipal area (Permatasari and Hudalah, 2013). Nevertheless, recent evidence in Jakarta Metropolitan Area has shown that the growing metropolitan transportation problems was not only involving reverse-, but also cross-commuting problems (Sadewo and Syabri, 2018). The emergence of post-suburbanization and its polycentric spatial structure has been argued to have double spatial implications: changes in commuting patterns and population mixing.

To some degrees, the commuting pattern is particularly affected by the individual residential strategies (Baccaïni, 1997). The evidence from Catalonia, Spain, has shown that commuting decision influenced the migration decision, vice versa (Romaní, Suriñach and Artiís, 2003). The suburbanization of employment to peripheral areas could bring positive impact to travel distances, if the workers choose to reside close to their job location (Ingram, 1998). The emergence of complex commuting phenomenon is showing that employment suburbanization process, did not followed by workers residential adjustment. The experience from French has indicate that majority suburban jobs has been taken by the workers from another suburbs (Aguiléra, 2005). While the motivation for doing reverse commuting could be explained by amenities-related factors (Aguiléra, Wenglenski and Proulhac, 2009), or socio economic disparity between home and work location (Davidson and Ryerson, 2018), the existence of cross-commuting pattern have not been well comprehended. While several

attempt has linked cross-commuting to household characteristics (Tscharaktschiew and Hirte, 2010), many were still presumed utility-maximization related factors as a major cause of the phenomenon (Berliant and Tabuchi, 2015; Viguié, 2015; Wrede, 2015). Despite of indicating the monocentric model influences, to the best of our knowledge, no empirical evidence of utility maximization influences on the residential mobility within the polycentric urban settings has been provided. Thus, question arises whether utility-maximization factors was also involved in a residential adjustment problem within polycentric urban region?

This study took the case study of Jakarta Metropolitan Area (JMA), a vast growing polycentric urban region in Indonesia. Post-suburbanization has been evident on its eight peripheral municipal areas. Driven by the private sectors, the development in the suburbs has been growing fast in the last several decades. Phelps and Wood (2011) argued that general post-suburbanization process would lead to the formation of a new town, as it was also expected by Hudalah and Firman (2012) in the case of JMA. Yet, recent evidence shows that amplifying polycentric form of JMA peripheral areas is dominated by manufacturing sectors, pushing back retail and service to agglomerate in the urban core (Sadewo, Syabri and Pradono, 2018). To date, the spatial implication of such distinct process to the population mobility have not been comprehend well. Despite the polycentric spatial structure being an important feature in the post-suburbanization process, several evidences from the post-suburbanized region, especially in Asia, still indicate a tendency toward monocentric land value pattern (Tsutsumi, Shimada and Murakami, 2011; Fang, Logan and Pal, 2015; Elmanisa *et al.*, 2016). Therefore, an empirical evidence of the interplay between utility-maximization and residential mobility in the region would not only contribute to the urban economics debate, but also to the post-suburbanization discussion.

2. Literature Review

2.1. *Urban Structure and Residential mobility*

The terms of residential mobility denote as an intra-urban moves within the same region, typically in a relative short distance (Howley, 2009). In a monocentric urban model, residential location selection was determined from one's ability to make a trade-off between land rent and transportation cost. The workers live in a concentric ring of a particular distance from the central business district (CBD) forming distance decay pattern of residential density. Given the assumption of perfect information, zero transaction cost, and zero moving cost, the residential location consumption for every household is frictionless and static. Quigley and Weinberg (1977) argue that in the equilibrium state of monocentric model, no household has an incentive to move, unless there are some changes in the parameter which defines their utility-maximizing behavior: housing prices; income or other demand determinants; and transportation cost. However, when employment is decentralized within the monocentric city, Dubin (1991) suggests that workers should adjust their residential location closer to their job to minimizing commuting cost. However, many evidences show that pure form of monocentric model has been increasingly difficult to find throughout the world. The emergence of multiple urban subcenter creates more complexity on worker's residential location selection.

Theoretical residential selection discussion in a multi-centered urban economics framework were built upon utility-maximization consideration. Using an inter-connected two cities

setting, Suh (1988) derived several scenarios of equilibrium with intercity commuting. The distance between cities, urban size, cost of moving, commuting cost, and the wage difference, were identified as important heterogeneities for generate the intercity commuting. Depending on the location of CBD, in a decentralized employment, wage rate is crucial to determine workers residential location (White, 1988). Wrede (2015) proposed three probabilistic properties of urban equilibrium. First, workers residential segregation of different subcenter is theoretically incomplete, thus, generates substantial excess commuting. Secondly, land rents are generally asymmetric around subcenters. And third, only a fraction of the available land in the outer urban areas were utilized, whereas the land rent is already equal to the land opportunity costs and therefor it is invariant with the distance to the CBD. When a commuting subsidy is given, it could create a welfare enhancing transfers which stimulate the decision of moving or commuting (Borck and Wrede, 2009). A further contribution was made by Viguié (2015), by adding the moving cost and housing-search imperfection variables in the canonical urban economics model, which lead to the coexistence of people working in different employment centers. Shortly, the basic assumption of distance decay housing price gradient from the monocentric model were still confirmed in the multi-nodal version.

The evidence from the several polycentric urban regions have also showing some consistency with the classic urban bid-rent theories. The existence of multi urban center is found to have a significant impact on housing prices both in developed and developing countries context (Heikkila *et al.*, 1989; Wen and Tao, 2015). Yet, each center shows different effect on housing prices, whereas new CBD has a higher impact than the traditional ones. Other studies using the multi-centered framework in Glasgow by Osland and Pryce (2012) found that the relationship between housing price and employment center in is non-monotonic. It is tended to rise initially to some distance from the employment (sub) center, and then gradually decline. With respect to commuting activities, more attractive employment (sub)center seems to played substantial role on affecting housing price gradient. Using a bi-centric examples, the study of Yiu and Tam (2007) find that the a closer location to more frequently traveled employment center have relatively higher housing prices. Huge amount of commuting activities between two similar employment centers would flatten housing price gradient from one to another, vice versa (Yiu, 2008). In San Francisco, the displacement between job-housing location is influenced by such high housing prices around employment centers (Cervero and Wu, 1997). Nevertheless, high waged workers in the outlying centers does not seems to follows the rule, as they choose nearest housing with high price. With respect to transportation cost, the study from 28 metropolitan areas in the US have shown that in many areas, transportation cost is as high or higher as housing, whereas low-income household tend to live in such high transportation cost areas (Haas *et al.*, 2006). Hence, the finding is also confirmed the influence of workers financial capacity which reflected on wage rate in determining the residential location selection.

2.2. *Urban Development and Mobility in Indonesia*

As commonly found in other developing countries, land development has been the subject of one of the main problems for many urbanites. While reviewing urban land development policy in developing countries, Firman (2004a) described some of the recognized problems: including the use of land resources; land regulation and legal frameworks; institutional land management and coordination; land pricing and taxation; inadequate data, information, and infrastructure capacity; and the lack of tenure security. In Jakarta Metropolitan Area, such

land policy perplexity has escalating land-price in the CBD and land banking practice by private sectors in the outskirts (Firman, 2004a, 2004b; Elmanisa *et al.*, 2016; Firman and Fahmi, 2017). Several consequences emerge in the peripheral areas. New town development has created spatial segregation and the rising tension between land owners, developers, and the local government (Firman, 2004b). Indeed, the housing expenditure in Indonesia were found to be strongly with income (Monkkonen, 2013). Thus, the mismatch between housing supply and demand in the peripheral areas has put a bigger challenge to the social segregation problems (Cahyadi and Surtiari, 2016).

Jakarta's future has argued to accommodate the middle class, while decreasing of affordable housing has displaced the marginalized farther on the outer periphery (Kusno, 2012). The influence of the urban structure transformation in JMA was showed by the increase of average number of daily trips and trips length in JMA between 1985 and 2000 (Susilo *et al.*, 2007). In terms of mobility, the segregation is clearly visible from the commuting mode preference. Earlier study from Sugiarto et al (2014) in JMA have shown that there is some tendency where increasing income followed by the rise in their transportation cost. Nevertheless, different from most developed country, up to 56 percent of commuting travel in region is conducted by motorcycle (Sadewo and Syabri, 2018). While the automobile commuters growth have been stagnant between 2000-2010, the use of motorcycle has increased of 27,5 percent (Susantono, Santosa and Budiyono, 2011). Among many reason, recent evidence from the college student travel in Semarang, Indonesia have revealed that motorcycle travel cost only half than public transportation (Nasruddin and Ratnasari, 2014). The rapid use of motorcycle to facilitate transportation cost-maximization seems to have encourage many people to commuting.

3. Data and Method

This study compares utility-maximizing parameters value between those eight suburban municipalities. Recently, Dewita et al (2018) have been highlighted the limited availability of publicly available and accessible data on housing costs, transport costs, and household income. Here, the value was obtained by analyzing the data from the National Socio-Economic Survey (SUSENAS). It is one of the most reliable cost of living survey in Indonesia, and have been used by several studies of housing (Monkkonen, 2013). The SUSENAS was a household expenditure-based survey. Unlike other surveys in Indonesia, it includes housing and transportation expenditure along with income and recent migration experience. The survey held twice a year in March and September, whereas the former intended for municipal level estimation needs, while the later used only for provincial level estimation. The March 2017's SUSENAS consist of 12,694 household in the whole JMA, of which 7,869 household located in the suburb is used for the modelling purpose.

For measuring household income, total monthly household expenditure was used for proxy by assuming of zero saving. The housing cost (HC) was approached using monthly residential expenditure, distinguished by type of tenure: tenured housing (TH) and rented housing (RH). While the rented housing cost shows actual paid price, the tenured housing cost is an owner equivalent rent (OER) for their current house, in which they willing to pay in a competitive market. Similar concept has also been used by US Bureau of Labor Statistics to measure Consumer Price Index. It was more efficient to measure user cost directly, thus preferably both theoretical and empirical (Gillingham, 1983). There had been some concern of several

drawbacks when using OER as a housing-cost proxy. Díaz and Luengo-Prado (2008) have been highlighted the possible bias of OER with the actual cost of housing, mainly comes from tax advantages from housing service. Dewita et al (2018) have also emphasize of the hardship for the respondent to accurately provide the estimation. Yet, they added that it is more suitable in Indonesian context for providing "aggregated and ground-truthed" information.

The differences of residential expenditure between municipal could also depict the moving cost, as it describes the potential amount that would be gained/loss if one's decided to move. While the transportation cost (TC) comprises of total monthly expenditure for the use of private vehicle and public transportation by all household member, including fare, fuel, taxes, maintenance, parking, and other operational cost excluding the purchase. The monetary aspect reported in this paper was obtained on the similar manner with Dewita et al (2018). Finally, the residential mobility refers to the number of households who made a residential move among the suburban areas within the region in the last five years (recent migration). The household who move within the same municipalities, or move from TH to RH vice versa did not covered by this paper.

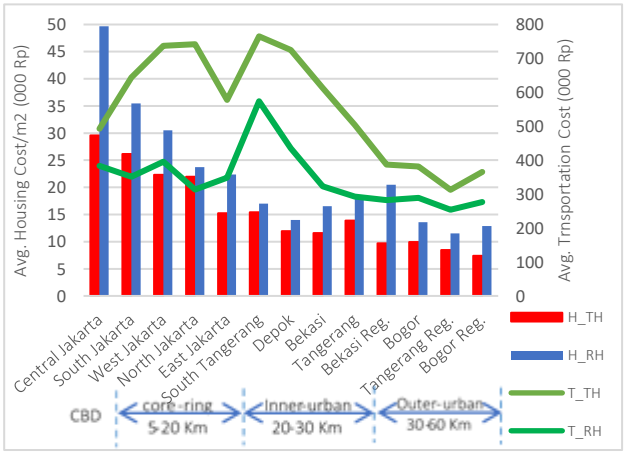
The analysis was simply taken by comparing the aggregative-mean of income, housing cost and transportation cost data from each municipal in JMA. Owing to the use of municipal level areas as an analysis unit, the spatial insight was given by divided the region into four concentric rings, based on their distance to the CBD. The core areas consist of the CBD (0-5 Km) and the core-ring (5-20 Km), while the suburb consist of the inner urban (20-30 Km), and the outer urban areas (30-60 Km). Furthermore, Data Envelope Analysis (DEA) was used for measure how these utility-maximizing parameters relate with in- and out- migration flows on suburban areas. DEA is a non-parametric based method, which originally designed to measuring the relative efficiency between units who performing similar task. It offers more objective ways for ranks the units itself in a best way without have any prior information of data distribution, nor the weight of each variables. In the calculation, each municipal in the JMA peripheral areas was treated as Decision Making Unit (DMU) which maximizing employment for their own citizen. Thus, they should provide a competitive environment to attract residential movement, rather than commuters. Given of particular input and output, DMU with the best combination (score of 1.00) were chosen as the most efficient location in doing the task, relative to other.

4. Findings

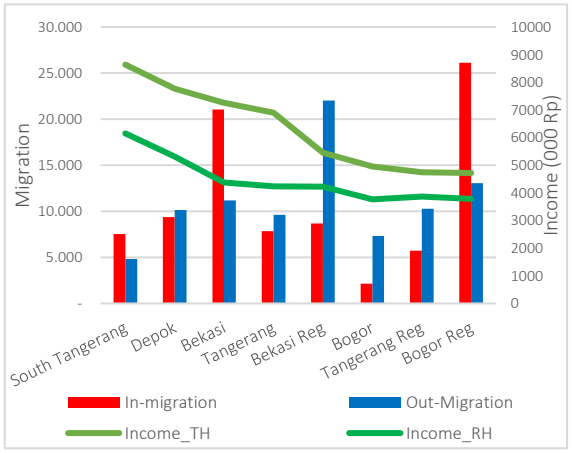
The comparative housing cost (HC) for the whole JMA shows some congruity with distance decay pattern (Figure 1.a). Highest HC was found in Central Jakarta, where the CBD (metropolitan core) located. It was decreased from 12 to 48 percent for tenured housing, and 28 to 55 percent for RH in the core-ring. The HC increased again in the inner urban areas, especially in the east and western parts of the inner urban areas. The HC tends to decrease as it goes further to the outer urban areas, except for rented housing (RH) in Bekasi Regency, where the recognized post-suburbia lies (Hudalah and Firman, 2012). The overall cost of having a tenured housing (TH) in JMA is 28 to 29 percent less than RH. This value was at the same rate between core areas and the suburb. Nevertheless, having whether TH or RH in the core areas will cost the workers doubled rather than in the suburb. Furthermore, moving from the inner- to outer-urban areas means that worker could save almost 33 percent from its HC spending if they choose to made a TH, and only 12 percent if they choose to rent.

For the transportation cost (TC) aspect, different pattern was found in the core-ring areas. While there was a tendency of decreasing TC for those who have RH, the TH travelers experienced the opposite. Their TC was increasing from 17 to 50 percent. Increasing TC cost was also found in several suburban areas, most notably showed on South Tangerang in the inner urban. South Tangerang's citizen TC was the highest compared to whole JMA areas, both for TH and RH. Their Adjacent neighbor's Depok was ranked the second, and overall inner urban ring TC was 14 percent higher than the regional's average. In contrast with the HC, the TC for permanent tenure was 38 percent higher than for those who rent. Living in core areas would cost TC respectively 11 and 5 percent higher for each TH and RH compared to the core area. Shall the workers choose to move farther from inner- to outer-urban areas, they could have saves 45 percent for TH and 32 percent for RH.

Average JMA household's income in 2017 was 6.2 million Rupiah. Those who live in the suburb have 23 percent less income compared to the core areas households. Figure 1.b. shows that while the municipalities with highest income could be found in South Tangerang, an inner-urban area, municipalities with lowest average income lays within the west and southern parts of the outer-urban. The disparity was even higher when we distinguished between TH and RH. Overall renters in JMA has 37 percent less of income compared to those who have tenured. Interestingly, RH household in the inner-urban areas have a higher income, compared to TH household in core, and RH household in core areas. If this finding be seen together with TC pattern, it could show that RH household have their income by commuting to another municipalities. Thus, the income aspects on selected residential location seems to be more related with TC rather than HC.



(a) Housing and Transportation Cost Comparison in JMA by Type of Tenure



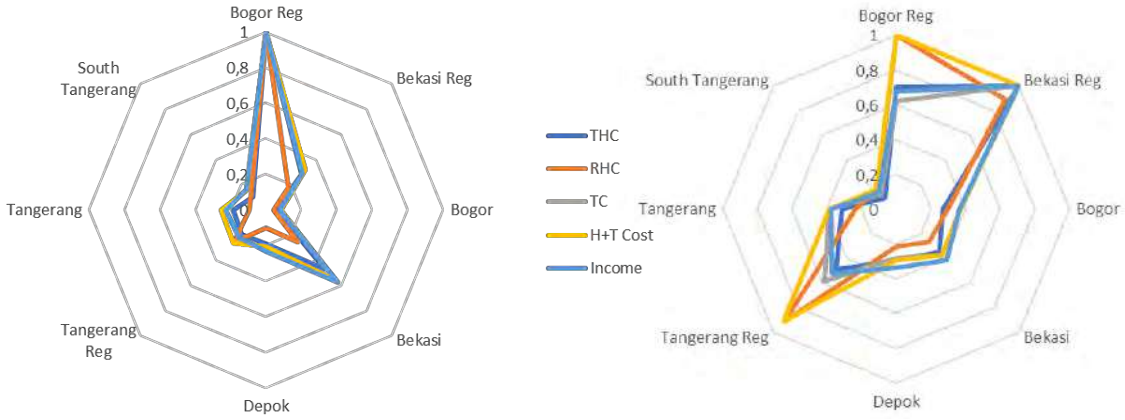
(b) Income Disparity and Migration Pattern in JMA's Suburban

Figure 1. Some Comparison of Utility Value in JMA

Inter-suburban moving events in JMA was actually inconsiderable. In 2017 the number of intra-suburban migrating household was less than 1.6 percent from the total. Highest in-migrant was found in Bogor Regency, municipalities which has the lowest HC and income. Migrant in this municipality mainly came from their adjacent inner-urban such as Depok, but many also came from another outer-urban areas like Bogor City, and Tangerang Regency. On a contrary, the in-migration flows seem to be reversing in Bekasi city. Located in the Inner-urban areas and being the second place of in-migration location, the majority of its migrant is

coming from the neighboring outer-urban, especially Bekasi Regency. The situation reciprocally experienced by Bekasi Regency. Almost 76 percent of Bekasi Regency's movers choosing Bekasi City in the inner urban areas, whereas 70 percent of the numbers, is moving for a TH. Such massive flows made Bekasi Regency the highest out-migrant holder. In brief, either in- or out-migration in JMA suburban seems to have no particular pattern.

For DEA analysis, recent migration experience between suburban areas was set as an output. The result showed a confirmation of how each TH cost, RH cost, TC, the combination of transport and housing cost (T+H cost), and income were efficient to attracted in-migration to Bogor Regency (Table 2.a). On the other hand, RH cost and T+H cost was showed a strong influence to pushing households moves out from Bogor Regency (Table 2.b). Considering that only 18 percent of the housing is rented, it means that most of out-migrant is renters and they moved for better opportunity in others suburb. The migrant which came to Bogor Regency pays as same as the average of existing household for TH cost and TC, but must pay one-third higher for RH. Similar situation of housing renters could also find in Tangerang Regency. The household moving to this place has a below average income and TH, but must pay tripled from the existing household. Interestingly, Bekasi Regency which was a major employment location was placed in the top rank for pushing people's moving out. The fact that the majority of their out-migrant move to a costly place in inner-urban areas indicate that utility-maximization was not the main reason behind this decision. The movers to Bekasi City have an average for income and HC, but pays 41 percent higher for TC indicates that they did not move closer to their job and hence creating more commuting. Other municipalities utility characteristics was far from ideal to attract inter-suburban migration. Thus, this municipal will continue to be the destination of movers from other suburban.



(a) In-migration (b) Out-migration

Figure 2. The Relation of Utility Parameters and Migration in JMA's Suburban

5. Conclusion

This paper comes with two conclusions. First, monocentric model utility-maximization parameters, were still consistent to be used in polycentric setting, but limited only for HC. For TC, inner-urbanites tend to have the highest expenses, imply that they have the longest journey, or maybe they were the most severely exposed with congestion. While less average TC in outer-urban areas shows that they were co-located better. In polycentric structure, the

trade-off between HC and TC does not merely depend on location. Tenurial status was also playing an important role on residential location decision. Despite of having much lower income, household which decide to choose RH were burdened with high HC cost but relatively lower TC. On contrary, selecting TH would cost less for housing, but charge more on TC. Secondly, suburban municipal with lowest utility value like Bogor Regency tends to be most efficient in attracting in-migrant. Surprisingly, they also produce some high score on pushing migrants out. Meanwhile location with similar utility value such as Bogor City does not display the same manner. Instead, developing post-suburbia, a significant major employment location as it could find in Bekasi Regency creating a numerous out-migration flows to their inner-urban area. This phenomenon shows that residential mobility within suburban areas occurs not for a lower HC and TC, nor to get near to major employment location. Further research on urban mobility within a polycentric setting should move beyond utility-maximization approach, and tried to identify the heterogeneity and behavioral aspect of mobile workers.

6. References

Aguiléra, A. (2005) 'Growth in commuting distances in French polycentric metropolitan areas: Paris, Lyon and Marseille', *Urban studies*, 42(9), pp. 1537–1547.

Aguiléra, A., Wenglenski, S. and Proulhac, L. (2009) 'Employment suburbanisation, reverse commuting and travel behaviour by residents of the central city in the Paris metropolitan area', *Transportation Research Part A: Policy and Practice*, 43(7), pp. 685–691. doi: 10.1016/j.tra.2009.06.004.

Baccaïni, B. (1997) 'Commuting and Residential Strategies in the Île-de-France: Individual Behaviour and Spatial Constraints', *Environment and Planning A*, 29(10), pp. 1801–1829. doi: 10.1068/a291801.

Berliant, M. and Tabuchi, T. (2015) *Equilibrium commuting*. Munich Personal RePEc Archive 63504. Available at: https://mpra.ub.uni-muenchen.de/67689/ (Accessed: 12 April 2017).

Bontje, M. (2004) 'From suburbia to post-suburbia in the Netherlands: Potentials and threats for sustainable regional development', *Journal of Housing and the Built Environment*, 19(1), pp. 25–47.

Borck, R. and Wrede, M. (2009) 'Subsidies for intracity and intercity commuting', *Journal of Urban Economics*, 66(1), pp. 25–32. doi: 10.1016/j.jue.2009.02.003.

Cahyadi, R. and Surtiari, G. A. K. (2016) 'Penduduk dan Pembangunan Perumahan di Jabodetabek: Tantangan Pengembangan Megapolitan Jakarta', *Jurnal Kependudukan Indonesia*, 4(1), pp. 55–72.

Cervero, R. and Wu, K.-L. (1997) 'Polycentrism, commuting, and residential location in the San Francisco Bay area', *Environment and Planning A*, 29(5), pp. 865–886.

Champion, A. G. (2001) 'A Changing Demographic Regime and Evolving Polycentric Urban Regions: Consequences for the Size, Composition and Distribution of City Populations', *Urban Studies*, 38(4), pp. 657–677. doi: 10.1080/00420980120035277.

Davidson, J. H. and Ryerson, M. S. (2018) 'Building reverse commute typologies through urban and suburban socioeconomic characteristics', *Cities*, 81, pp. 180–189. doi: 10.1016/j.cities.2018.04.007.

Dewita, Y., Yen, B. T. H. and Burke, M. (2018) 'The effect of transport cost on housing affordability: Experiences from the Bandung Metropolitan Area, Indonesia', *Land Use Policy*, 79, pp. 507–519. doi: 10.1016/j.landusepol.2018.08.043.

Díaz, A. and Luengo-Prado, M. J. (2008) 'On the user cost and homeownership', *Review of Economic Dynamics*, 11(3), pp. 584–613. doi: 10.1016/j.red.2007.12.002.

Dubin, R. (1991) 'Commuting Patterns and Firm Decentralization', *Land Economics*, 67(1), p. 15. doi: 10.2307/3146482.

Elmanisa, A. M. *et al.* (2016) 'Land price mapping of Jabodetabek, Indonesia', *Geoplanning: Journal of Geomatics and Planning*, 4(1), p. 53. doi: 10.14710/geoplanning.4.1.53-62.

Fang, Y., Logan, J. R. and Pal, A. (2015) 'Emerging socio-spatial pattern of Chinese cities: The case of Beijing in 2006', *Habitat International*, 47, pp. 103–112. doi: 10.1016/j.habitatint.2015.01.011.

Firman, T. (2004a) 'Major issues in Indonesia's urban land development', *Land Use Policy*, 21(4), pp. 347–355. doi: 10.1016/j.landusepol.2003.04.002.

Firman, T. (2004b) 'New town development in Jakarta Metropolitan Region: a perspective of spatial segregation', *Habitat International*, 28(3), pp. 349–368. doi: 10.1016/S0197-3975(03)00037-7.

Firman, T. (2011) 'Post-suburban Elements in an Asian Extended Metropolitan Region: The Case of Jabodetabek (Jakarta Metropolitan Area)', in Phelps, N. A. and Wu, F. (eds) *International Perspectives on Suburbanization: A Post-Suburban World?* London: Palgrave Macmillan UK, pp. 195–209. doi: 10.1057/9780230308626_11.

Firman, T. and Fahmi, F. Z. (2017) 'The Privatization of Metropolitan Jakarta's (Jabodetabek) Urban Fringes: The Early Stages of "Post-Suburbanization" in Indonesia', *Journal of the American Planning Association*, 83(1), pp. 68–79. doi: 10.1080/01944363.2016.1249010.

Fishman, R. (1987) *Bourgeois Utopias: The Rise and Fall of Suburbia*. Basic Books (Basic books).

Gillingham, R. (1983) 'Measuring the Cost of Shelter for Homeowners: Theoretical and Empirical Considerations', *The Review of Economics and Statistics*, 65(2), p. 254. doi: 10.2307/1924491.

Haas, P. M. *et al.* (2006) *Housing & Transportation Cost Trade-offs and Burdens of Working Households in 28 Metros*. Center Neighborhood Technology, p. 74.

Heikkila, E. *et al.* (1989) 'What happened to the CBD-distance gradient?: land values in a policentric city', *Environment and planning A*, 21(2), pp. 221–232.

Howley, P. (2009) 'Attitudes towards compact city living: Towards a greater understanding of residential behaviour', *Land Use Policy*, 26(3), pp. 792–798. doi: 10.1016/j.landusepol.2008.10.004.

Hu, L., Sun, T. and Wang, L. (2018) 'Evolving urban spatial structure and commuting patterns: A case study of Beijing, China', *Transportation Research Part D: Transport and Environment*, 59, pp. 11–22. doi: 10.1016/j.trd.2017.12.007.

Hudalah, D. and Firman, T. (2012) 'Beyond property: Industrial estates and post-suburban transformation in Jakarta Metropolitan Region', *Cities*, 29(1), pp. 40–48. doi: 10.1016/j.cities.2011.07.003.

Ingram, G. K. (1998) 'Patterns of metropolitan development: what have we learned?', *Urban studies*, 35(7), pp. 1019–1035.

Kling, R., Olin, S. C. and Poster, M. (1995) 'The Emergence of Postsuburbia: An Introduction', in Kling, R., Olin, S. C., and Poster, M. (eds) *Postsuburban California: The Transformation of Orange County since World War II*. paperback edition. University of California Press.

Kusno, A. (2012) 'Housing the margin: Perumahan Rakyat and the future urban form of Jakarta', *Indonesia*, 94(1), pp. 23–56.

Lee, S., Seo, J. G. and Webster, C. (2006) 'The Decentralising Metropolis: Economic Diversity and Commuting in the US Suburbs', *Urban Studies*, 43(13), pp. 2525–2549. doi: 10.1080/00420980601038370.

Lucy, W. H. and Phillips, D. L. (1997) 'The post-suburban era comes to Richmond: city decline, suburban transition, and exurban growth', *Landscape and urban planning*, 36(4), pp. 259–275.

Monkkonen, P. (2013) 'Urban land-use regulations and housing markets in developing countries: Evidence from Indonesia on the importance of enforcement', *Land Use Policy*, 34, pp. 255–264. doi: 10.1016/j.landusepol.2013.03.015.

Nasruddin and Ratnasari, A. (2014) 'Perbandingan Biaya Umum Transportasi Angkutan Umum dan Sepeda Motor Sebagai Moda Transportasi Oleh Mahasiswa (Studi Kasus: Kampus Universitas Diponegoro Tembalang)', *Jurnal Teknik PWK*, 3(3), pp. 406–417.

Osland, L. and Pryce, G. (2012) 'Housing Prices and Multiple Employment Nodes: Is the Relationship Nonmonotonic?', *Housing Studies*, 27(8), pp. 1182–1208. doi: 10.1080/02673037.2012.728571.

Permatasari, P. S. and Hudalah, D. (2013) 'Pola Pergerakan dan Dekonsentrasi Pekerjaan di Kawasan Metropolitan: Studi Kasus Pekerja Industri Cikarang, Bekasi', *Jurnal Teknik Sipil*, 20(2), pp. 97–106.

Phelps, N. A. and Wood, A. M. (2011) 'The New Post-suburban Politics?', *Urban Studies*. Edited by G. MacLeod and M. Jones, 48(12), pp. 2591–2610. doi: 10.1177/0042098011411944.

Phelps, N. A. and Wu, F. (2011) 'Conclusion: Post-suburban Worlds?', in Phelps, N. A. and Wu, F. (eds) *International Perspectives on Suburbanization: A Post-Suburban World?* London: Palgrave Macmillan UK, pp. 245–257. doi: 10.1057/9780230308626_11.

Quigley, J. M. and Weinberg, D. H. (1977) 'Intra- Urban Residential Mobility: A Review and Synthesis', *International Regional Science Review*, 2(1), pp. 41–66. doi: 10.1177/016001767700200104.

Romaní, J., Suriñach, J. and Artiís, M. (2003) 'Are Commuting and Residential Mobility Decisions Simultaneous?: The Case of Catalonia, Spain', *Regional Studies*, 37(8), pp. 813–826. doi: 10.1080/0034340032000128730.

Sadewo, E. and Syabri, I. (2018) 'Perbandingan pendekatan reformasi metropolitan dalam menyelesaikan isu komuter di Jakarta Metropolitan Area', *Planomadani*, 7(1), pp. 89–105.

Sadewo, E., Syabri, I. and Pradono (2018) 'Beyond the Early Stage of Post-suburbanization: Evidence from Urban Spatial Transformation in Jabodetabek Metropolitan Area', *IOP Conference Series: Earth and Environmental Science*, 158, p. 012040. doi: 10.1088/1755-1315/158/1/012040.

Sugiarto *et al.* (2014) 'Transportation Expenditure Frontier Models in Jakarta Metropolitan Area', *Procedia - Social and Behavioral Sciences*, 138, pp. 148–158. doi: 10.1016/j.sbspro.2014.07.190.

Suh, S. H. (1988) 'The possibility and impossibility of intercity commuting', *Journal of Urban Economics*, 23(1), pp. 86–100.

Susantono, B., Santosa, W. and Budiyono, A. (2011) 'Kepemilikan kendaraan dan pola perjalanan di wilayah Jabodetabek', *Jurnal Transportasi*, 11(3), pp. 153–162.

Susilo, Y. O. *et al.* (2007) 'A reflection of motorization and public transport in Jakarta metropolitan area: Lessons learned and future implications towards better transportation development in developing countries', in *Proceedings of the Eastern Asia Society for Transportation Studies The 7th International Conference of Eastern Asia Society for Transportation Studies, 2007*. Eastern Asia Society for Transportation Studies, pp. 46–46.

Tscharaktschiew, S. and Hirte, G. (2010) 'How does the household structure shape the urban economy?', *Regional Science and Urban Economics*, 40(6), pp. 498–516. doi: 10.1016/j.regsciurbeco.2010.06.006.

Tsutsumi, M., Shimada, A. and Murakami, D. (2011) 'Land price maps of Tokyo Metropolitan Area', *Procedia-Social and Behavioral Sciences*, 21, pp. 193–202. doi: 10.1016/j.sbspro.2011.07.046.

Tzaninis, Y. and Boterman, W. (2018) 'Beyond the urban–suburban dichotomy: Shifting mobilities and the transformation of suburbia', *City*, 22(1), pp. 43–62. doi: 10.1080/13604813.2018.1432143.

Viguié, V. (2015) *Cross-commuting and housing prices in a polycentric modeling of cities*. Working Paper WP 2015.09. French Association of Environmental and Resource Economist. Available at: http://faere.fr/pub/PolicyPapers/Viguie_FAERE_PP2015.03.pdf (Accessed: 22 March 2017).

Wen, H. and Tao, Y. (2015) 'Polycentric urban structure and housing price in the transitional China: Evidence from Hangzhou', *Habitat International*, 46, pp. 138–146. doi: 10.1016/j.habitatint.2014.11.006.

White, M. J. (1988) 'Location choice and commuting behavior in cities with decentralized employment', *Journal of Urban Economics*, 24(2), pp. 129–152.

Wrede, M. (2015) 'A continuous spatial choice logit model of a polycentric city', *Regional Science and Urban Economics*, 53, pp. 68–73. doi: 10.1016/j.regsciurbeco.2015.05.001.

Wu, F. and Phelps, N. A. (2008) 'From Suburbia to Post-Suburbia in China? Aspects of the Transformation of the Beijing and Shanghai Global City Regions', *Built Environment*, 34(4), pp. 464–481. doi: 10.2148/benv.34.4.464.

Yiu, C. Y. (2008) 'Housing price gradient changes between Macau and Hong Kong: a neighboring city effect', *International Journal of Housing Markets and Analysis*, 1(2), pp. 195–206. doi: 10.1108/17538270810877808.

Yiu, C. Y. and Tam, C. S. (2007) 'Housing price gradient with two workplaces — An empirical study in Hong Kong', *Regional Science and Urban Economics*, 37(3), pp. 413–429. doi: 10.1016/j.regsciurbeco.2006.11.007.

Zhao, P., Lü, B. and de Roo, G. (2010) 'Urban Expansion and Transportation: The Impact of Urban form on Commuting Patterns on the City Fringe of Beijing', *Environment and Planning A*, 42(10), pp. 2467–2486. doi: 10.1068/a4350.

Research Paper

Global-Local Dynamics in Urbanization: The transformation of the desa-kota in Bali and the roles of adat institutions

B. Setiawan
Graduate Program in Urban and Regional Planning Gadjah Mada University,
Jl. Grafika 2 Sekip, Yogyakarta Indonesia
e-mail: bobi.setiawan@ugm.ac.id/ bobi.setiawan@gmail.com

Sita Rahmani
Graduate Program in Urban and Regional Planning Gadjah Mada University,
Jl. Grafika 2 Sekip, Yogyakarta Indonesia
e-mail: bobi.setiawan@ugm.ac.id/ bobi.setiawan@gmail.com

Abstract

For so long, urban studies in developing regions such as Indonesia has been trapped into a single view of global value and capital as the main, powerfull forces of the process. The result is therefore, a global, universal form or urbanization and the production of urban spaces. The fact that cities each have different histories, heritage, and resources show that there are local variations in response to global-economic pressures.With a case study of the transformation of the desa-kota in Bali, Indonesia, this paper shows and argues that in the dynamics process of urbanization, local actors and forces have play a significant roles in the production of urban spaces. Further, it argues that the existing centralized-Indonesia 'formal/legal' urban policy and planning system does not fit with the existing dynamics of local-cultural variations of urbanization – the roles of adat institutions and nomrs are significant and therefore should be supported and facilitated.

Keywords

desa-kota, transformation, local-global dynamics, adat institution, Bali

1.Introduction

1.1 Urbanization and Urban Growth in Indonesia: Questioning the Desa-Kota Idea

With the rapid level of urbanization and urban growth, the sustainability and the quality lives of the majority of the Indonesian population will depend on the quality of the urban environment. Based on the data of the Central Bureau of Statistics Indonesia (BPS, 2013), in 2010, the rate of urbanization in Indonesia is 49.8 percent. Recently, more than half the residents of Indonesia (53,3%) reside in urban areas. In 2025, with the total population of around 273 million, approximately 68 percent of them will be living in urban areas. Such rapid urbanization rate which is then manisfestated in the rapid growth of the city should be

anticipated with good planning and appropriate management in order to guarantee its sustainability.

This current status and future projection of urbanization in Indonesia brings two related aspects. First, urbanization and urban growth will facilitate the improvement of the quality of life and the environment of a large part of Indonesia society – something that we all hope. Second, however, this rapid urbanization phenomenon could increasingly perpetuate many problems that are already exist, and even leads to the worsening quality of the urban environment and urban communities – the sustainability of the city and its residents is questioned. There is a crucially need for a better and appropriate planning effort to guide rapid urbanization and urban groiwth in Indonesia.

The theory and the concept of the kota-desa were firstly promoted by McGee (1991). It was to explain the phenomenon of the development of suburban areas of Asian countries, including Indonesia. The basic argument is that the process and the product of urbanization in Asian countries is not similar to that in Western countries. In particular, this concept refers to the processes, forms and characteristics of the sub-urban settlements. It describes that such area has already some urban characteristics, but at the same time, still retain the characteristics of the rural environment and life. Further, this concept explains the stages of the development of urban areas on the sub-urban or outskirts of the city that are not entirely planned and managed, and tend to be organic. Physicaly, the concept of desa-kota manifestated in the form spatial transformation, a complexd and dynamic mix between urban and rural elements. Socially, culturally, and economically, the concept also explains an interesting, complex, and dynamic mixed and interaction between urban and rural activities, between modern and traditional institutions, and between formal and informal mechanisms.

Since its birth, the desa-kota concept tends to be used to describe the phenomenon or development model of Indonesian cities and also Southeast Asian cities – it is a kind of descriptive model. In spite of some criticisms, the concept is increasingly accepted as a relevant concept to understand the processes, forms and characteristics of the development of Indonesian cities. Under the challenges and the need for a more better and appropriate planning approach to guide urban development in Indonesia, it would be very challenging to explore the possibilities of such concept for a more prescriptif ones. A preliminary study done in Yogyakarta in 2014 (Harmen et.all. 2014) shows that the desa-kota in Yogyakarta has a range of distinctive characteristics and contains aspects that in accordance with the principles and indicators of sustainability.

1.2 Urbanization and Urban Grwoth in Bali: Problems or Challenges

Up to now, various studies and writings have been done on Bali, the paradise island, famous as the largest tourist destination in Indonesia. With the beauty of nature, traditions, culture, and history, Bali is called as the island of the gods, that offers exceptional beauty. Traditional settlements in Bali, for example, has very clear concepts and principles that are a balance and harmonious interactions between man and nature (Budiharjo, 1987). The very rapid development of tourism, however, is increasingly brought pressures and problems to the beauty of Bali. As have been documented by several studies, various environmental, social, and economic problems have appeared in Bali and threatening her sustainability (Martopo and Mitchell, 1995).

According to data from BPS (2013), the level of urbanization in Bali is currently around 56 percent. This means that about 1.7 million inhabitants of Bali resided in urban areas. It is also already projected that by 2025, the urban population will increase to about 2 millions.

Such significant increase should be appropriatelly respond to make sure the sustainability of Bali.

Geographically, the urbanization in Bali is concentrated in the city of Denpasar, which has more access to various economic centers and tourism attractions in Bali. In 2013, the city of Denpasar has only 789,000, population, and it is projected that it will become 1.2 million in the year 2020. This figure includes the whole urbanized areas of Denpasar, known as metropolitan of Sarbagita, consists of Denpasar, some parts of Badung and Gianyar. This rapid development has penetrated the villages on the outskirts of Denpasar which some are traditional Balinese villages. The expansions of urban areas in the tradional Balinese villages are crucially important phenomena which should be explored and documented. It is with the assumptions that such case may constitute best practices of rural-urban settlements, which can be learned and then further develop as a descriptif model of rural-urban settlements in the future.

1.3 The Objectives of the Paper

Based on the background presented above, this goal of this research is to explore and document the desa-kota phenomena in Bali, which is belived to be a unique and may contains some important elements and principles of sustainable urban settlement. Such general goal could then be elaborated into three objectives, which are: 1) To document the best practices of three types of rural-urban settlements in Bali;
2) To examine their sustainability as well as the factors that determine the sustainability;
and 3) to develop a planning model to guide the future development of the desa-kota settlement in Bali.

This research was conducted with deskritif analytical approach, whereby the three cases studied were explored and analyzed with a set of indicators. The indicator used is determined through a review of the literature and discussed with stakeholders in the three cases examined. From here, the level of sustainability can be measured in three cases. Further, it then analyzed factors that determine the sustainability of the three cases. From such process then, lessons learned could be then generated. In order to achieve such objectives severalmethods were used in the reserach which included: field surveys, interviews, as well as FGD with stakeholders in three villages. Further, secondary data were also collected, particularly related to aspects of sustainability in three cases.

2.Revisiting The Desa-Kota Ideas

The concepts and terminology of the desa-kota, firstly promoted by Terry Mc. Gee, an expert on urbanization and urban areas in Asia, in the mid 1980s (McGee, 1987). McGee used the term kotadesasi, to explain the phenomenon of the development of the city in the Asian country, particularly the Southeast Asia countries, which shows difference process and products compare to that of cities in Western countries. This concept specifically describes the process, form, and character development in the suburb area which was originally a rural area. The developmental process of the city that are not fully planned and managed resulted in a mixture of between urban and rural environments. Such unique spatial formation is complicated with a dynamic mix between urban and rural activities. Such processes then produces a distinctive settlement characteristic.

Although Gottman already explained the unnique phenomena of a megalopolis city in 1960s, McGee argues that the concept of kotadesasi is not the same as a Megalopolis concept. He stated that: "The megalopolis is a region dominated by the activities of the central urban system. In many Asian countries, the process of Kotadesasi is somewhat different, for it is occuring in many different locations often in areas adjacent to fairy-giants of the urbans cities and sometimes in the form of corridor development adjacent to main roads or railways that link reasonably close, large cities."

Further, he explained that the growth of megalopolis will form special elements namely: 1) a big city; 2) suburban areas; 3) rural-urban; 4) high population density village; 5) low population density village; and 6) small town. This process is characterized by the change of the village became a city, which was accompanied by a shift in economic activity into the formal informal. Example of a megalopolis in Indonesia, among others, is Jabodetabekjur (Jakarta, Bogor, Depok, Bekasi, Cianjur). He, however, also explained how the entire Java island can also be referred to as a series of large megalopolis. The ide of kotadesasi is then used to explain the development of metropolitan cities like Jabodetabekjur, referred to as the Extended Metropolitan Region – EMR. Some characteristics of EMR are: 1) high population density); 2) most of the population depends on agriculture; 3) undergoes transformation activities from agriculture to non farm activities (trade, transport and industry); 4) the intensity of a high population mobility possible availability of transportation is cheap; 5) high interaction between rural and urban activity; and 6) mixing of intensive land use between settlements and economic activities, such as agricultural, industrial, household and industrial areas.

Later, the concept of kotadesasi was then used by many researchers to investigate the phenomenon of urbanization and urban growth in various Asian countries. These studies confirm this concept (Guldin, 1997; The Desakota Study Team, 2008; Moench and Gyawali, 2008). One among studies concerning the desa-kota idea has resulted in nine parameters of to be used to asess the desa-kota, as can be seen in the Table below.

Table 1. The Desa-Kota Parameter

No	Parameter	General Condition of Three Cases
1.	Access to the city	This network enables connectivity between villages and cities, either to support the activities of the economic and social
2.	Job opportunities in second and tertiary sector	Allow the villagers, including woman to acess job and income, without having to leave her village/familly
3.	Access to outside world	The network of communication that allow villagers associated with the outside society actively, both national and global
4.	Most household engage in both farming and non-farming activities/labour	The villagers have a double income from farming activities and non-agriculture
5.	There is still local/traditional group	Provide opportunities to maintain traditional norms, including a spirit of social works and togetherness; strong social capital

6.	Access to Modern technology	Enable local communities to respond global/modern opportunities; Start available modern technologies for processing agricultural and non-agricultural products
7.	Contractual works is exist	Direct wages/cash economy quite dominant, though still tend to be informal sector
8.	Mixed on rural and urban institution	Enable local communities to maintain both traditional and modern activities
9.	Link to global market	Getting connected with the global economy

Source: Adopted from The Desakota Study Team (2008)

3.Description Of Research Area

Bali represents the most important tourist destination of Indonesia (Cole, 2012). Located eight degree of equator, Bali has warm temperatures which draws more than 3.5 million tourists in 2014 Tourism in Bali has been relying on the cultural activities and beaches (Rajendra and Nicholls, 2014). Hindu is the main religion in Bali. Its culture is strongly embodied in ceremonies, everyday rites, and temple festivals (Tang, 2004). Natural resources have been very important for this 5,636.66 km2 island, for example coastal resources, agriculture, mining, and forest (Rajendra and Nicholls, 2014). Bali's main concept of development in 1970s was culture-based tourism development supported by agricultural activities (Sudaratmaja, 2010). Having relatively small area combined with high number of population, for about 4 million people in 2015, land conversions have been unbearable to occur. Land conversion has been a high demand for tourism development, mainly at Badung Regency, Gianyar Regency, and Denpasar City.

Land conversion in Bali has been occurred in average 380-400 ha per year in the last 12 years (Bali Environmental Agency, 2015). The highest record was set during 1987-2003. In average 1,000 ha open land per year was converted into built-up land. The number has actually declined in 2010-2014 that was 338 ha per year land conversion. Paddy field is relatively more in favor for investor than dry land because its equipped infrastructure, for example irrigation canal, street, bridge, market, and information system (Sudaratmaja, 2010).

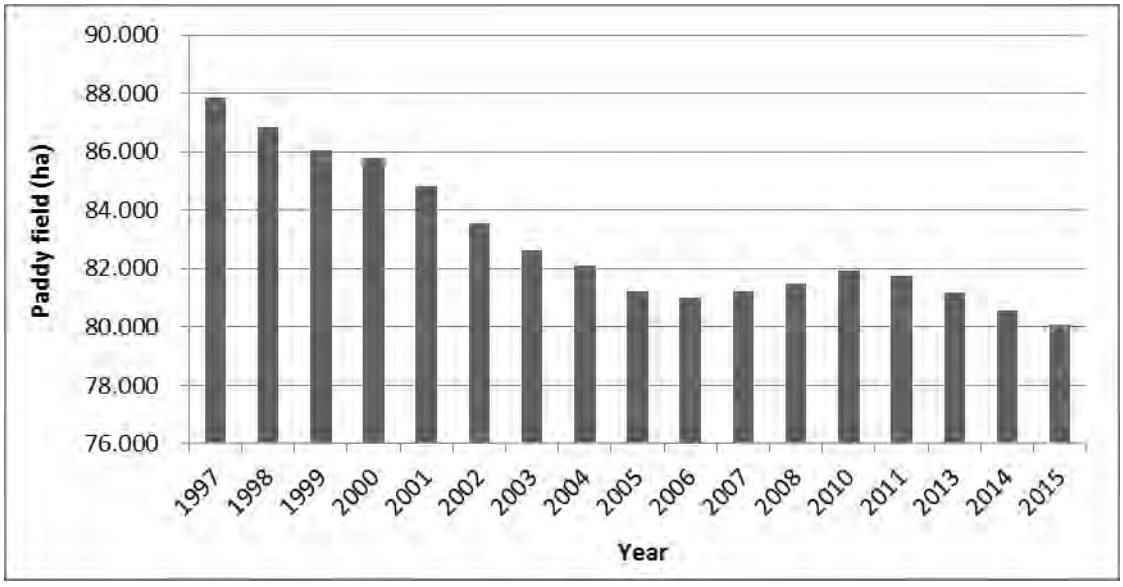


Figure 1. Land Conversion in Bali 1997-2015

Source: Bali Environmental Agency (2015) and Sudaratmaja (2010)

Bali Employment Statistic (2016) stated that in 2015, 56.12% employee in Bali works in service sector, and followed by 24.43% and 24.02% of agricultural sector and manufacture. In Denpasar City, tertiary sector has absorbed major employment, that are trading-hotel-restaurant (39.55%), service sector (24.02%), and industry (13.29%). Work opportunities in Denpasar City have drawn people from other regions, particularly rural area. The good quality of road infrastructures has made Denpasar accessible and relatively close to commute every day. Three cases of desa-kota, that are Lebih Village, Jagapati Village, and Pejaten Village, have different distances and traveling times.

Table 1. Distance from Three Villages to Denpasar City

Village	Distance to Denpasar	Traveling time to Denpasar
1. Lebih	20 km	45 minutes
2. Jagapati	15 km	33 minutes
3. Pejaten	30 km	1 hour and 4 minutes

Source: village book profile (2016)

Figure 2. The study area

Source: Google map and analysis (2016)

Figure 2. The study area

Source: Google map and analysis (2016)

Descriptions of Three Case Studies/Villages

The reserach has been able to identify several characteristics of the three villages that distinguishes one with the other. This characteristic is important to be understood and documented because it will be the basis of the development of three villages in the future. The following table summarizes the characteristics of the three villages that were examined.

Table 2. Description of Three Villages

DIMENSION	Village: Lebih, Gianyar	Village: Jagapati, Badung	Village: Pejaten, Tabanan
Physic/ environmental dimensions	• Unique landscape, a combination of hilly areas and coastal areas • Under pressures of new regional road/bypass: land conversion; • Traditional settlements and housing is still preserve, including agricultural lands	• Environmentally sensitive, yet fertile areas in between two rivers; • Paddy fields still dominant and preserved; • Divided by regional road, but not significantly give pressures; • Traditional settlement is still preserved	• A fertile geographical unit • Paddy fields, which are spacious and dominant, mixed with clay industry are tourism potential.
Socio-cultural	• Traditional practices are still strong; • New urban/tourism activities	• Traditional practices are still strong; • New/modern activities exist in limited ways	• Traditional practices are still strong; • Some villagers engage in tourism sectors/activities; • Start to become small tourism destination
Economy	• Mostly still depends on agricultural and fishery sectors; • Local economy is still dominant; • Tourism sector is increasing	• Mostly still depends on agricultural sector; • Increasing number of villagers work in modern sectors (public and private)	• Mostly depends on SMEs; • Increasing number of villagers engage in modern sectors.

Source: analysis (2016)

It can be summarized from the study that the three villages have characteristics that are fairly typical, although not too special. From physical point of views, for example, each village has its own unique which could be developed into a beautiful and unique residential and landscape. It particularly has an interesting blend of natural and human-made environment. It could then appreciated as a unique and interesting cultural landscape.

However, despite their uniquesness, the study also documented transformation processes that happen slowly. Such transformations, if not guided, could slowly erode and undermine the values landscape of the villages. As will be further expalin in this paper, the changing landscape of these villages have caused by some modern/government projcests, including, bypass, embankment of the beach along the waterfront, as well as the construction of a variety of commercial and tourist facilities. In the case of the village of Jagapati, the existing

landscape has not occurred in large scales, except for the case of the construction of a new residential complex by developer which then adding elements of the urban landscape in the village setting. In the case of Pejaten, the changes happened due to the exploitation of clay for the raw material of tile and pottery which is quite massive. This process is even triggered some landslides in several areas, caused some casualties.

4.Research Finding And Discussions

4.1 Three cases based on Desa-kota Parameters

As has been stated in the previous section, McGee has stated that desa-kota settlement could be evaluated through at least nine parameters, consists of physical, social, and economic dimessions. An assessment of the three cases studied in this research reveals that these three cases meeting the parameters and criteria stated in the literature. As can be seen in the Table 3 below, with a slightly different conditions, all three cases meeting the criterias as desa-kota settlements according to Mc.Gee.

From spatial points of views, these three cases have relativelly good and efficient access to the at least two cities. All three cases have access to the main/major city in the region, Denpasar. Case 1, Lebih also has access to the nearby city of Gianyar, Jagapati also has access to a famous town of Ubud, while Pejaten has also access to a growing city of Tabanan. Such good and efficent access to these three cities, open local communities in three villages to commute daily from their village for many economic, social, and even cultural activities.

Table 3. The Three Case According to the Desa-Kota Parameters

No	Parameter	General Condition of Three Cases
1.	Access to the city	All three villages have good access to the city and other urban/economic centers
2.	Job opportunities in second and tertiary sector	All three villages offer job opportunities in primary, secondary, and tertiary sector – mixed of job opportunities open for village residents;
3.	Access to outside world	All three villages have a good access to outside world, through many kinds of IT
4.	Most household engage in both farming and non-farming activities/labour	Most of village residents in three cases have a mixed-income/jobs, farming and non-farming
5.	There is still local/traditional group	Traditional institution (Adat) is still exist and strong/effective in three villages
6.	Access to Modern technology	Tend to uses traditional technology (in farming, industry, and trading
7.	Contractual works is exist	cash economy tends to be dominant, sector informal is still important
8.	Mixed on rural and urban institution	Balance mixed between traditional and modern institution (desa dinas and desa adat; bank etc.)

9.	Link to global market	More connected to global market, particularly Lebih village

Source: analysis (2016)

4.2 Sustainability Assesssment

A qualitative assessment based on FGD and various other informations has revelead that in general, the three villages could be categorized as those which shows some elements of sustainability. As can be seen in the Table 4 below, the sustainability prospect of the three villages is quite good. This general conclusion is very important because it can be used as the basis for further efforts to enhance the prospect of sustainability of the three villages.

Table 4. The Sustainability of Three Villages

Main Indicators	Lebih	Jagapati	Pejaten
1. Food Security And Sovereignty	+++	+++	+
2. Poverty/Vulnerability	+	+	+
3. Welfare/Happiness	+++	++	+++
4. The Role of Traditional Institutions	++++	++++	++++
5. Identity/Proudness	+++	+++	+++
6. Quality of Landscape	++	++	+++

Source: qualitatif assessment from FGD, interviews, and secondary information (2016)

The above table indicates that there are quite a lot of positive factors that play a role in ensuring sustainability of the three villages. Of the three pillars of sustainable development that are physical/environmental, social, and economic, all three villages have generally had a positive factors to maintain the condition and prospects of sustainability in three villages.

4.3 Factors Contributed to Sustainability of Three Villages

The study also identify factors that affect the condition and prospects of sustainability. Through a qualitatif assessment based on FGD, interviews with stakeholders, as well as the data collected, it can be summarised in the following table. The following table summarizes the various factors according to three pillars of sustainable concepts that are physical aspect/environment, social, and economic issues.

Table 5. Factors Contributed to Sustainability of Three Villages

DIMENSION	Village: Lebih, Gianyar	Village: Jagapati, Badung	Village: Pejaten, Tabanan
Physical/ Environment	• Fertile land; • Water availability; • Open access to sea; • Topograhy/steep slope.	• Clear settlement pattern; • Fertile land; • Good water supply; • Paddy field still preserved; • Housing density still	• . Clear settlement pattern; • Unique settlement pattern (SMEs village) • Good water supply; • Housing density still fine/ok.

		fine/oke.	
Social	• Strong traditional institutions; • Good local leadership; • Good social capital; • Relatively small number of poor/vulnerable villagers. • Community's tolerance.	• Strong traditional institutions; • Good local leadership; • Good social capital; • Community's tolerance.	• Strong traditional institutions; • Good local leadership; • Good social capital; • Community's tolerance; • Relatively small number of poor/vulnerable villagers.
Economy	• Strong local economy/agriculture and fishery; • Mixed economy; Tourism opportunities	• Job Opportunities from urban sectors; • Mixed economy.	• Sustainability of traditional roof tile industry – its comparativeness; • Mixed economy.

Source: Qualitative assessment from FGD, interviews, and secondary information

4.4 Problems and Challenges faced by Three Villages

As mentioned earlier, the three villages also face some pressures that threaten their sustainability. The following table summaries the pressures and challenges faced by the three villages. Such pressures and challenges, for sure, should be understood and appropriatelly respond as they would guarantee the future sustainability of the three villages.

Table 6. Problems and Challenges faced by Three Villages

DIMENSION	Village: Lebih	Village: Jagapati	Village: Pejaten
Physical/ environmental	• Urban development: road and tourism facilities, • Seawall construction; • New housing development by developer; • Agricultural land conversion; • Increasing housing density; • Changing of traditional pattern of housing; • Air and water pollution.	• New housing development by developers; • Agricultural land conversion • More uses of pestisida; • Increasing housing density; • Changing of traditional pattern of housing;	• New housing development by developers; • Increasing housing density; • Changing of traditional pattern of housing; • Soil degradation; • Agricultural land conversion.

Socio-cultural	• Social changes; • New migrants; • New job opportunities; • Social inequality; • HRD.	• Job opportunities; • HRD; • New consumerism	• Job opportunities; • HRD.
Economy	• Economy gap • Tourism opportunities; • More cash economy.	• Local economy; • Access to credit; • Economic value of agricultural sectors.	• Competition with modern roof tile industry; • Market fluctuation

Source: qualitatif assessment from FGD, Interviews, and secondary information

5.Conclusion: Desa-kota: An Alternatif for Sustainable Settlement?

This research concludes four main findings. The first is that, as assumed in this research, the idea of desa-kota, firstly promoted by McGee in the early 1990s, is also existed in Bali. In this paradise island, the urban and rural tissue are strongly intertwined in a dynamic and complex system. Two settlement typologies exist in a very close proximity, the Desa (village) and the Kota (city) – The Desa-Kota. It is a mixture of agricultural and urban landscapes/fabrics which then can be appreciated as an interesting and unique cultural landscape. The Desa-Kota has urban densities, but a highly green quality. Functionally, urban settlement and rural landscape are intertwined in a dynamic and synergetic cooperation.

The second conlusion could be drawn from this research is that the Desa-Kota in Bali has some positive aspects in terms of its sustainability. There are at least six aspects of sustainability explored in this research, which includes: 1) food security; 2) poverty/vulnerability; 3) welfare and happines; 4) identitiy/proudness; 5) quality of landscape; and 6) the role of traditional institution. Although each village has differnt level of quality among these six aspects, in general, however, all have some that kind of quality. In other words, this researach has founded that those three cases have a relatively sustainability condition and prospects.

Further, the researach also found several positive factors which significantly contribute for the sustainability of cultural landscape of the desa-kota in Bali which are: 1) strong adat/traditional institution; 2) government policies; and 3) local/community leadership. These three factors are dynamically play together. Efforts to guarantee future sustainability would depend very much on how we could support such three important factors. The fact that the role of traditional institutions is very strong and significant in three cases is actually not surprising as many studies have already argued that such aspect is crucial for the whole of Balinese culture.

In addition to such positive findings, however, the researach also recognize several problems and challenges faced by the desa-kota in Bali. Among three dimensions of sustainability, economic dimention is the most challenges and problematic aspect. As far as these three villages able to appropriatelly respond such problematic and challenging aspect, their sustainability would be more guaranteed. This, in particular, relates to the idea of whether they could develop an alternative local economic resources, managed by local communities,

and tapping the growing global market opportunities. If that condition could be achieved, the desa-kota settlement in Bali could be further develop into an alternative model for resilient and sustainable settlement.

References

Bali Environmental Agency (2015) Environmental Agency Reports: Bali Province 2015.

Cole, Stroma (2012) "A Political Ecology of Water Equity and Tourism: A Case Study From Bali", Annals of Tourism Research, Vol. 39, No. 2, pp. 1221–1241.

Firman, T. (2003) "The Spatial Pattern of Population Growth in Java, 1990-2000: Continuity and Change in Extended Metropolitan Region Formation", International Development Planning Review 25(1), pp. 53-66.

Guldin, Gregory Eliyu (1997), Desakotas and Beyond: Urbanization in Southern China. Farewell to Peasant China: Rural Urbanization and Social Change in the Late Twentieth Century . Armonk NY: M. E. Sharpe.

Haryadi, dan Setiawan. (2002), "Penyusunan Indikator-Indikator Keberlanjutan Kota di Indonesia." Dalam Jurnal Manusia dan Lingkungan. Vol. IX. No. 3.

Hebbert, Michael. (1994), Sen-biki amidst Desakota: Urban Sprawl and Urban Planning in Japan. Planning for Cities and Regions in Japan. Liverpool: Liverpool University Press.

Martopo, dan Mitchell. Eds. (1995). Bali: Balancing Environment, Economy and Culture. University of Waterloo. Department of Geography Publication Series Number 44.

McGee, Terry G. (1991), The Emergence of Desakota Regions in Asia: Expanding a Hypothesis. The Extended Metropolis: Settlement Transition Is Asia. Honolulu: University of Hawaii Press.

McGee, T.G. (2009), The Spatiality of Urbanization: The Policy Challenges of Mega-Urban and Desakota Regions of Southeast Asia, UNU-IAS Working Paper (161), United Nations University Institute of Advanced Studies.

Moench, Marcus and Dipak Gyawali. (2008), Desakota: Reinterpreting the Urban-Rural Continuum.

Parimin, Ardi Pardiman. (1986), Fundamental Study on Spatial Formation of Island Village: Emvironmental Hierarchy of Scred-Profane Concept in Bali. Disertasi tidak dipublikasikan. Osaka University, Japan.

Pelling, Mark; Mustafa, Daanish. (2010), Vulnerability, Disasters and Poverty in Desakota Systems. Environment, Politics and Development Working Paper (31), Department of Geography, King's College London

Proto Tamansari Team. (2014), Workshop Report. Manuskrip tidak dipublikasikan.
Rajendra, Anom and Nicholls, Richard. 2013. Public Space Issues in Bali Tourist Beaches. Proceedings REAL CORP 2013 Tagungsband, Rome, Italy

Setiawan, B. (2007), "Indikator Keberlanjutan Kota di Indonesia: Studi Komparasi Empat Kota di Jawa." Dalam Jurnal Manusia dan Lingkungan. Volume 14, Noor 1.

The Desakota Study Team. (2008), Re-imagining the Rural-Urban Continuum. Understanding the role ecosystem services play in the livelihoods of the poor in desakota regions undergoing rapid change.

Research Paper

A Study on the Approach of Sustainable Development on Traditional Cultural Landscapes Surrounding Metropolitan Shanghai

Ding SHI, Department of Cultural Heritage and Museology, Fudan University; China
Dianhong ZHAO, Shanghai Tongji Urban Planning & Design Institute CO.,LTD; China

This work was supported by Youth program of
Shanghai Planning Office of Philosophy and Social Science (2016ECK002)

Abstract

At present, the area of urban built-up areas in Shanghai has been effectively controlled, and the once neglected rural landscape has attracted much attention. This study focuses on the methodology of effectively utilizing cultural landscape resources and promoting further harmonious development of urban-rural relations in Shanghai. As a category of cultural heritage, cultural landscape is an indispensable resource for urban development. During the process of urban and rural planning, local cultural landscapes need to be regarded as the driving source of urban development. For a long time, Shanghai, as an international metropolis, has lain particular emphasis on historical relics in the built-up areas of the city. However, since the cultural landscape resources surrounding the built-up areas have been neglected, the image of Shanghai lacks an echo with nature and the countryside. This study examines features of cultural landscapes in Shanghai and puts forward several issues in the conservation and sustainable development of cultural landscape resources, so as to provide the basis for heritage protection, urban and rural planning and tourism planning in Shanghai in the future.

Keywords

cultural landscape, metropolitan Shanghai, conservation, sustainable development, Methodology

1. Shanghai: The Paris of the East?

Shanghai used to be the largest metropolis in the East. It was regarded as the Paris of the East, the city of opportunities and the paradise for adventurers. On mentioning the urban image of Shanghai, what would you think of? The answers may vary. The 20th century Shanghai is usually marked with European-style historical buildings left during the Concession Era, shikumen-style residences or large areas of industrial heritage when the banks of the Huangpu River and the Suzhou River underwent a period of industrialization.

Meanwhile, the 21st century Shanghai may consist of groups of skyscrapers, an advanced underground system, complex highways, and a futuristic new urban area built after the 2010 Shanghai Expo. It can be concluded that Shanghai is an Asian metropolis with a large scale, a complex urban structure, cultural diversity, and an active economy. It is also a complex of urban heritage left during particular historical periods. Therefore, it is hard to summarize in one sentence the value system which Shanghai represents.

What impresses people most is in fact the large number of buildings and the historical neighbourhood, brought by the art of architecture and urban and rural planning as well as a tremendous amount of capital investment during the development of Shanghai. From a chronological perspective, the most impressive urban image of Shanghai is largely related to the urban history after Shanghai became a foreign treaty port in 1843. Therefore, the origin of Shanghai's urban culture has become a bewildering question. Has Western commercialism contributed to the prosperity of Shanghai in recent history? Is Shanghai the Paris of the East?

2. Where is "the rural Shanghai"?

The image of urban Shanghai is regarded as the representative of contemporary Shanghai because it is characteristic and highly-recognizable. However, Shanghai is not made solely from various building groups. Apart from highly concentrated built-up areas, Shanghai owns extensive rural areas. With traditional Chinese gardens scattering in the city, natural landscapes account for a large proportion of urban areas. Shanghai is not a city without history. Before it became a foreign treaty port, it was not a fishing village, but a county. Therefore, the history of Shanghai started before 1840.

The choice of the location of a city and its construction should take natural and geographical features into consideration. Shanghai is located on the west coast of the Pacific Ocean and on the east of the Asian continent. It is a part of the alluvial plain of the Yangtze River Delta. With an average elevation of 4 meters, the majority of Shanghai is situated on a flat terrain except for several hills and mountains in the south-western region (with the highest altitude of 103.4 meters). Approximately 6000 years ago, the present west part of Shanghai already became a land. The present eastern region has also become a land for 2000 years. According to statistics published at the end of 2017, Shanghai enjoys 6340.5 square kilometers of land area, accounting for 0.06% of the total land area of China (SMPG 2019).

The following part is contributed to a brief history of Shanghai. In the Spring and Autumn Period and the Warring States Period, Shanghai was named as "shen" (申) as it belonged to Huang Xie, Lord Chunshen (春申君) of the Kingdom of Chu. In the Jin Dynasty (4th -5th century), the inhabitants who lived on fishing made a bamboo fishing tool named "hu" (扈). Since the estuary was called "du" (渎), the lower reaches of the Song River was first named as "hu du" (扈渎). Later, the character "hu" (扈) was replaced by "hu" (沪), the present abbreviation of Shanghai. In the tenth year of the Tianbao Years of the Tang Dynasty (751 AD), Shanghai belonged to Huating County (the present Songjiang District). In the second year of the Chunhua Years of the Northern Song Dynasty (991 AD), as the upper reaches of the Song River gradually became shallower, the coastline moved eastward, which caused inconvenience for large ships entering and leaving the harbour. As a result, non-local ships could only dock at Shanghaipu (the present Huangpu River from the Bund to Shiliupu), a

branch of the Song River. In the third year of Xianchun Years of the Southern Song Dynasty (1267 AD), a town was established on the west coast of Shanghaipu, named "Shanghai Town". In the 29th year of the Zhiyuan Years of the Yuan Dynasty (1292 AD), the central government ruled out Shanghai Town from Huating County and established Shanghai County, which marked the beginning of Shanghai as a city. In the middle of Ming Dynasty (the 16th century), Shanghai became the national center of cotton, textile and handicraft industry. In the 24th year of the Kangxi Years of the Qing Dynasty (1685 AD), the Qing government established the customs in Shanghai. In the middle of the 19th century, Shanghai became a prosperous business port. After the founding of the People's Republic of China in 1949, Shanghai underwent tremendous economic and social transformation. In particular, it has deepened reform and opening up since 1987. Since the beginning of the 21st century, Shanghai has striven to create an international center of economy, finance, trade, shipping, and technological innovation (SMPG 2019, ESEC 2010).

Due to the massive migration into the city and a rapid increase in floating population from other regions, the total population of Shanghai has been gradually accumulating. The population was under 100 thousand when Shanghai became a foreign treaty port. By the end of 1949, the household registration population was 5.2 million. By the end of 2017, the permanent residential population was 24.1833 million, with 9.7268 million permanent living migrants from other cities and 14.4565 million permanent household registration residents. By the end of 2017, Shanghai had 16 districts, 107 towns, 2 villages, 4253 resident's committees and 1590 villager's committees (SMPG 2019).

The above statistics demonstrate that Shanghai enjoys distinctive natural environments and a long history of human interaction with nature. Shanghai is in fact surrounded by large areas of villages, towns and rural areas, which witnessed human activities before the city became a foreign treaty port. If Shanghai is compared to a painting, these rural areas are its color base. Therefore, a study of the more extensive natural environment and a longer history of Shanghai needs to take into consideration of these "color bases", which can be termed as "the rural Shanghai".

How to display the key elements of the rural Shanghai? From the perspective of landscape heritage conservation and urban and rural planning, the idea of cultural landscape needs to be introduced.

3. How to understand the cultural landscape of Shanghai?

"Cultural landscape" is a concept from cultural geography and a type of world heritage. It can also be viewed as a holistic methodology for heritage conservation (Han 2010). For urban and rural planners, whether they can comprehensively understand the idea of cultural landscape is significant to the future realization of the sustainable development of natural resources and culture.

3.1. The concept of cultural landscape

The founder of cultural geography, Carl Ortwin Sauer (1889-1975), proposes the concept of "cultural landscape" in his 1925 paper "The Morphology of Landscape", which has exerted a profound influence on later studies of landscape. According to Sauer's definition, cultural landscape is "fashioned from a natural landscape by a culture group", among which "culture is the agent, the natural area is the medium, the cultural landscape the result" (Sauer 1925).

In 1992, cultural landscape was listed as a category of world heritage. According to *The Operational Guidelines for the Implementation of the World Heritage Convention*, cultural landscape belongs to the category of cultural heritage and it represents "combined works of nature and of man". In addition, cultural landscape is further classified into three sub-categories: landscape designed and created intentionally by man, organically evolved landscape (relict or fossil landscape, continuing landscape), and associative cultural landscape (UNESCO 2017).

The purpose of creating these sub-categories is to promote deeper understanding of various ways of human interaction with nature and to look for cultural landscape heritage sites with "outstanding universal value" worldwide. In China, classic examples of cultural landscape include the following world heritage sites: Hani Terrance of Yunnan province, the West Lake of Hangzhou, a city of Zhejiang province, and Huashan rock painting of Guangxi province (UNESCO 2019).

Some cultural landscapes gather attention worldwide because they are selected as world heritage sites. However, this does not mean that only cultural landscapes with special value need conservation. Since the selection of world heritage is choosing the best from the good, some ordinary cultural landscapes are destined to remain off the list, which should not diminish their value. On the contrary, these ordinary cultural landscapes are closely connected with people's daily life. In urban Shanghai, what are the characteristics of cultural landscapes?

3.2. Cultural landscape as a platform for interaction between human and nature

To examine cultural landscapes of Shanghai as a platform for interaction between human and nature, the focus should switch from architecture heritage to a more extensive area with a consideration of diverse natural features.

Types and features

To examine cultural landscapes in urban Shanghai as "combined works of nature and of man", there are several types of classic cultural landscapes: gardens and green spaces (including traditional-style gardens and modern public gardens, which are highly-integrated works of nature and humanity), riverside landscapes (especially referring to the combination of waterways, ships, trees on both sides of the bank, bridges, architecture heritage closely related to shipping, and industrial heritage), rural areas (including villages, large areas of fields, and crisscrossed canals), and water towns (business and handicraft industry towns emerged around the intersection of water and land for convenient transportation during ancient times).

In terms of spatial features, the above types of cultural landscapes are closely related to the water system. Most of them can be interconnected through the spiderweb of the water system, which forms an interconnected web when viewed from a flat space. Meanwhile, as waterways extend linearly, landscapes along the bank form a particular sequence. For instance, the Suzhou River, one of the main water systems of Shanghai, originates from the Taihu water system to the west of Shanghai. It travels across villages in Suzhou and rural areas in Shanghai and enters the central area of Shanghai through water towns. It connects several urban public gardens, industrial heritage sites and architecture heritage areas when

it flows under numerous bridges with various shapes and designs. Finally, it joins the Huangpu River around the north of the Bund. From west to east, the wider Huangpu River connects a number of traditional and modern areas, including villages, rural-urban fringes, industrial heritage groups, harbors and ports, historical building clusters in the Bund, business circle in Lujiazui and urban parks, before it finally joins the Yangtze River northward. Therefore, the main waterways in Shanghai have broken their barriers and have respectively connected landscapes emerged from different eras together, which helps to form a way of understanding the geographical features, history and value of Shanghai (XI 2019).

Value

The value of cultural landscapes is rather obvious for Shanghai. To begin with, cultural landscapes contain ecological value. From an ecological perspective, in central Shanghai, public gardens and green spaces along both sides of river banks have made tremendous contribution to biological diversity in the urban area. From the perspective of cultural ecology, those areas provide citizens with spaces for communication, leisure and entertainment, which are important to the mental health of urban residents.

Secondly, cultural landscapes can bring economic value. Since the ancient times, rural areas around urban Shanghai have provided the city with agricultural goods, handicraft goods, industrial raw materials, labour forces and intellectual resources. Rural areas have also been the market for industrial products from urban Shanghai. The urban and rural areas have basically maintained a healthy relationship, complementary to and interacting with each other.

The next is historical and cultural value. Like the large number of architecture heritage sites and industrial heritage sites, cultural landscapes also witness the history of Shanghai. A number of Ming-style and Qing-style gardens locate in urban areas of Shanghai and its surrounding water towns. Shanghai also has the first public urban garden in China. Water towns surrounding the urban area has enjoyed numerous famous figures and literature talents.

It is those clearly-ordered, spiderweb-like waterways and water systems that bring ecological, economic, historical and cultural value together. Most of the water systems are not naturally formed, but are dependent on the canal system of natural main river channels, such as the Suzhou River (old name: Wusong River) and the Huangpu River. They reflect how residents of Shanghai have effectively utilized water resources through their interaction with natural environments during hundreds and thousands of years. Their wisdom can be found in various kinds of water-related activities, such as flood discharging, shipping, irrigation, farming, and planting. This giant water web not only creates a connection between the agricultural, industrial and commercial society during the same era, but also forms a tie between the past and the present (Hartog 2019).

3.3. Challenges and opportunities

However, it is a pity that Shanghai did not fully utilize and promote the value of cultural landscapes during the process of urbanization and industrialization in the past. As an international metropolis, Shanghai has been attracting domestic and foreign capital. Consequently, the land prices of Shanghai have remained high, which has popularized investment in commercial real estate properties. Although capital-led urban development can boost modernization of basic infrastructure, it does not reserve large areas of ecological,

cultural and historical spaces, which, from a profit-oriented perspective, is not worthwhile. Therefore, lack of large areas of high-quality waterfront green spaces and outdoor spaces for sports and leisure becomes an obstacle in promoting the living environment of urban Shanghai. On the other hand, from the perspective of urban and rural relationship, the development of urban Shanghai is based on incorporating its surrounding rural areas. Rapid urbanization and industrialization forces the surrounding rural fields to transform into living areas and industrial areas. Therefore, lands in the countryside also become targets for capital investment. Thus, the ecological and cultural value of the countryside are devalued or neglected.

The values of a city can determine its destiny. Shanghai has begun its introspection and transformation. In 2018, Shanghai Master Plan (2017-2035) was officially published. Till 2035, Shanghai aims to become an excellent global city, a desirable innovation city, a humanistic city, an eco-city, and a modern socialist international metropolis with world influence. Based on the requirement on "Negative Growth" of total land planned for construction, the total area shall be controlled within 3,200 square kilometers. Shanghai shall prioritize ecological requirements, making them the bottom line and the red line for urban development. It shall also strengthen the urban ecological basis and increase the area of ecological lands. Specifically, urban and rural planning shall guard four bottom lines, including ecological conservation red line, permanent prime cropland conservation red line, urban development boundary and cultural protection control line (Tu 2019, Meyer 2019). Therefore, the Plan is a great opportunity for the understanding and conservation of cultural landscapes in urban Shanghai as well as sustainable development.

4. Conservation and Sustainable Development: planning for balance

How should areas with highly-concentrated cultural landscapes be planned if large projects of demolition and construction are not available in Shanghai? In terms of natural elements, compared with built-up urban areas, rural areas around the city have a higher possibility to be re-planned. The following sections will illustrate several ways for cultural landscape conservation and sustainable development.

4.1. The water system: rebirth and revival

During the process of urbanization, Shanghai used to depend on the shipping function of water systems, but neglect their ecological functions. Since the establishment of modern road traffic system, the shipping function of waterways has been abandoned, except for main waterways. Consequently, a number of water systems were filled. It is necessary to rediscover the possible ecological functions of the remaining waterways and irrigation water systems that extend to villages, towns and rural fields. Waterways that have been filled can be unfilled. For existent water systems, apart from upgrading their shipping functions, exploring the possibility of creating ribbon-like landscapes is also necessary. During ancient times, creating landscapes and building irrigation facilities used to work together. For example, there have been blooming peach blossoms and fluttering willows on the Bai Causeway of the West Lake, which have formed a beautiful landscape with traditional Chinese style. Planting scenic tress along water systems can not only revive the beauty of

traditional Jiangnan style, but can also provide routes for birds and other animal migration, which, from a landscape ecology perspective, carries significant ecological value.

4.2. The countryside: a pastoral life at home

Due to convenient transportation, residents of Shanghai usually choose to spend their weekends to the beautiful countrysides in nearby Suzhou or Hangzhou. Although Shanghai enjoys large areas of countryside, most of them are used for productive and functional reasons and lack interaction with urban culture. Therefore, "urban Shanghai" and "rural Shanghai" seem to have been two independent worlds without cultural connections. How rural and pastoral landscape can comfort people of Shanghai is yet to be explored and the wisdom of traditional pastoral lifestyle has not been brought to modern society. As a result, representing the past pastoral life at home, apart from increasing productivity, the countryside needs to create high-quality rural landscapes with a traditional Jiangnan style and thrives to become the charming and attractive countryside at home. In terms of building rural industry, it can also actively explore the connection between pastoral life and pension industry. To conclude, urban and rural planners should view the countryside as a kind of cultural resource and should discover value from production and lifestyle in the countryside, which can later be put into practice and popularized.

4.3. The water town: a poetic habitation

Water towns are connected with water systems and the countryside. Water towns emerged because villagers gathered to exchange goods, which played a significant role in the ancient agricultural society. At the same time, in ancient times, water towns used to be cultural centers of Shanghai where a number of intellectuals had lived. Water towns in Shanghai are culturally and geographically connected with those in the south of Jiangsu province and the north of Zhejiang province (Nolf 2019). While water towns around Shanghai, such as Zhouzhuang, Tongli and Wuzhen, have had high-quality tourism industry, water towns in Shanghai generally lack development in tourism. It is not because Shanghai is short of good water town resources, but because it does not fully understand and promote lifestyles and aesthetics of water towns.

Water towns in Shanghai are the most complex and important cultural landscape areas as they possess both urban and rural features, thus connecting the urban area with the countryside. In recent years, with the development of infrastructures, people can not only enjoy a convenient modern lifestyle in water towns, but also the comfort of streets and alleys in water towns while developing an intimate relationship with nature. Therefore, more and more youngsters have been attracted to live in water towns and start their business there. From the perspective of non-local residents, water towns create a perfect combination of modern technology and traditional architectural spaces and possess huge potential in becoming "poetic habitations", a project which is now under exploration and implementation in towns around Shanghai. Water towns in Shanghai prospered during ancient times, became wasted during the age of modernization and industrialization, and now have been revived under the new age to create new values for the city. As an example of traditional habitation culture, water towns are worthy of careful study in urban and rural planning, tourism planning and conservation planning.

5. Conclusion and suggestions

Shanghai is not the Paris of the East. It is rooted in the rich soil of Jiangnan culture and enjoys characteristic geographical and cultural features. Therefore, it is meaningless to decorate Shanghai with European style. The spirit of Shanghai should be viewed with a larger scope which takes the city's history and geography into consideration. The cultural landscapes surrounding the built-up areas of Shanghai emerge from the city's natural and cultural basis, known as "the base color" of the city. The development of Shanghai cannot proceed without its background and base color. Otherwise, it would become water without a source, and a tree without roots.

The countryside and water towns are the largest cultural landscapes in Shanghai and are interconnected with a huge network of water systems. These landscapes bear wisdom of traditional production and lifestyle and are a key to understanding "the rural Shanghai". Although these cultural landscapes were once neglected and damaged during the process of rapid modernization, they are still the important foundation for ecological protection and cultural development in the future and can shed light on building future human habitations. Therefore, the wisdom and value of these cultural landscapes are worthy of deeper exploration and study.

Cultural landscapes are indispensable resources for a city. In order to "plan for balance" in Shanghai, several types of unbalance need to be tackled with, including unbalance of the city and the countryside, unbalance of conservation and development, unbalance of men and nature, and unbalance of history and modernity. Since conservation and sustainable development of cultural landscapes can greatly help in solving these issues, it is necessary to rediscover the value of cultural landscapes. This can help to incorporate historical, natural and cultural elements into people's daily life, to create a charming "rural Shanghai" and to revive the countryside. During this process, cultural landscapes can be viewed as a holistic methodology of heritage conservation and of sustainable development of urban ecology and culture.

6. References

Han, Feng (2010) Cultural Landscape--Filling the Gaps between Nature and Culture. *Chinese Landscape Architecture,* Vol.26 No.9.

Hartog, Harry Den (2019) Re-appreciation and New Uses of Urban Watersides in Shanghai. *In:* Zhang,Daogen; Xue, Anwei; et al. (ed.) *SASS STUDIES: Reform and Opening-up and Urbanization in* China. Shanghai: Shanghai Academy of Social Sciences Press.

Meyer, Han (2019) Towards a New Narrative for the 21st Century Delta City. *In:* Zhang,Daogen; Xue, Anwei; et al. (ed.) *SASS STUDIES: Reform and Opening-up and Urbanization in China.* Shanghai: Shanghai Academy of Social Sciences Press.

Nolf, Christian; Xie, Yuting; Vannoorbeeck Florence (2019) A Consolidated Archipelago: Retrospective of Water Engineering and Urbanization in the Yangtze River Delta. *In:* Zhang,Daogen; Xue, Anwei; et al. (ed.) *SASS STUDIES: Reform and Opening-up and Urbanization in China.* Shanghai: Shanghai Academy of Social Sciences Press.

Shanghai Municipal People's Government (SMPG). Available: http://www.shanghai.gov.cn/nw2/nw2314/nw2318/index.html [Accessed 07-10 2019].

Sauer, Carl Ortwin (1925) The Morphology of Landscape. *University of California Publications in Geography,* Vol. 2.

The Encyclopedia of Shanghai Editorial Committee (ESEC) (2010) The Encyclopedia of Shanghai. Shanghai: Shanghai Scientific & Technical Publishers.

Tu, Qiyu. (2019) Shanghai 2035 Master Plan: Innovation and Expectation. *In:* Zhang,Daogen; Xue, Anwei; et al. (ed.) *SASS STUDIES: Reform and Opening-up and Urbanization in China.* Shanghai: Shanghai Academy of Social Sciences Press.

UNESCO (2017) Operational Guidelines for the Implementation of the World Heritage Convention. Paris: UNESCO World Heritage Centre.

UNESCO. *World Heritage List* [Online]. Available: http://whc.unesco.org/en/statesparties/cn [Accessed 07-10 2019].

XI, Dongfan (2019) Shanghai: Striving for a World-class Waterfront Area. In: Zhang,Daogen; Xue, Anwei; et al. (ed.) Towards a New Narrative for the 21st Century Delta City. Shanghai: Shanghai Academy of Social Sciences Press.

Case Study Paper

ISOCARP WORLD CONGRESS 2019 - Track 2: Besides the Megacity

Township Development by Private Sector: Lesson Learned from Greater Jakarta

Ir. Soelaeman Soemawinata, MM[1]
Dani Muttaqin, ST[2]
Adhamaski Pangeran, ST[3]
[1]*President of Indonesia Real Estate Association & President of FIABCI Asia Pasific*
[2]*Chairman of Indonesia Association of Planners – DKI Jakarta*
[3]*Jakarta Research Council*

Abstract

High urbanization rate in Indonesia become a huge challenge for Indonesia nowadays. It is predicted that in 2025, 68% of Indonesia's population will live in urban area. Jakarta is the most challenging city for controlling urbanization. As the Capital City of Indonesia, nowadays Jakarta has 11 million population, and almost 30 milions population in Jakarta greater area makes Jakarta became the world's second largest urban area.

As cities become more crowded, many cannot support inhabitants' basic needs like housing. The township development outside Jakarta becoming a huge project for the government of Indonesia and private sector. Today, in Greater Jakarta area itself, there are 33 township development project since early 80's, which is mostly developed by private sector. Township development become a new resident area and center of economic growth. This is why high urbanization rate in Indonesia is also followed by a historic transformation of Indonesia economy. From rural – agriculture to urban – services economy.

Township development outside Jakarta is also creates a more challenging development phase: connectivity between Jakarta and township at greater Jakarta and also a public – private partnership in developing new township.

Keywords*:*

Township Development, Urbanization, Greater Jakarta Area

1. Introduction

High urbanization rate in Indonesia increased tremendously following the country's rapid development by rural – urban migration. In 1950, 15% of Indonesia's population lived in urban areas, in the next 40 years in 1990, later this number is doubled to 30%. The latest report in 2015, The Central Bureau of Statistics (BPS) reported that Indonesian people in urban areas has increased from 49% in 2010 to 53% in 2015. It is also projected by The Ministry of National Development Planning that in 2035, 66% Indonesian will be living in urban areas (PPN/Bappenas, 2015). This circumstance leads to socio-economic and cultural shifts and changes. Moreover, it has an impact on national and urban policies, including housing and settlement sectors.

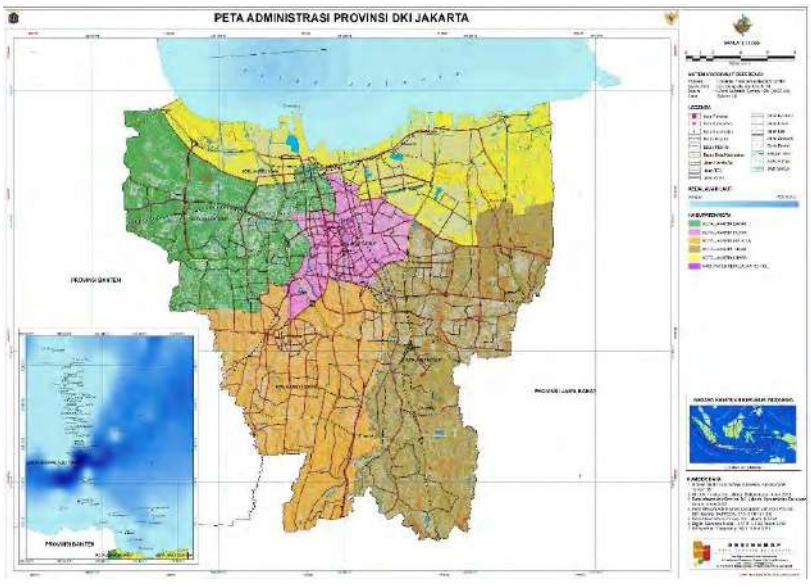
Table 1 Population Distribution in Urban and Rural Area

Source: Central Bureau of Statistics (2018)

YEAR	POPULATION LIVED IN URBAN AREAS (%)	POPULATION LIVED IN RURAL AREAS (%)
2010	49,80%	50,20%
2015	53,60%	46,40%
2035	66,60%	33,40%

Jakarta is the most challenging city for controlling urbanization. As the Capital City of Indonesia, Jakarta holds some pivotal roles for the country as well as region. The city is the centre of Indonesian national government, transportation system, and the heart of some activities such as economy, education, healthcare, culture, and tourism. As a centre of national activity, Jakarta also has been attracting many people from other areas of Indonesia to migrate to the city. According to the Central Bureau of Statistics, the rate of population growth in Jakarta during 2000-2010 was 1.41%, and in 2010 the population in Jakarta reached 9,607,787 with a density of 14,506 people/km^2, making Jakarta the densest province in Indonesia. Nowadays Jakarta has 11 million population, and almost 30-millions population in Jakarta greater area makes Jakarta became the world's second largest urban area.

Figure 1 Administrative Map of Special Region of Jakarta



Source: Special Capital Region of Jakarta in Figures, Central Bureau of Statistics (2018)

Table 2 Area of Special Capital Region of Jakarta

Districts	Area (Km2)	%
The Thousand Islands	8.70	1.31
South Jakarta	141.27	21.33
East Jakarta	188.03	28.39
Central Jakarta	48.13	7.27
West Jakarta	129.54	19.56
North Jakarta	146.66	22.14
Grand Total	**662.33**	**100%**

Source: Central Bureau of Statistics (2018)

Based on Globalization and World Cities Research Network (Globalization and World Cities Research Network, 2018), research conducted by University of Borough, UK, Jakarta is categorized as the Alpha World Cities, compatible to Amsterdam, Beijing, Milan, Frankfurt, and also Seoul. It means that Jakarta is an important world cities that link major economic regions and states into global economy. Jakarta is also promoted as Global City. According to A.T Kearney Global Cities Index in 2012, Jakarta ranks at 54th position among world's global cities.

As the largest city in Indonesia where urbanization is growing rapidly, people are seeking for a place to live in or at least near the city. When Jakarta itself has been fully occupied, and the land prices are getting hard to be controlled, people tend to move outside the city, which causes urban sprawl.

The overall population of the megacity of Jakarta grew in the 20th Century, from about 150.000 in 1900 to about 32 million in 2019. The megacity of Jakarta is also called Jakarta Greater Area or *Jabodetabek,* a name formed by combining the initial syllables of Jakarta, Bogor, Depok, Tangerang, and Bekasi areas.

Table 3 Regional Profile of Jakarta Greater Area

Cities	Population	Areas (km^2)	Density (people /km^2)	Population Growth (%)
DKI Jakarta	10.374.235	662,33	15.663	0,94
Kota Bogor	1.081.009	118,5	9.122	1,53
Kota Tangerang	2.139.891	165,55	13.005	2,16
Kota Tangerang Selatan	1.644.899	147,19	11.175	3,21
Kota Bekasi	2.409.083	210,49	11.445	2,5
Kota Depok	2.254.513	200,29	11.256	3,48
Kab. Tangerang	3.584.770	959,61	3.736	3,08
Kab. Bogor	5.715.009	2.663,81	2.145	2,28
Kab. Bekasi	3.500.023	1.225,00	2.748	3,81
GRAND TOTAL	**32.703.432**	**6.234**	**5.246**	

Source: Special Capital Region of Jakarta, Bogor, Tangerang, South Tangerang, Bekasi, Depok, Tangerang Regency, Bogor Regency, and Bekasi Regency in Figures 2018, Central Bureau of Statistics

Based of the research conducted by World Bank, Indonesia can benefit more from urbanization. I assumed that why Indonesia's benefit from urbanization is still low because Indonesia has only a little number of cities that acts as urbanization target city.

Other countries have gained higher economic growth through formal employment and better labor productivity that result from urbanization. Every 1% growth in urban

population correlated with per capita GDP increase of 13% for India, 10% for China, and 7% for Thailand. But Indonesia is gaining only 4% GDP growth for every 1% of urbanization.

Moreover, the rate of urbanization in Indonesia is negatively correlated with the supply of housing, transportation, and infrastructure. Population growth encourages fulfillment of basic infrastructure and services for all groups of people living in urban areas. Housing ownership as a basic need must be affordable for all levels of society. Uneven or unplanned provision of residential housing will cause sprawl in peri-urban areas and cause green areas to convert to urban areas, which in turn can have a negative impact on food security and the emergence of slums.

To support their daily activities, urban communities' accesibility can burden the transportation system and cause negative externalities such as congestion and pollution. The high ownership of private vehicles due to the failure to fulfill public transportation services for the community can lead to heavy traffic and causes economic loss for such city. According to the Governor of DKI Jakarta, in January 2019 there has been a Rp100 trillion pounding every year. Although there have been many government efforts to overcome traffic congestion in Jakarta, from motorcycle restrictions, odd-even license plate policies, to the development of transit oriented development (TOD) but none of these efforts has directly touched the main causes of congestion in Jakarta, namely the increase of motorized vehicles every year, not including the flow of transportation around the city of Greater Jakarta Area in and out of the city of Jakarta in the morning and evening, or during office hours.

The fulfilment of othe basic infrastructure needs causes high-financing burden for the government. Infrastructure needs such as hospitals, schools, parks, highways, flood and fire disaster management facilities, and other government supporting installations. Moreover, due to urbanization, the provision of basic infrastructure must meet certain quality standards, accommodate the needs for the elderly and persons with disabilities, and in proximity of the settlement's areas.

2. Urbanization Challenge in Greater Jakarta Area

Jakarta as a Megapolitan City involves the city/provincial governments of the surrounding areas in dividing the burden Jakarta has to bear, forming Jabodetabek as the largest urbanization destination in Indonesia. Besides accommodating a total population of 32 million in 2019, it is also home to 26 million vehicles, based on the Jabodetabek Transportation Management Agency (BPTJ) in 2019. The total number of people traveling to-and-from the Greater Jakarta Area area increases from year to year, at least 49.5 million people commute per day in 2018. Of that number, 23.4 million people commute within the city of Jakarta, 4.67 million people commute from areas other than Greater Jakarta Area, while the other 20.02 million are Bodetabek (Bogor, Depok, Tangerang, Bekasi) residents who commutes into Jakarta city per day. With the proportion of vehicles dominated by motorbikes (75%), private vehicles (23%) and public vehicles (2%) per day puts great pressure on Jakarta and the surrounding area.

Bearing a huge burden to the city, the Jakarta Greater Area is also a hub for various activities. According to the Central Bureau of Statistics, the City of Jakarta and the surrounding area have a very large GRDP level of Rp 2,249 trillion in 2017, where DKI Jakarta Province alone contributes half of that value, in the sum of Rp 1,286 Trillion. The average GDP growth per-annum reaches 9.89%, making Jabodetabek a large economic agglomeration in Indonesia. The value of GDP produced should be sufficient in providing the resources needed for the City of Jakarta and its surroundings to solve urbanization problems and fulfill the basic needs of its people.

Table 4 Gross Domestic Product of Region (GDPR) of Jabodetabek Region in Rp Million

Jakarta Greater Area	Gross Domestic Product Of Region (GDPR) (Rp Million)	GDPR Growth (%)
DKI Jakarta	1.286.668.000,00	10,29
Kota Bogor	38.506,50	26,51
Kota Tangerang	149.420.370,00	5,91
Kota Tangerang Selatan	68.317.150,00	11,20
Kota Bekasi	83.327.640,00	5,73
Kota Depok	58.344.490,00	6,65
Kab. Tangerang	119.293.279,63	9,10
Kab. Bogor	201.385.790,00	5,96
Kab. Bekasi	282.468.808,60	7,68
TOTAL	**2.249.264.035**	**9,89**

Source: Special Capital Region of Jakarta, Bogor, Tangerang, South Tangerang, Bekasi, Depok, Tangerang Regency, Bogor Regency, and Bekasi Regency in Figures 2017, Central Bureau of Statistics

The level of income per capita or the average income of the population in Jabodetabek Region is Rp. 145.49 million based on 2017 BPS data. The largest per capita GRDP is owned by Central Jakarta City, Rp. 641 million or 11.05 times greater than Indonesia's per capita GDP in the same year. While the lowest per capita GRDP is owned by the City of Depok with Rp. 25.88 million. The per capita GRDP in the Jabodetabek area, which is above the national average, is mostly the contribution of the DKI Jakarta province, while the contribution from surrounding cities is only a small portion of the proceeds obtained by the Jakarta Province.

Table 5 Gross Domestic Product of Region (GDPR) per capita of Jabodetabek Region in Rp Million

Jakarta Greater Area	GDP Per Capita (Rp Million)
Kep Seribu	303,10
Jakarta Selatan	242,49
Jakarta Timur	145,87
Jakarta Pusat	641,08
Jakarta Barat	158,31
Jakarta Utara	255,31
Kota Bogor	35,62
Kota Tangerang	60,90
Kota Tangerang Selatan	41,53
Kota Bekasi	29,14
Kota Depok	25,88
Kab Tangerang	33,28
Kab Bogor	35,23
Kab Bekasi	80,75
RATA-RATA	**145,49**

Source: Central Bureau of Statistics, 2017

In comparison to the degree of inequality of population distribution or gini ratio in Jabodetabek, seen from the table 6, DKI Jakarta and Banten provinces have low level of inequality, which is below 0.4. Gini ratio is a measure of inequality or aggregate inequality whose numbers range from zero (perfect income equality) to one (perfect income inequality), and classified in 3 categories, namely low (<0.4), medium (0.4-0.5) and high (> 0.5). In contrast to West Java Province which has a moderate level of inequality or above 0.4. Thus, it can be said that Jabodetabek's ability to face the challenges of urbanization is at a sufficient level. Although these capabilities are on the borderline of land capacity and financial capacity in meeting the daily needs of the community.

Table 6 Gini ratio of Jabodetabek Region

PROVINCE	URBAN-RURAL GINI RATIO
DKI Jakarta	**0.390**
Jawa Barat	**0.405**
Kab. Bekasi	0,336
Kab. Bogor	0,384
Kota Bekasi	0,351
Kota Bogor	0,410
Kota Depok	0,352
Banten	**0.367**

Source: Central Bureau of Statistics, Various Year

Compared to other countries, based on research conducted by UN Habitat in measuring the welfare level of a city in the City Prosperty Initiative (CPI), the welfare level of Jakarta is relatively low. The CPI is based on the aspects that make up a city, starting from the ability to meet the basic needs of the population, the use of economic benefits for the welfare of the population, the quality of the environment, the implementation of policies, and the capability of government institutions. Based on a scale of 0 - 100, Jakarta was ranked 40th out of 60 cities studied by UN Habitat. In comparison to other Asean countries, Jakarta's CPI ranking is above the cities of Manila and Bangkok.

Table 7 City Prospertity Index of Jakarta

GLOBAL RANK	ASIA AND OCEANIA COUNTRY	CPI	PROSPERITY INDEX QULITY
7	Melbourne	80,30	Very Solid
10	Sydney	79,77	Solid
15	Tokyo	77,82	Solid
19	Osaka	76,99	Solid
24	Hong Kong	73,35	Solid
33	Almaty	67,44	Moderately Solid
40	**JAKARTA**	**57,23**	**MODERATELY WEAK**
41	Bangkok	56,71	Moderately Weak
42	Ulaanbaatar	56,58	Moderately Weak
44	Manila	55,81	Moderately Weak
46	Abha	54,25	Moderately Weak
47	Yerevan	53,23	Moderately Weak
51	Kathmandu	46,98	Weak and Very Weak
57	Karachi	37,00	Weak and Very Weak

Source: City Prosperity Initiative Global City Report, 2015

Based on another research conducted by the Indonesian Planners Association (IAP) in the Indonesia Most Livable City Index for cities in Indonesia, when compared to the surrounding area, Jakarta scored an average level. Most Livable City Index tries to

measure from two aspects, namely the physical (such as infrastructure, infrastructure and spatial planning) and non-physical (such as the level of community participation and economic activity) in order to score the comfort level of the city as a place to settle and work. Jakarta is rated above the cities of Depok and Tangerang, but Jakarta is rateds under the City of South Tangerang which is categorized in Upper tier of the most livable city group. In conclusion, the pace of urbanization is driving cities around Jakarta to help improve the level of service in order to reduce the burden on the City of Jakarta. Including occupancy expenses that Jakarta can no longer fulfill due to the scarcity and high-price of land.

Table 8 Most Livable City Index of Jakarta Greater Area

Source: Indonesia Most Livable City Index Report, 2017

JABODETABEK	MLCI 2017	TIER 2017
DKI Jakarta	62,6	Average
Kota Bogor	63,2	Average
Kota Tangerang	61,1	Bottom
Kota Tangerang Selatan	65,4	Top
Kota Depok	61,8	Bottom

3. Housing Needs in Jakarta Greater Area

According to Jones Lang LaSalle (JLL) Research Report (2018) regarding Jakarta Property Market Review Q4-2108, the availability of apartments in Jakarta is abundant, judging from the completion of several apartment towers in the Jakarta CBD area and apartments around the LRT and MRT projects which are in the marketing phase. The construction of apartments around the transportation corridor is to support the fulfillment of transit-based housing. Meanwhile, according to the Q4 2018 Market Report in Jakarta issued by Colliers International, the conditions for fulfilling occupancy in Jakarta also showed the same outcome. It is estimated that 41,677 units from 79 projects in 2019-2021 will increase the total supply to 21% over the next 3 years to reach 243,495 units. The available stock of apartments in Jakarta will also be dominated by the middle and middle-to-lower classes, with various stimulant policies from the government, it is estimated that the apartment occupancy will be well-maintained.

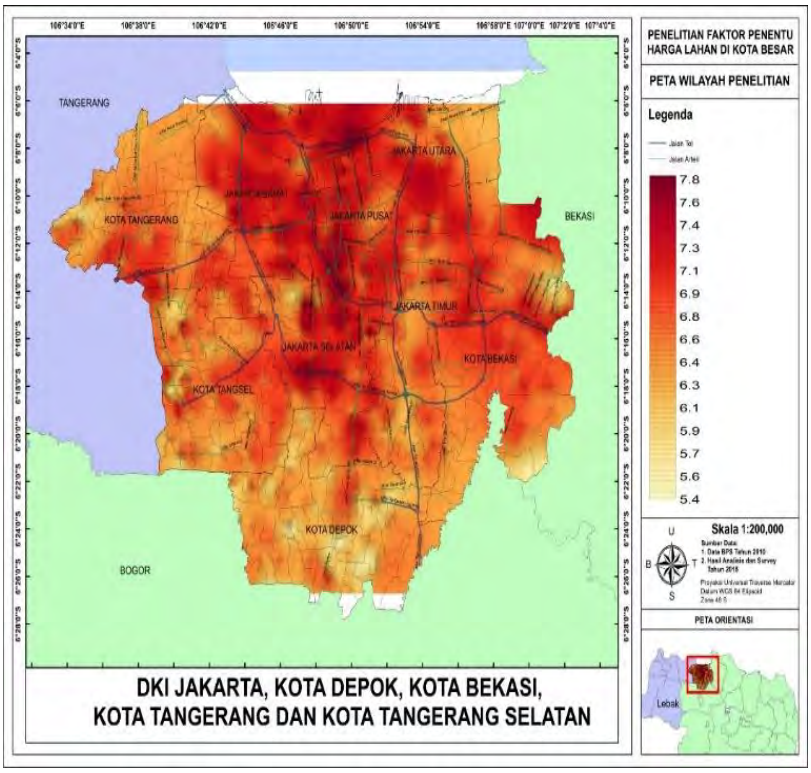
However, the diversity of people who come or settle in Jakarta as a result is different from one another, such as the diversity of the population's purchasing capability to own a house. Based on 2017 Susenas data analysis, only half of the population of DKI Jakarta (51.67%) owns property, where residents who does not own a home are concentrated in 40% of the poor. This is caused by several factors, in addition to the rate of population urbanization into the capital, limited land availability, high land prices in Jakarta, and wage of Jakarta workers whose growth does not parallel land prices. The percentage of families living in a house owned by another family or individual and does not own another house in the DKI Jakarta province, is highest when compared with other provinces, which is 43.60% (Susenas, 2017). This number is an indication of the backlog or lack of housing for residents of Jakarta. The low quality of settlements in a particular area leads to slums, a problem in the destination cities of urbanization. With such challenges, the only solution

in order for people to have permanent and habitable occupancy is, to provide new habitable housing outside the city of Jakarta.

The challenge of ownership backlogs and uninhabitable homes in Jakarta, is still major. Based on the 2015 data from the Central Statistics Agency, there are 1.276 million Jakarta residents who does not own a home. Residential needs will continue to be a challenge in the future. Estimated by 2020, there will still be a housing deficit with a backlog of 7.63 million and 2.38 million non-habitable homes nationally. Not including the addition of new families to reach 700,000 units per year.

The limited development of housing to meet the housing backlog is due to the scarcity of land and high land prices. The density of land that has been built in cities and the high price of land in urban centers ultimates to the development of settlements that convert land on the outskirts of the city from green areas to settlements, and the limited land to support settlements because it is far from water and electricity services. The average increase in land prices from 2010 to 2014 reached 24.54% in the Jabodetabek region. Map of land prices in Jabodetabek are shown in the following figure, where relatively cheap land prices are in cities around Jakarta. This has led to the development of township development to reduce the occupancy burden in Jakarta.

Figure 2 Land Price Map in Jabodetabek



Source: Winarso dkk, 2015

4. Township Development as an Innovative Solution

At the early stages of the development of Jabodetabek, Indonesia experienced a large economic development with growth in 1995 and 1997 reaching an average of 5.2 percent (Stern, 2003) and even reached 7 percent per year for more than a decade (Hill, 1996). This situation encouraged the development of land on a large scale and became one of the causes for Jakarta to develop into very large metropolitan. (Winarso, 1999; Winarso, 2002; Cybriwsky and Ford, 2001). Large-scale land development or township development, also known as the development of a "new city", united Jakarta with its periphery which became known as Jabodetabek, a very large urban area, or "megacity" (Winarso et al. 2015).

At a time when the Indonesian economy was booming, or in the 10-year period since 1986, large-scale land development has led to 20 new cities in the area of Jabodetabek (Winarso, 1999). As of now, in 2019, according to research conducted by JLL there are 33 new cities that develop large-scale housing. The total area of the new cities now amounts to 50,388 hectares in the Jabodetabek area which is mapped in the table below.

Table 9 New Cities in the Greater Jakarta Area

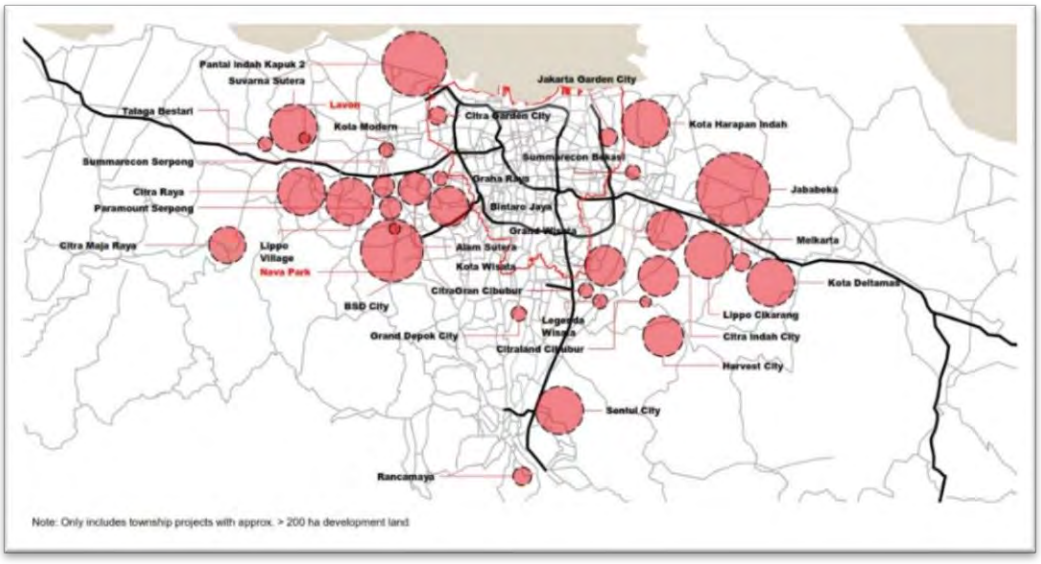
NO	TOWNSHIP	LOCATION	AREA (Ha)
1	Alam Sutera	Tangerang	700
2	Bintaro Jaya	Bintaro, Tangerang	2.321
3	BSD City	Tangerang Selatan	6.000
4	Citra Garden City	Jakarta	451
5	Citra Grand Cibubur	Cibubur	220
6	Citra Indah City	Bogor	825
7	Citra Maja Raya	Maja	2.600
8	Citra Raya	Tangerang	2.760
9	Citraland Cibubur	Cibubur	200
10	Graha Raya	Tangerang	350
11	Grand Depok City	Depok	300
12	Grand Wisata	Cibubur	1.100
13	Harvest City	Cibubur	1.050
14	Jababeka	Cikarang	5.600
15	Jakarta Garden City	Jakarta Timur	270
16	Kota Deltamas	Cikarang	3.000
17	Kota Harapan Indah	Bekasi	2.200
18	Kota Modern	Kota Tangerang	400
19	Kota Wisata	Bogor	750
20	Lavon Swan City	Tangerang	2.600
21	Legenda Wisata	Bogor	500
22	Lippo Cikarang	Cikarang	5.500
23	Lippo Village	Tangerang	1.500
24	Meikarta	Cikarang	500
25	Nava Park	BSD, Tangerang Selatan	68
26	Pantai Indah Kapuk 2	Jakarta Utara	1.000
27	Paramount Serpong	Tangerang Selatan	550

28	Rancamaya Golf & Country Estate	Cileungsi, Bogor	400
29	Sentul City	Bogor	3.100
30	Summarecon Bekasi	Bekasi	240
31	Summarecon Serpong	Tangerang Selatan	375
32	Suvarna Sutera	Tangerang	2.600
33	Talaga Bestari	Balaraja, Tangerang	308
GRAND TOTAL			**50.338**

Source: Analysis, 2019

The development of new cities provides new housing opportunity for people who work or live in Jakarta and the surrounding areas. The approach to the construction of a new city is very strategic in triggering the emergence of new hubs that may potentially distribute the burden of Jakarta in meeting the needs of the community. The new cities were built by the private sector to assist the government in meeting shelter needs. In the figure below, the distribution of the 33 new cities in the Jakarta Greater Area is mapped based on the location and scale of the development. It is seen that, connectivity between the township and the city of Jakarta encourages the development of public transportation infrastructure, such as trains or inter-city buses that pass-through toll roads. Township must also be well planned, both in terms of technical planning, infrastructure and finance and connectivity with its hinterland, Jakarta. With the establishment of an effective new city, it will create a new growth center that can generate collective regional growth. Thus, it can be said that township development is a solution to the challenges of urbanization in the city of Jakarta by distributing the burden with new cities around it.

Figure 10 Township Distribution in Jabodetabek



Source: JLL Annual Report, 2018

5. Government and Private Roles in Township Development

5.1. Government Role

The government as the policy-maker, formulate strategic programs and development plan. In urban development, the Indonesian government has compiled the 2015-2045 national urban development policy and strategy (Kebijakan Strategis Pembangunan Perkotaan Nasional/KSPPN) which sets a national urban development vision to realize "Sustainable Cities and Competitiveness for Community Welfare" which are described in the following 6 missions:

1. Increasing equitable development of cities according to their roles and functions in order to reduce inequality between cities, between regions and between villages
2. Speed up the fulfillment of minimum urban service standards based on the typology and characteristics of the city
3. Build decent, safe and comfortable city dwellings, which are environmentally, societally and culturally based
4. Controlling space and urban development activities, by maintaining the capability and capacity of the city environment, as well as being responsive and adaptive to climate change and disasters
5. Build economic activities, government, and urban communities that are productive, creative and innovative, efficient and IT-based
6. Improve the quality of the implementation of urban governance that is transparent, accountable, participatory and professional

The government plays a major role in setting policies, strategies, plans and programs, both in development planning and budgeting or in preparing spatial plans. Plans for the construction of township must be accommodated in spatial plans with structures and patterns that has legal strength so as to provide long term legal certainty. The government must also provide various incentives in the form of easy business processes and permits that are fast, transparent and free of extortion.

In order to achieve the vision and mission and to put the urban development plan into realization, the government is not independently capable due to budget constraints. Therefore, the government budget allocation must be placed on strategic allocations, namely on allocations that will trigger the growth of regional development, and allocate budget for development where the private sector cannot or is not interested for taking part. In this case, the government can play a role in the construction of basic infrastructure such as roads, clean water, electricity and the construction of public facilities such as mass transportation, or in some cases in providing land for the development of the township area which can be cooperated with the private sector.

Due to the limitations of the government in terms of budgeting and technical capabilities, the government must involve urban stakeholders especially those who have access to financing and proven technical capabilities. The main stakeholders that must be involved by the government are the private sector, because the private sector has sufficient

financial resources and technical capabilities that have been tested in the construction of dozens of new cities around the Jakarta area.

5.2. Role of Private Sector

The private sector has access to funding both in the form of company internal capital funds, banking funds and public funds through the stock exchange. The technical capabilities of private developers have also been proven in building township of world-class quality, in which some has received international awards such as Bumi Serpong Damai and Alam Sutera. With these various factors, the private sector is very strategic to become a partner of the government in the construction of new cities.

The private sector has a role as the party that provides the land and create masterplan and siteplan, which must be in aligned with spatial plan set by the government. Furthermore, the private sector also has the role to find and provide funding needs for the development process. After the development funds are available, the private sector will carry out the development process in staging phases in accordance with the planned development staging. Furthermore, the private sector must also build various public facilities and social facilities in accordance with the minimum standards of service facilities. After the new city is built and has been inhabited by residents with various activities in it, the private sector must provide good management of the area in order to create a quality urban environment.

Table 11 Role of Government and Private Sectors in Township Development

Government Role	Private Role
1. Planning Strategic National Policy Planning	1. Land Provision
2. Compiling National-Reguional-Lokal Spatial Planning	2. Creating Masterplan and siteplan
3. Provide incentives; Ease of Business Process, Hasten License and Permits	3. Funding the development
4. Build basic infrastructure needs: Roads, Bridges, Water Supply, Energy Supply	4. Development Process
5. Provide Public Facilities: Public Transportation, Waste Management Facilities etc.	5. Build Public and Social Facilities: Mosques, Green Areas, etc
6. Providing Land (in some partnership scheme)	6. Estate Management

Sumber: Analysis, 2019

5.3. Future Challenges: Public and Private Partnership in Township Development

Township development has been carried out by the private sector in a dominant manner, starting from initial initiatives, ideas, concepts of planning, financing, development and estate management of the township region. The government's role is only as a regulator. Along with the increase of the urbanization and difficult urban challenges, the Indonesian government currently plans to build 10 new cities, where initial initiatives, ideas, concepts of planning, financing, development and estate management are carried out by the

government. This is certainly a challenge and raises a big question, will the government be able to realize the development of new world-class city quality independently?

Based on the experience of private developers over the past 4 decades, building new cities is a long-term project that requires large funds and long-term commitments. Without intending to undermine the government's capability, it doesn't seem appropriate if the government moves independently to build 10 new cities. Synergy and collaboration with the private sector that has the ability, experience and tested is certainly a wiser step. The government can become a regulator, enabler and in certain cases act as a provider of land for the construction of new cities. This public-private partnership can work well by mirroring and learning from previous experiences.

Nowadays, the Indonesian government plans to move capital to a new location which has yet to be determined, although based on various studies, the possibility of an alternative location is the Kalimantan Island, namely in East Kalimantan, Central Kalimantan or South Kalimantan. With an estimated budget requirement of around Rp. 466 trillion (USD 30 Billion), the budget provided by the government is around Rp. 30 trillion. The rest of these budget is realized from the cooperation of the government and the private sector as much as Rp. 340 trillion, and Rp. 95 trillion from the private sector. In this case, the government has stated that it will involve the private sector through the public private partnership scheme and pure private investment scheme. Of course, with a long history of township development experiences around megapolitan Jakarta, experienced private developers can become a strategic partner of the government in building the new capital city of Indonesia.

6. References

Badan Pengelola Transportasi Jabodetabek. (2018). *http://bptj.dephub.go.id/*. Retrieved from Rencana Induk Transportasi Jabodetabek (RITJ): http://bptj.dephub.go.id/rencana-induk-transportasi-jabodetabek-ritj

BPS DKI Jakarta. (2018). *Jakarta Dalam Angka 2018.* Jakarta: BPS DKI Jakarta.

BPS Indonesia. (2018). *Welfare Indicators.* Jakarta: BPS-Statistics Indonesia.

BPS Kab Bekasi. (2018). *Kabupaten Bekasi Dalam Angka 2018.* Kab Bekasi: BPS Kab Bekasi.

BPS Kab Bogor. (2018). *Kabupaten Bogor Dalam Angka 2018.* Kab Bogor: BPS Kab Bogor.

BPS Kab Tangerang. (2018). *Kabupaten Tangerang Dalam Angka 2018.* BPS Kab Tangerang: Kab Tangerang.

BPS Kota Bekasi. (2018). *Kota Bekasi Dalam Angka 2018.* Kota Bekasi: BPS Kota Bekasi.

BPS Kota Depok. (2018). *Kota Depok Dalam Angka 2018.* Kota Depok: BPS Kota Depok.

BPS Kota Tangerang. (2018). *Kota Tangerang Dalam Angka 2018.* Kota Tangerang: BPS Kota Tangerang.

BPS Kota Tangerang Selatan. (2018). *Kota Tangerang Selatan Dalam Angka 2018.* Kota Tangerang Selatan: BPS Kota Tangerang Selatan.

Colliers International. (2019). *Jakarta, Surabaya and Bali Property Market Report Condition Q4 2018.* Jakarta: Colliers International Indonesia.

Globalization and World Cities Research Network. (2018, November 13). *Globalization and World Cities Research Network*. Retrieved from https://www.lboro.ac.uk/gawc/world2018t.html

Hill, H. (1996). *the Indonesian Economy since 1966.* Cambridge, United Kingdom: Cambridge University Press.

Indonesian Association of Urban and Regional Planners. (2017). *Indonesia Most Livable City Index.* Jakarta: Citieslab.

Jones Lang Laselle Indonesia. (2019). *Jakarta Property Market Review Q4 2018.* Jakarta: JLL Indonesia.

Kementerian PPN/Bappenas. (2015). *Kebijakan dan Strategi Pembangunan Perkotaan Nasional (KSPPN) 2015-2045.* Jakarta: Kementerian PPN/Bappenas.

PPN/Bappenas, K. (2015). *Indonesia: Peta jalan Menuju Reformasi Kebijakan Perumahan.* Jakarta: Kementerian PPN/Bappenas.

Provinsi DKI Jakarta. (2017). *Rencana Panjang Jangka Menengah Daerah.* Jakarta: Pemerintah Provinsi DKI Jakarta.

Stern, J. (2003). The Rise and Fall of the Indonesian Economy. *Faculty Research Working Papers Series, John F. Kennedy School of Government Harvard University*, 3.

Tirto.id. (2019, Januari 14). *Tirto.id*. Retrieved from Jokowi Sebut Rugi Akibat Macet Rp65 Triliun, dari Mana Asalnya?: https://tirto.id/jokowi-sebut-rugi-akibat-macet-rp65-triliun-dari-mana-asalnya-dea1

UN Habitat. (2015). *City Prospertity Initiative Global City Report 2015.*

Winarso, H. (1999). Private Residential Developers and Spatial Structure of Jabotabek. In P. D. Chapman, *Urban Growth and Development in Asia.* Farnham: Ashgate, Aldershot.

Winarso, H. (2016, September 30). Pengembangan Lahan dan Perumahan yang Berpihak pada Masyarkat Miskin. *Sidang Terbuka Forum Guru Besar ITB* (p. 3). Bandung: Institut Teknologi Bandung.

Winarso, H., Hudalah, D., & Firman, T. (2015). Peri-Urban Transformation in the Jakarta Metropolitan Areas. *Habitat International*, (p. 49).

Case Study / Project

FACTORS INLFUENCING of LAND USE CONFLICTS

IN PATIMBAN SEAPORT INDONESIA

Roni SUSMAN, Thomas WEITH

Abstract

Coastal areas are globally under pressure during the last centuries. It often results in land use conflicts which are affected by the diverse composition of stakeholders and interest as well as lack of governance. Our study from Patimban Indonesia explores the influencing factors of large scale land transformation for seaport development resulting in land use conflicts and options for governance in the future. We realized interviews and standardized survey to investigate drivers of changes and landowners' decision making processes to uncover different dimension of the relationship between land use changes between 2010 and 2018. Additionally, those GIS maps are utilized to identify the physical and spatial changes. We valuate that coastal land management in Northern of Subang shows poor performance of land governance, which undermines or hamper the efforts to create sustainable development, environment, and agriculture. One option for the future could be to enforce a stronger coherence between land use planning and land tenure towards an integrated land governance process. Additionally, it will be necessary to discuss and redefine the role of government in coastal land-use development at all levels, especially to raise the capacity of local government in land management.

Research Paper

The City of the Future

A new paradigm, a new vocabulary

Esther Vlaswinkel, Urban designer MSc and director of SVP; The Netherlands

Abstract

THE CITY IN WHICH EVERYTHING IS CONNECTED TO EVERYTHING

To design the city of the future, we have to stop extrapolating the problems of today. This is why team Stadsvrijheid developed a new conceptual framework, a new paradigm for the future. On the basis of this paradigm, the team argues back to the here and now. This approach requires different ordering principles and new design tools, in short: the development of a completely new vocabulary.

Current ordering principles such as density and functions will no longer be applicable in the future, which will centre on length of residence, production potential and the intricacy of the urban fabric. Combinations of these factors determine the DNA of an area. The team's conceptual framework for the future sketches a new world in which everything is connected to everything; people as well as things. Technology plays an important role in this. In the resulting circular economy, everything is productive.

The test site for this new paradigm was Utrecht's eastern fringe. This promising location allows the interweaving of landscape and city in the context of today's urbanization pressure. It is precisely in the monofunctional and fragmented urban fringes that a new type of urban character can emerge by connecting new developments in the field of mobility and technology.

Anyone who wants the city to be liveable and healthy has to move towards a city in which walking is the norm and therefore away from 'radial thinking' of the traditional city. The outskirts of Utrecht will become gateways to the city or even the Randstad, with the Sciencepark as the global attractor and the Lunetten hub as the global connector.

The team translated the contours of the conceptual framework into ordering principles and balanced these using a 'mixing console'. Important principles are: the intricacy of the urban fabric (everything is connected), travel time (everything is proximate), length of residence (everything takes its own time) and varied production (everything is productive). The mixing console allows an alternative method of organizing areas according to functions or density. A specific mix determines the DNA of a region.

The team devised new design tools to create the city of the future. The 'armature', for example, is a tool that can be used to redefine the current road infrastructure. Development along the Z axis, for example, is based on the principles of urban stratigraphy and builds on the strata of the existing city. This allows densification and the current physical barriers such as the motorways will transform into layered landscapes that will act as hubs connecting future centres.

In 2040, city dwellers travel by foot and motorized transport between cities will be connected collectively or individually. The resulting city is a continuous city for pedestrians that not only allows more density, but in which there is more room for greenery as well. Functions such as

roads and housing are layered, stackable, connectable entities linked to new energy and transport networks. They create a productive and endlessly connected urban landscape.

In this layered city everything, including waste, produces something. Everything is designed to last a certain period of time, for example based on length of residence. In this city, the cost of space is the driving force behind change. This comes with new investment models in which the relationship between interest and involvement play a part.

Team Stadsvrijheid consists of designers and specialists of SVP, OKRA landschapsarchitecten, Cross Architecture, Advier, Thefutureinstitute, Info.nl, BPD and The Missing Link

Keywords

Future city, new vocabulary

1. The Landscape as the Basis for an Intensive and Healthy City

1.0. Situation

The outskirts in the east of Utrecht are fragmented. Office locations, residential neighbourhoods of all kinds and recreational functions typical of urban fringes, such as sports fields and a stadium, determine the atmosphere. In addition, substantial infrastructure bundles such as roads, the new tram line and the railway track cut across the area.

Waterlinieweg, which is part of the Dutch Water Line, traditionally bounds the area to the west and guards the border between city and surrounding landscape. The New Dutch Water Line is of high spatial and cultural-historical value. Utrecht's eastern outskirts contain perfectly beautiful forts and defences, which currently go largely unnoticed. In the years that new construction in the area has been permitted – which it previously was not because of its military significance – some scattered locations have been developed. The ambition is to give the area more cohesion and to link its transformation to the improvement of the existing green structures.

1.1. Spearheads: intensive and inclusive utility value and new mobility systems

Utrecht is growing, the use of the city centre is increasingly intensive and there is growing pressure on its scarce open spaces. Stadsrand Oost's green basis can potentially change from a monofunctional to an intensively used and socially inclusive area that meets the conditions of healthy urbanization. The eastern outskirts of Utrecht can accommodate urban functions and will therefore allow the densifying city some breathing space.

In addition, the quest is on for new mobility systems that are light and adaptable and will improve access to the fragmented area and connect it with the city and the region. The existing infrastructure of car lanes, train tracks and the soon to be opened new Uithof Line are obstacles as well as connections. What will this area look like in the distant future? Is light rail the solution or will the system have to become more and less radially-oriented? And what role can Waterlinieweg play in this development?

1.2. Challenge

The growth of Utrecht and the densification of the existing city create opportunities to transform Oostelijke Stadsrand into a metropolitan living, working and recreational landscape. A well-proportioned landscape design can bring back coherence and make the cultural-historical layers experienceable. The challenge is to combine this with more intensive use, densification and accessibility. How can the city achieve this while maintaining a good spatial, social and economic balance?

Healthy urbanization is the starting point every time. This means the focus is on exercise, well-being and sustainability and on living, employment and education. This calls for a living environment that is designed to actually have positive effects on health and that encourages healthy behaviour.

2 New paradigm, new vocabulary

Figure 1 Test plan 'Stadsvrijheid' (urban freedom): The term stadsvrijheid, which denoted the area outside the city walls in the Middle Ages, today once again denotes space in which there is room for experiment.

To design the city of the future, we have to stop extrapolating the problems of today. This is why team Stadsvrijheid developed a new conceptual framework, a new paradigm for the future. On the basis of this paradigm, the team argues back to the here and now. This approach requires different ordering principles and new design tools, in short: the development of a completely new vocabulary.

Current ordering principles such as density and functions will no longer be applicable in the future, which will centre on length of residence, production potential and the intricacy of the urban fabric. Combinations of these factors determine the DNA of an area. The team developed these ordering principles on a test site.

The team's conceptual framework for the future sketches a new world in which everything is connected to everything; people as well as things. Technology plays an important role in this. In the resulting circular economy, everything is productive.

The test site for this new paradigm was Utrecht's eastern fringe. This promising location allows the interweaving of landscape and city in the context of today's urbanization pressure. It is precisely in the monofunctional and fragmented urban fringes that a new type of urban character can emerge by connecting new developments in the field of mobility and technology.

Figure 2A
Movement is everywhere
Mobility will be a commodity. Design will not take existing forms of infrastructure into account.

Figure 2B
Everything is connected
In addition to people, objects are also part of the network, connected to it and operating independently.

Figure 2C
Everything produces something
In the circular economy, everything produces something. Waste is raw material and health clubs generate energy.

Figure 2D
People's perception of time is layered. We no longer build for 'as long as possible', but for 'long enough'.

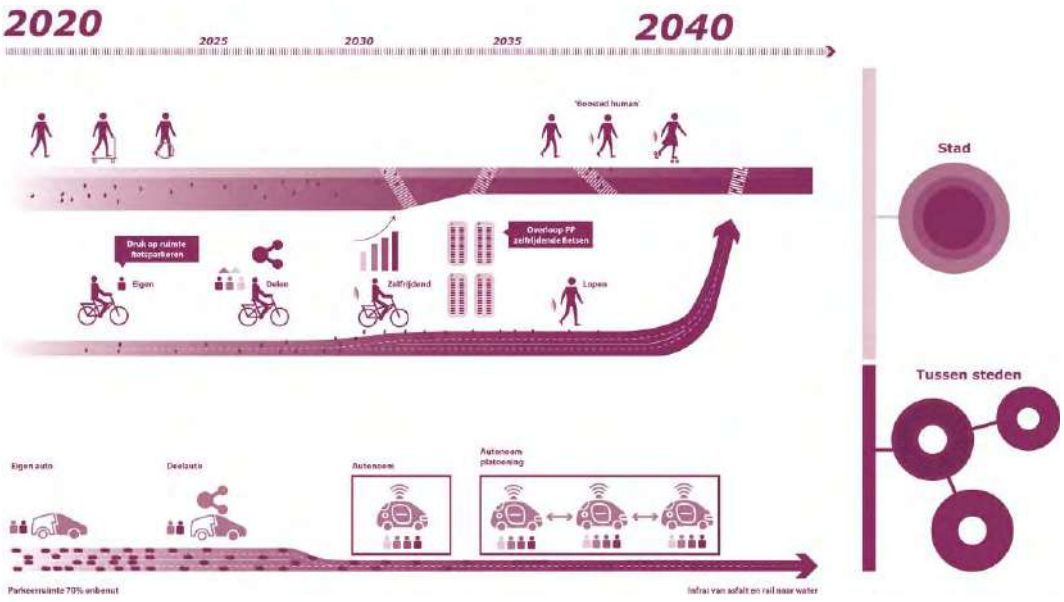


Figure 3 The cost of space is the driving force behind change: human dimensions are the most efficient. By 2040, the test site no longer needs any large-scale transport. The Lunetten and Science Park hubs and the intricate urban fabric ensure that every destination in the area is within walking distance.

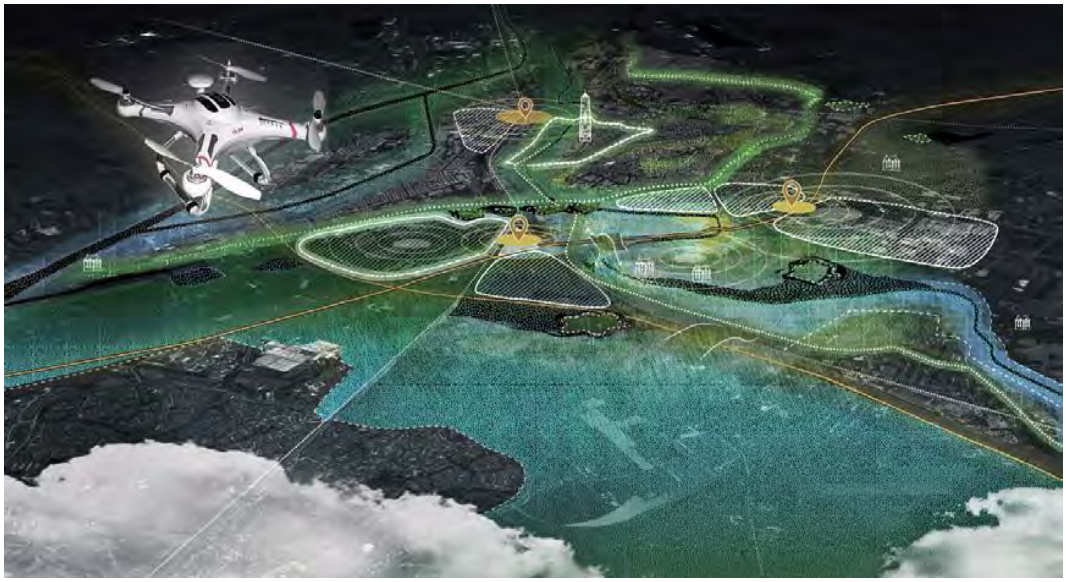


Figure 4 West to east transformation: from back of the city to front of the city (Lunetten, Sciencepark and Kromme Rijn landscape).

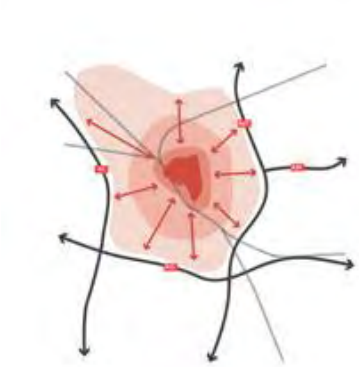
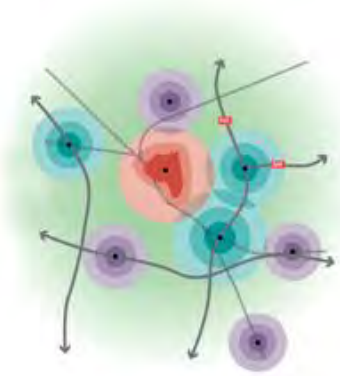
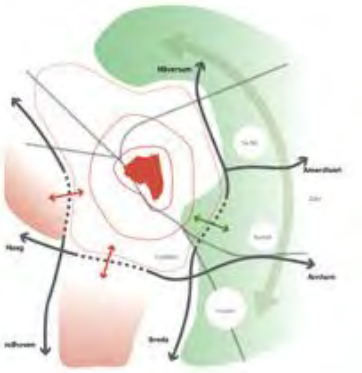


Figure 5A/B/C
Utrecht today: radial thinking



Utrecht 2040: Complementary centres



Utrecht 2040: #030 integration

2.1 Complementary Centres

Team Stadsvrijheid wants to create a healthy city with a large variety of living environments in which the human dimension is the starting point for every intervention. The team also considers connecting the existing city with its outskirts as an important task. After all, the infrastructure that is intended to ensure accessibility also cuts the city into segments and often creates barriers that stand in the way of good connections.

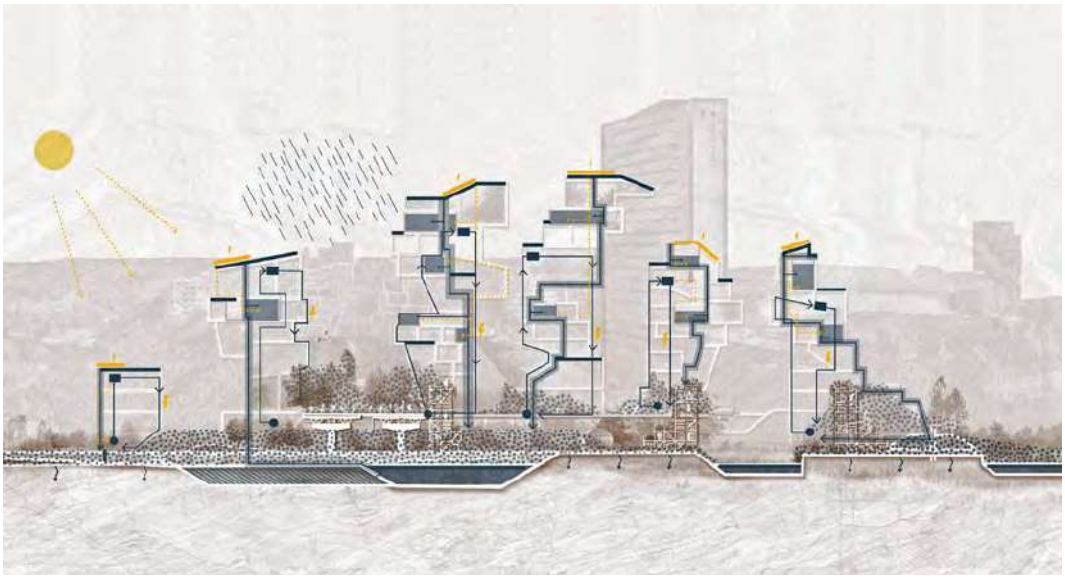


Figure 6 The landscape as a valve that controls the flow of water to the city: 70 per cent of the water in the canal system originates from the Kromme Rijn River. In 2040, the meandering 'water machine' will result in a stronger current, less sedimentation, cleaner water and new ecological connections to the city. Locally, the river will become important as a climate-adaptive production and recreational landscape and as the Arcadian backdrop of the city's new front.

Figure 7A Science Park: 'global attractor'

Figure 7B Lunetten: 'global connector'

Anyone who wants the city to be liveable and healthy has to move towards a city in which walking is the norm and therefore away from 'radial thinking'. By looking at Utrecht as a city with several complementary centres rather than a single centre-oriented city, specific places in the outskirts of Utrecht that can serve as hubs of connections with the region and the rest of the world catch the eye. The outskirts of the city will become gateways to Utrecht or even the Randstad, with the Sciencepark as the global attractor and the Lunetten hub as the global connector, and thus change from the B-side of the city to its A-side.

Figure 8 Transformation Kromhoutkazerne: adaptive campus for 'new arrivals'. Self-built top-up community from locally produced bamboo (light, biobased and adaptable).

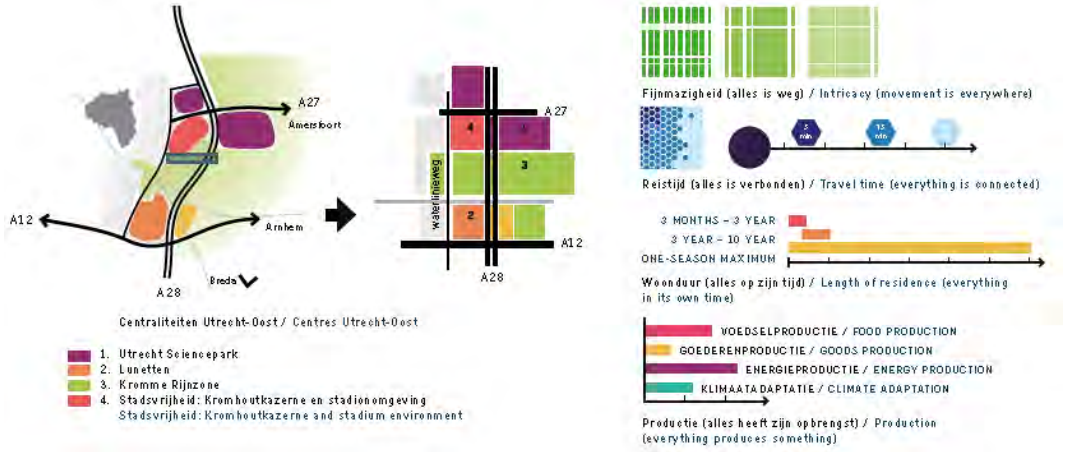


Figure 9

2.2 Area Mixing Console

The team translated the contours of the conceptual framework into ordering principles and balanced these using a 'mixing console'. Important principles are: the intricacy of the urban fabric (everything is connected), travel time (everything is proximate), length of residence (everything takes its own time) and varied production (everything is productive). The mixing console allows an alternative method of organizing areas according to functions or density.

A specific mix determines the DNA of a region. The team developed these principles for different locations on the test site. The Kromme Rijn zone, for example, offers space to green pioneers who live and work in a nature-friendly way. No fixed energy network is provided for them, but rather an autarkic system that matches their nomadic lifestyle. In Utrecht Science Park, a higher density of housing and business activity is appropriate.

Living here means using a service, which will suit the lifestyle of temporary residents such as expats and students.

Figure 10 Transformation stadium environment: the high-density heart of Stadsvrijheid with ground floors at various levels. As the crow flies, the area is 100 per cent wadeable and therefore 100 per cent passable.

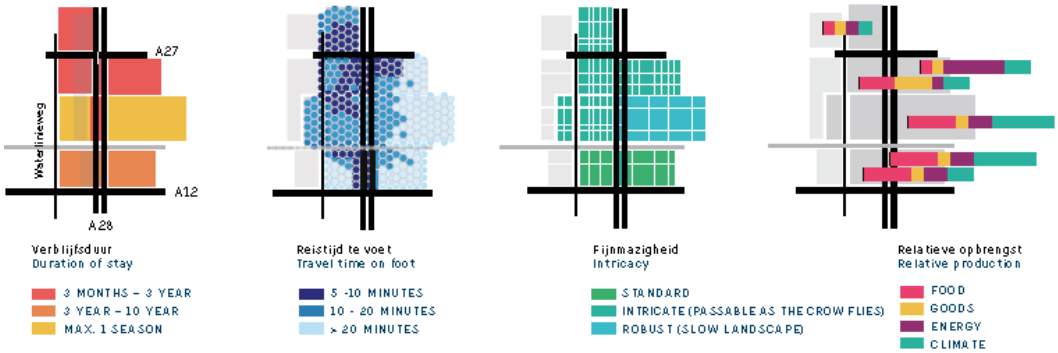


Figure 11 Mixing console for the area (theme maps).

Noun[1] **{ar•ma•ture}** The	*meaning* housing of infrastructure, such as utility bundles, data, energy, waste, goods [2] layered support structure for what has not yet been built [3] carrier of urbanization [4] *origin* arma: equipment [5] *synonym* setting, support structure [6] *example* Armature 27; interurban armature located on former A27 motorway.
Noun **{cen•tra•li•ty}** the	[1] *meaning* source of activity and exchange in urban landscape [2] multifunctional and dense [3] sometimes coincides with mobipoint (see list) [4] *synonym* community.
Noun **{food•board}** the	[1] *meaning* body that promotes the impor tance of circularity [2] local administrative body [3] origin food forest; production based on the ecological food cycle in an area.
Noun **{he•ri•tage deal}** the	[1] *meaning* investment vehicle developed in connection with the nomination of the New Dutch Waterline for the World Heritage List for creative petit projects by local heritage corporations.
Noun **{me•an•der}** the	[1] *meaning* dynamic climate-adaptive landscape [2] *origin* winding course of a river.
Noun **{mobi•point}** the	[1] *meaning* point that links routes with mobility-related service providers [2] where supply and demand is largely determined by market forces [3] social safety and experience are important synonym site.
Noun **{nolli 2.0}** the	[1] *meaning* design principle for the walkable city [2] movement as the crow flies through an intricate network of third places [3] *origin* map that distinguishes between public and private space.
Noun **{turn}** the	[1] *meaning* shif t in economic and spatial focus from west to east in the twenty-first centur y [2] *origin* shif t in power relations.
Verb **{to un•bun•dle}**	[1] *meaning* deconstruction of the transport system: infrastructure of transpor t, mobility objects, people, services based on data, curators, users [2] this leads to the walkable city (see nolli 2.0).
Noun **{ur•ban•stra•ti•gra•phy}** the	[1] *meaning* urban densification by developing via the Z-axis [2] dense construction near armatures [3] physical barriers are removed without compromising on the amount of greenery.
Noun **{Utrecht hash•tag}** the	[1] *meaning* system of main armatures around the city of Utrecht [2] the armatures form the development axes of the city [3] the #hashtag is rooted in the past, and shapes the future [4] carries the development and is the grid along which people reflect [5] *synonym* fence; grid [6] *origin* graphic symbol used on Twit ter to mark keywords in a message; word or sentence prefixed with the # symbol.
Noun **{wa•ter ma•chi•ne}** the	[1] *meaning* landscape system that purifies water and meets the power requirements for the urban system. Improves quality of life.

Figure 12 Vocabulary design tools

2.3 Design Tools

The team devised new design tools to create the city of the future. 'The armature', for example, is a tool that can be used to redefine the current road infrastructure. Development along the Z axis, for example, is based on the principles of urban stratigraphy and builds on the strata of the existing city. This allows densification and the lifting of the physical barriers of Waterlinieweg and the A27 motorway; the landscape can be layered and brought into the city.

The test site shows the possibilities of the new ordering principles. Embracing change and a variety of governance practices can never produce a clear-cut final picture. That is why the team presents an imagined atmosphere that includes the dynamics of gradual development – with tempting vistas that provide insight into the functioning of the city of the future, but that also raise questions.

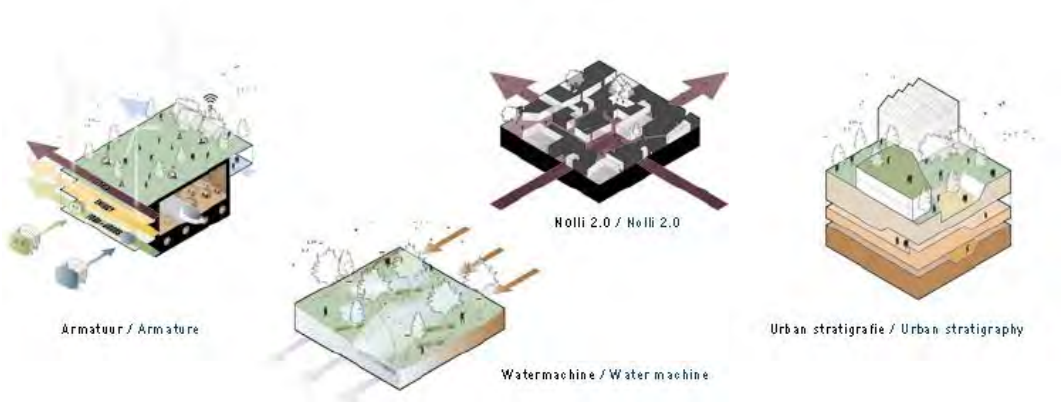


Figure 13

2.4 A continuous city for pedestrians

In 2040, city dwellers travel by foot and motorized transport between cities will be connected collectively or individually. Current barriers such as Waterlinieweg and the A27 motorway are hubs that connect Utrecht's future centres. The resulting city is a continuous city for pedestrians that not only allows more density, but in which there is more room for greenery as well. Functions such as roads and housing are layered, stackable, connectable entities linked to new energy and transport networks. They create a productive and endlessly connected urban landscape.

In this layered city everything, including waste, produces something. Everything is designed to last a certain period of time, for example based on length of residence. In this city, the cost of space is the driving force behind change. This comes with new investment models in which the relationship between interest and involvement play a part. The team distinguishes different models for each housing type. The interests and returns of the one housing type can accrue to a residents' collective, for example; other target groups can decide to use housing services, in which case the return and interest are in the hands of owners and investors.

Figure 14 Section Waterlinieweg (implementation of the Armature, Nolli 2.0, Urban stratigraphy).

Figure 15 View of Waterlinieweg: foreground left Kromhoutkazerne, foreground right Rietveld Schröder House.

$$\left(\frac{EB}{GB} + \frac{EB}{I/VP} + \frac{EB}{I/T} \right) * I * R_1 = W$$

I = INVESTMENT
R = RISK
W = VALUE

EB = OWN INTEREST
R = COMMON INTEREST
T = TIME

Figure 16 Formula for calculating the value of the city of the future.

Research Paper

The Anti-city

Gurgaon and its villages

Soumya S Warrier, School of Planning and Architecture Delhi; India

Abstract

Today is a time of unprecedented growth — of shaping newer and ever changing environments around. Issues and shortcomings of rapid urbanisation offer opportunity grounds for architecture and planning, in this changing maze of activities. The paradigm shifts in the way how people see spaces, and how professionals see the same, are exposing and challenging the architect and urban designer to current harsh realities.

India has been home to the earliest of civilisations and growth. Its intense engagement with the other continents have shaped and reshaped its culture and political ideas. With ginormous populations, extraordinary cultural mixes and rising economies, some of its regions are sites of intense action. This stage of intense fluctuation and turbulence demands reflection on how they have shaped (or are shaping) our relationships, societies and human exchanges. One is also forced to ask questions as to whether the existing knowledge capacities are enough to help manage and intervene these situations. It's time we decoded our development trajectory and identified the fault lines so as to aim for a favourable projected future.

Keywords

Liberalisation, privatisation, service villages, anti-city

1. Introduction

Serpentine flyovers, glazy facades, sky-kissing towers — who knows the history to this 'millennium city' of Gurgaon? For a region that belongs to a country that was home to some of the most urban ancient civilisations as compared with its contemporaries, how is it that the impression of it, left on its rampant modern versions shrank down to a negligible?

The late twentieth century urbanisation that spread (in India) was in complete disconnect to its past centuries (McNeill, 2000). Never had humankind (all over the world) left behind what existed before this much, and never had it impacted such a wide spectrum of both animate and inanimate matter as it did starting from the late 1900's. As patrons kept changing, what the land saw was the rise and fall of cultures and power forces, thereby giving in to dystopia. Liberalisation and globalisation gave birth to 'world cities' (coined by Patrick Geddes in 1915) that brazenly allowed transnational business interests to eat them up. Such 'New York, London and Tokyo models' infected our cities and social styles to change in an uncurbed manner. The new urban landscape has fallen prey to late global capitalism with zero connect to context or people. We are thus in and around *anti-cities* that highlight the differences and not similarities among its lot.

The consumerist trait was effortlessly transferred overseas to a subcontinent that was in thirst for this postmodern drift. One would wonder how such control exertions could ever be so powerful. The backward or the East (with reference to orientalism) is subtly convinced that this is the only best thing that could ever happen to them – through literature, education and media (Gramsci, 1930's). The images of America, Shanghai and Dubai thus haunt our bigger cities – the watered down version of which will soon start hitting the smaller ones. The over emphasis on universalisation of what 'living' or 'habitat' means has gotten us mind blocked, so much so that they shy away from the truth that none of this will make any sense unless grounded in a specific locality. The cultural (il)logic of late capitalism as explained by Fredric (Jameson, 1991) is a kick-starter to the postmodern catastrophe that hit (or will hit) all areas alike.

The 'culture of congestion' (Koolhaas, 1978) engulfed the East almost a century later than it did in the West. Cities, its people and its architecture followed the image of an image – simulacrum[1]. It could be thought of as an era of hyper-reality which took away from the originality or genuineness of a place. In semiotics this stage is considered as an inability of one's conscience to differentiate reality from a simulation of the reality – where one is surrounded wholly by pseudo-reality. There is thus a comfortable existence of the self in a constructed (though temporary) 'new real'. Cities today, have conveniently absorbed this concept for their growth. Nehru's vision for modern India could be read under similar lines; history and environment took a backseat while capital intensive strategies were welcomed with the backing of a large group of deeply patriotic men (Guha, 1995). The planning of the capital city of New Delhi and the dream city of Chandigarh were on-ground realisations of this vision which initiated a new wave of city planning and development in the country. The act of mimicry they followed is clearly evident from how our cities are being viewed since then with a top down approach, blanketed by master plans.

Design and development of many contemporary cities in India are active examples of this phase of liminality[2]; Gurgaon being a perfect case for investigation. The name Gur*gaon* (*gaon* meaning village) with its added note of being the 'millennium city' is a striking contradiction in itself. Its history is splendid and eventful – references in the *Mahabharata;* oldest agrarian settlements in the area; along early important trade routes; base of early British units — all vocabulated contextually through either history, art or architecture.

2. Pre-liberalisation Gurgaon

2.1. Early history

The oldest record of Gurgaon is in Mahabharata (the ancient Hindu mythology), where it is believed to have been an area granted by the eldest Pandava king Yudhishthira to Dronacharya. Around 900 BCE, this area had been under the effective control of Maurya Empire. The area of Gurgaon also formed a part of Harsha's empire in the 7th CE, and then of the Gurjara-Pratiharas. From 763CE to 1156, it was under the Tomara and Chauhan dynasty. In 1192 during the rule of Delhi Sulatanate, people were forced to convert to Islam, creating

[1] A blind imitation of a person or thing; *image of an image*.
[2] The idea of threshold. An in-between mental stage; interstitial space/phase.

years of Hindu-Muslim unrest. During early 1700s the area was under Rajput rule, and in the late 1700s it was conquered by French generals.

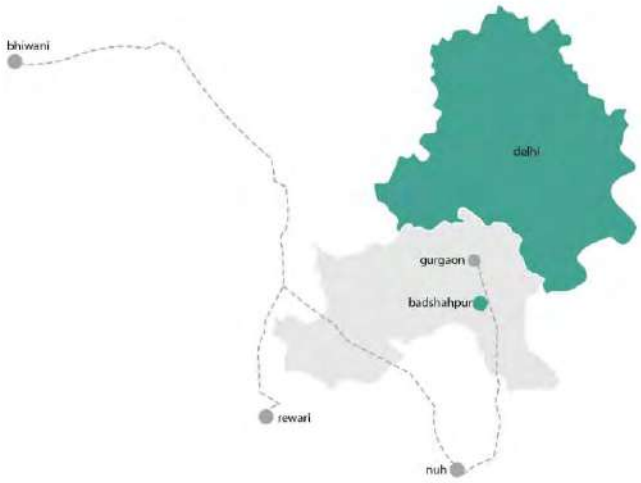


Figure 1 Gurgaon and its surroundings, Source: Author

2.2. The British influence

The proximity of Gurgaon to the imperial capital (Delhi) played a major role in shaping its destiny. In 1803 The East India Company took control over Gurgaon, and in 1816 the town became its administrative headquarters. The feudatory races continued to engage in agriculture while the higher castes were involved in trade or British service.

The 1857 uprising created huge unrest in Gurgaon, due to the constant fights between the Nawabs and the British. There was a considerable loss of life and built, and no steps were taken to develop Gurgaon educationally or economically. After the World War I, the policy of ignorance was slightly modified as the people of the district contributed liberally in men and money for the war.

With the strengthening of Muslim League in 1940, communal tension increased in the following years. Following independence in 1947, the Punjab Province was bifurcated to East Punjab (India) and West Punjab (Pakistan). Members of the minority community on either sides fled for their life in large numbers leaving everything behind.

2.3. Urban rehabilitation

The government distributed land to employ all the displaced farmers, where all of them who owned land or were cultivating it in Pakistan were declared eligible for temporary allotments. Each family was given a plough unit of 10 acres (or 4 hectares). Because of this, despite the shattered economy during the post partition years, agricultural production in the state did not remain low for very long.

With majority of the displaced persons settling in urban areas, the trade and industrial sectors saw a development, initiating an industrial economy in the district.

2.4. Contemporary phase

In 1966 when the state of Haryana was formulated Gurgaon was designated as one of its districts, with an agro-based economy. Planned urban development of Gurgaon started in 1966 with the Urban Estates Department Haryana. 1970s marks the beginning of the city's growth and development journey.

The potential evolutionary prospects of Gurgaon were noted by the authorities during the preparation of the first master plan of Delhi. Gurgaon remained a small farming village while Delhi emerged as the political capital of India.

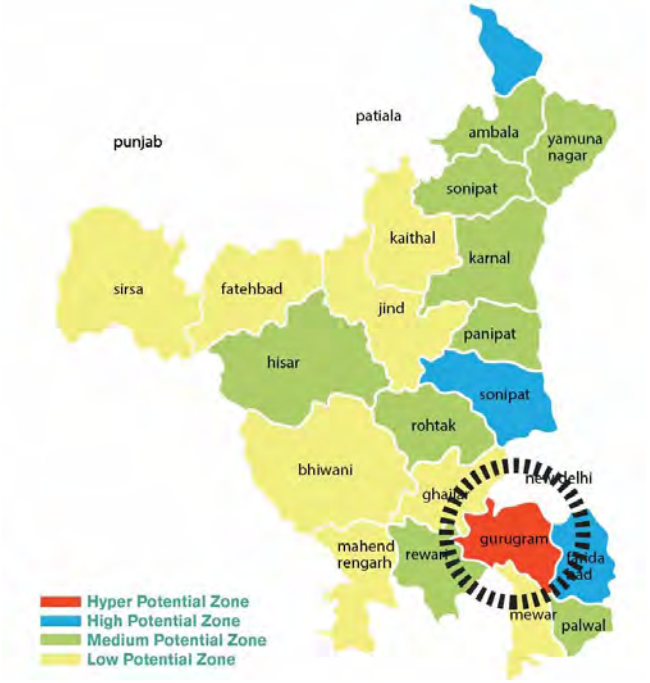


Figure 2 Map of Haryana showing growth potential zones, Source: Government of Haryana, Graphics: Author

In the 1970s the town of Gurgaon expanded initially juxtaposed to the old colonies of Gurgaon. Later, residential and industrial sectors were realised. Gradually the expansion started encroaching upon the agricultural land of the villages surrounding Gurgaon.

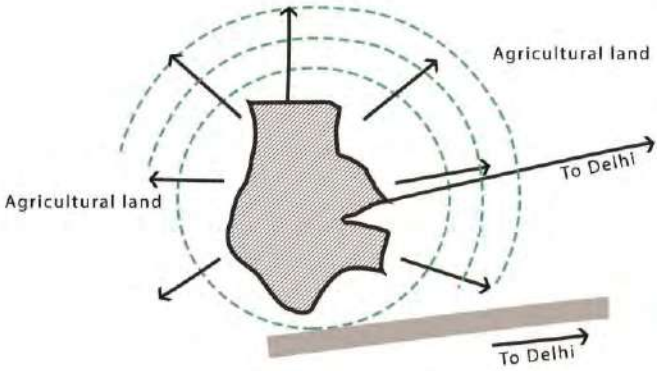


Figure 3 Growth expanding to agricultural lands by early 1970's, Source: Author

With the establishment of HUDA (Haryana Urban Development Authority) the growth and development gained momentum. More villages were acquired and converted to residential sectors in the 1980s. The implementation of Haryana Urban Development Act in 1981 was a gateway to the entry of private developer groups like DLF and Ansals. The coming up of Maruti Suzuki plant in 1983 triggered a new industrial fabric thereby making Gurgaon a priority town in the metropolitan area. These developers transformed the growth trajectory of Gurgaon.

The old colonies and the adjacent sectors located to the right of NH8 were largely built by the government authorities prior to 1990s and these constitute the Old Gurgaon. The areas built to the left of NH8 were built by private developers from 1990 onwards to form New Gurgaon. The small villages that exist till date and have become urbanised in the process of the city's growth spread in both Old and New Gurgaon are the Urban Villages.

3. Post liberalisation Gurgaon

The sectors built after 1990 were largely built by private developers. New Gurgaon experienced a job centre boom in late 1990s which resulted in more people moving into the city. Several multi-national companies like American express, IBM, Microsoft, Infosys, Ericson, Oracle, Bank of America, Nokia, The Coca-Cola Company, and many more chose to locate their offices in Gurgaon during the late 1990s. The sudden demographic changes and cultural changes gave the city a new identity.

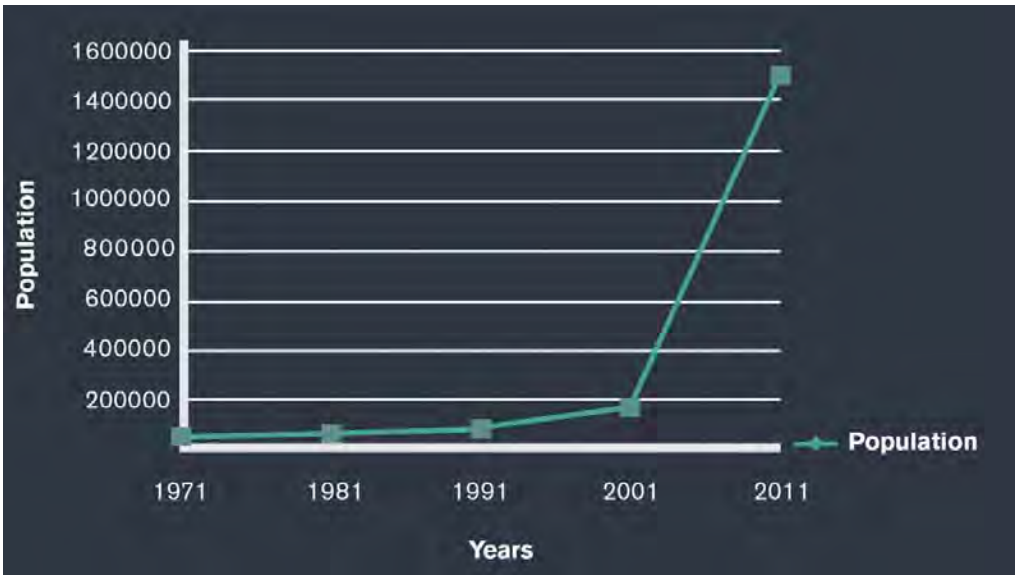


Figure 4 Population influx post liberalisation
Source: Census 2011, Graphics: Author

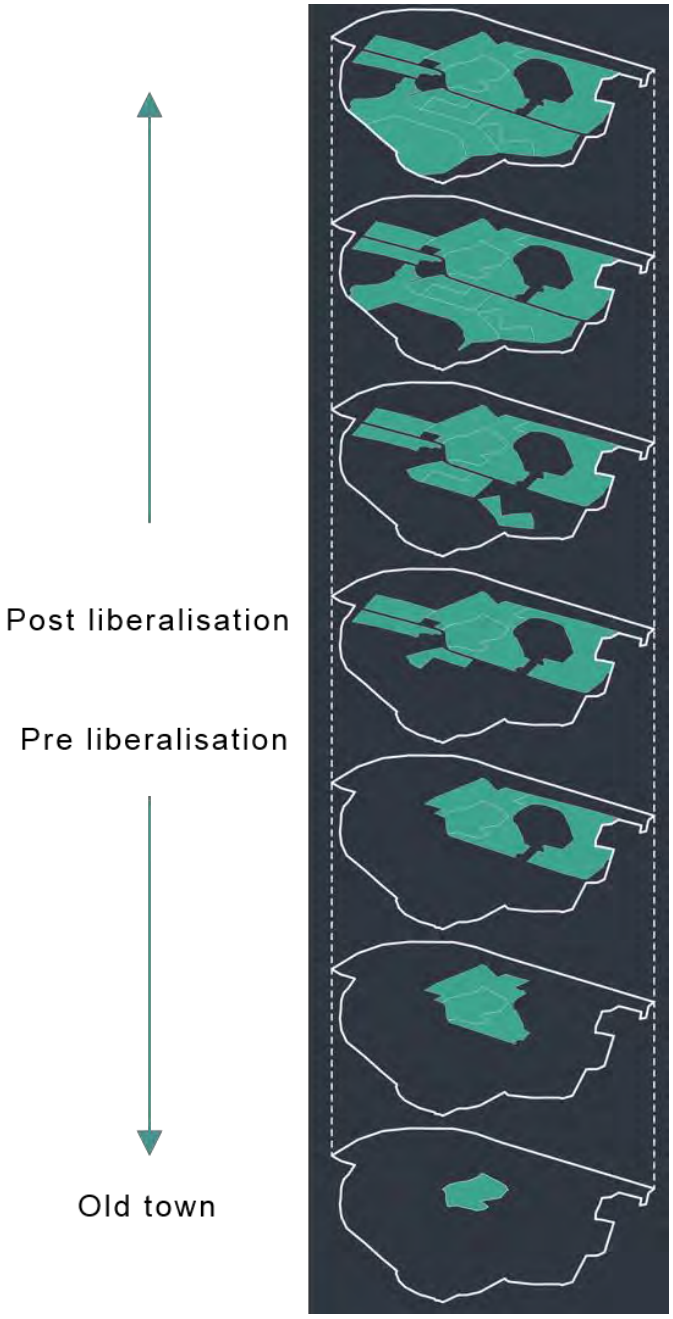


Figure 5 Growth of Gurgaon, Source: www.shodhganga.com, Graphics: Author

Various jurisdictional changes were also seen in the period of 1991-2001, where many rural villages merged to form municipal corporations or tehsils in and around Gurgaon. The 2018 September *Hindustan Times* newspaper reported an incident where 46 villages in Gurgaon decided not to pay property tax to the Municipal Corporation of Gurgaon (MCG). The villagers claimed that the land was rightfully owned by them and were transferred illegally to MCG. It was also mentioned that since the inception of MCG in 2008, all their lands were brought under the jurisdiction of MCG, all local panchayats were disbanded, and plot lands worth crores of rupees were transferred illegally.

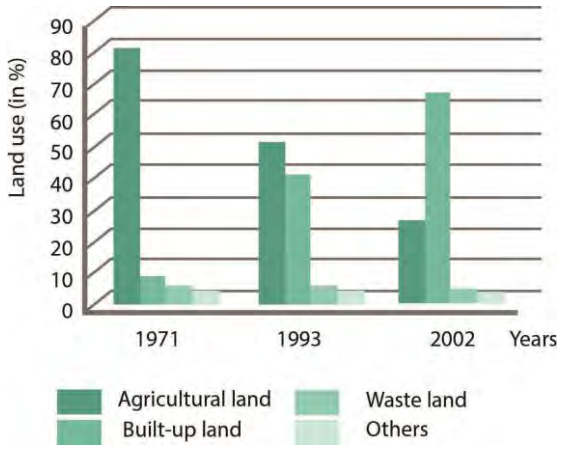


Figure 6 Land use transformation
Source: Population explosion and land use changes in Gurgaon city region – A satellite of Delhi Metropolis, IUSSP

4. Urban village/city?

Post-independence, Gurgaon – along with other cities/towns in and around Delhi – (unfortunately) got absorbed into the 'new plan wave for future cities'. Migration (both in and out) created unsettling environments for a while but the emphasis, as priorly planned, was more on the urban agenda of creating a new face to the city. The 1970's saw Gurgaon falling on the track of accelerated urban growth and development – enormous population influx post liberalisation caused the growth rates to shoot up in the 1990's. Gurgaon was no more a village, but a rapidly growing city.

Land values and land ownerships juggled in the years that followed – owing to sectorisation and privatisation of land. There was a rapid flow of people into the sectors of Gurgaon, small and big – from villages (to the former) and *New* Delhi (to the latter). The 'surburbia' concept that was tested (and which had failed) in the West, was thus tweaked and appropriated to Gurgaon where the new city was advertised as a better liveable one as compared to the congested city of New Delhi. The way in which Gurgaon started pulling in people like a hungry magnet is a marker to a subtle new trend of city growth dominated by private players – a trend that was borrowed from the West and which was comparatively new in India. The spatial ideas though remained the same (as the West) with zero considerations to site history/context. Sector plans proudly adorned the plots where once (probably) stood native agrarian community neighbourhoods which were probably sent away to some inner villages nearby. Many villages in Gurgaon saw shifts in their built landscapes due to this.

4.1. Villages of Gurgaon

The villages Jharsa, Sukhrali and Sarhol were studied for an understanding of the trends (Source: Author, Ashin Thomas, Venna Sri Hari Kanth – M.UD Batch 2019, SPA Delhi), which revealed a fascinating picture of the past and present conditions of these villages.

The 1848 East India company map of Delhi district shows the prominence of a place called *Jharsuh* along the trade route between Delhi and Ajmer. *Jharsuh* and *Sookralee* are amongst the oldest settlements of Gurgaon district. As evident from the map, *Jharsuh*, or modern day

Jharsa village was more important than Gurgaon for trading and agriculture. As the traders always preferred routes which were safe from natural obstacles such as mountains, deserts and deep forests, and which had easy access to supply centres, Jharsa was a much convenient option for being a halt point.

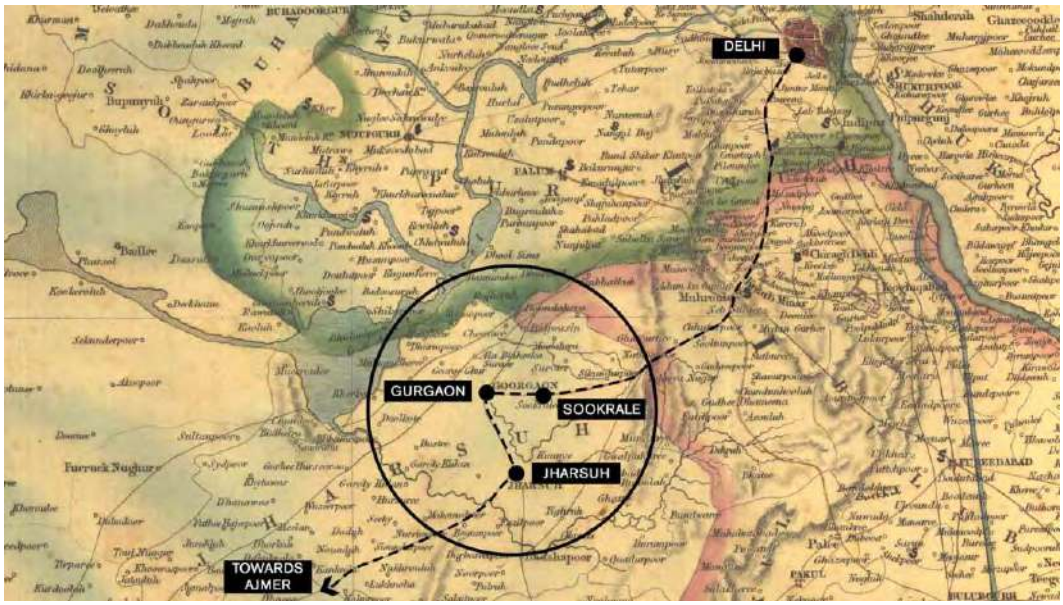


Figure 7 The 1848 East India Company map

What blew away the economy of Jharsa was the partition of India in 1945 when the trading communities migrated to the Muslim dominant country of Pakistan. The village witnessed influx and outflow of people leading to changes in settlement patterns and housing typologies. Changes in the community profile and occupation were observed as the new immigrants were either absorbed in the field of agriculture or were accommodated in the newer markets formed near the core city area. There was thus a major shift from agriculture to service sector during the 1960s. When HUDA acquired land in the core city, people started moving to outer villages like Jharsa, Sukhrali, Patel Nagar, Dhankot and the like. As the city had more and more to offer to its people and outsiders, many more in-migrated to the city and surrounding villages.

Sectored developments appeared around Jharsa, especially in 2004 when the Cyber Park was opened and the construction of Medicity Hospital was initiated. It was approached by workers and migrants, which marked the beginning of a new real estate market. The village witnessed the emergence of a new service/working class population. With Medicity hospital and Cyber Park fully operational by 2008, huge migrant population from other cities and states approached Jharsa for cheap and affordable housing. This led to construction of newer floors and buildings to appropriate the village to absorb the migrant working class. By 2014 this trend became stronger and the peripheries of the village began to change to include newer requirements of the working population. Jharsa today is primarily populated by these migrant workers with small groups of natives also living in it.

The work flow patterns were observed to find out that majority of the people who lived in Jharsa were migrant labour groups (of various economic classes) who worked in the nearby city areas.

Figure 8 Live-work patterns, Source: Author

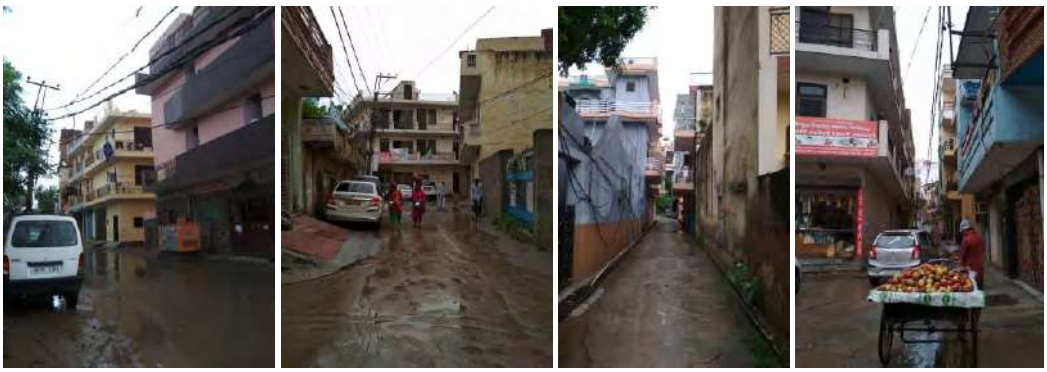
The present community fabric of Jharsa could be understood as follows:

Residents of old village Jharsa	Property owners in Jharsa village	Workers of Cyber Park	Workers of Medicity	Other residents
• They constitute the native population of Jharsa village • People are involved in cattle rearing and such local jobs • Significant presence of unemployed population • Isolated from the outside city as there are no major job/other connections to and from the village	• Major property owners are Jats – they have strong community feeling and dominance in the area – they rent out their floors for the working population • Presence of Pandits and muslims who also rent out their homes to the various working population there • No new buying/selling of property – high demand for land and space – great opportunity for rental business	• Stay on rental basis in Jharsa – cheaper rents and convenient accessibility • Do not have a sense of belonging to the place – they see Jharsa as merely a place of residence • No community unions or associations	• Doctors and nurses of Medicity form a significant population of Jharsa due to easy accessibility and cheap rents • Dominant presence of Malayali and Afghani population – small stores and restaurants that cater to them present in the area • Start of cultural identification to the place – the Syro Malabar Prayer centre in Jharsa	• The population working in other areas of Gurgaon find cheap accommodation in Jharsa • No significantly visible cultural associations to the place

Figure 9 Community fabric of Jharsa, Source: Author

The fact that Jharsa is rapidly becoming home to more of migrants and less of natives is thus very evident. The question that rises is, if this trend continues, what would be the identity of Jharsa tomorrow when the identity of it today bears no relation to its past?

Images from the inside of Jharsa village



Images from the periphery of Jharsa village

The villages Sukhrali and Sarhol were also studied, and the comparison presents striking similarities in the present character of these 3 villages.

Attribute	Urban Village		
	Jharsa	Sukhrali	Sarhol
Place of residence	• Most prominent attribute • Huge rental business run by Jat communities that accommodate the service and working population • Mix of cultures and ethnicities	• Most prominent attribute • Natives have appropriated their houses to accommodate the rental floors • Huge student and working population – proximity to cyber city • Mix of cultures and ethnicities	• Lesser native resident population and dominance of service class population – trend of natives moving to the sectors for better facilities • Mix of cultures and ethnicities
Commercial space	• No major commercial magnets – therefore does not entertain outside population	• Main roads are lined with small to medium scale commercial stores and eateries – entertains both resident and outside population (to a small extent)	• Most prominent attribute • Earlier ground floor residences converted into small shops – on rental basis • Entertains outside population due to its commercial nature
Cultural node	• Living population has little cultural association to the place • Resident population unaware of the history of the place • No major festivals or procession routes in the village – culturally passive zone	• People display no significant cultural association to the place • Resident population unaware of the history of the place	• Lack of cultural prominence due to lesser residing population
Industrial area	• No major industries in the village and therefore do not provide any job/service opportunities to the outsiders	• No major industries – though small scale industrial outlets are present along the main roads – does not entertain any significant outside population	• Industries in close vicinity – entertains huge service class population
Institutional area	• Medicity in close vicinity – provides job for various working classes	• Minor management institutes in close vicinity – entertains student population	• No major institutions in close vicinity

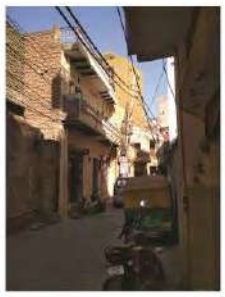
Figure 10 Comparison of villages, Source: Author

Images from Sarhol village




Images from Sukhrali village



Source of all site images: Author

4.2. Emergence of a new village type?

It is interesting to observe how the growth of Gurgaon into a millennium city has given way to a new trend of development of *service villages* around it.

Cities normally grow outward from the inner (historic) core forming a nucleus type of development. In most cases, the core remains intact with high historic prominence manifested through its architecture (and/or function). The cities of Old Delhi and New Delhi are the nearest examples to this. *Service villages* on the other hand follow a different growth pattern. These (urban) villages are generally the ones that surround huge magnet cities. The edges of these villages are approached by magnets that induce a gradual ripple of inward transformation in them. This inward growth is found to eat up the inner core thereby completely transforming the village into a new type bearing no relations to its past.

Figure 11 Service villages: understanding the anit-growth, Source: Author

All of the villages studied here, though have their respective history and evolution patterns, however today fall perfectly into the category of such **service villages** that could be identified with a common equation. The lack of connections they have with their past identities, and the similarities in their current profiles and growth trajectories presents us with a plausible future where each of these villages could be replaced in space and context with any other, and it wouldn't make much of a difference. These 'cities of non-cityness' further strengthens the argument that our cities today are traversing a path of *anti-growth*.

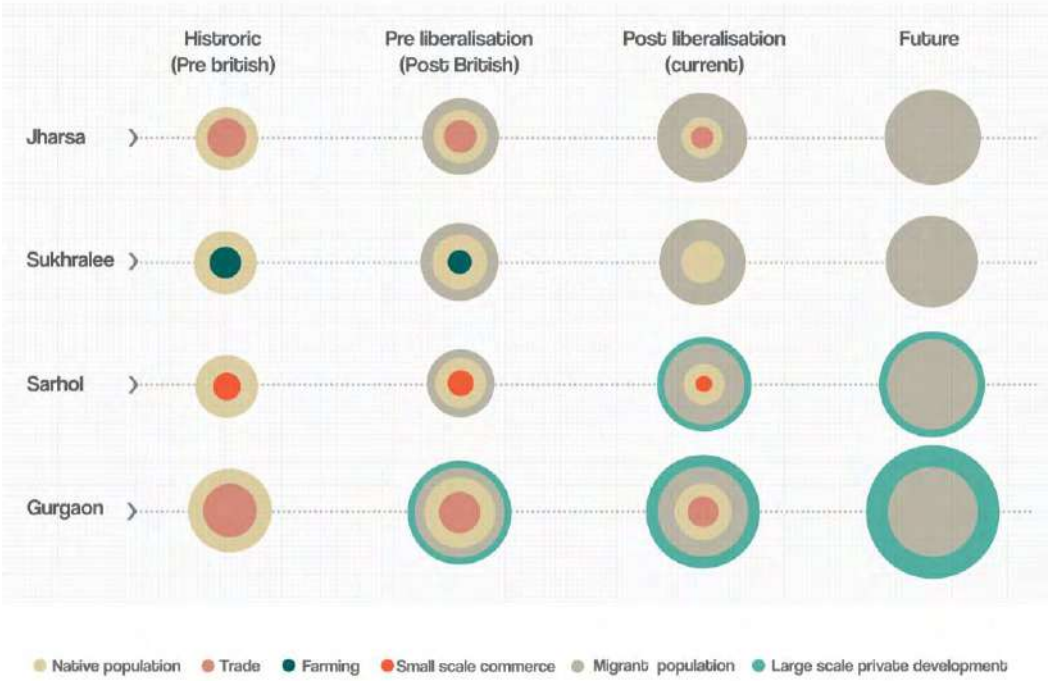


Figure 12 Comparison of villages, Source: Author

Thus, what one sees here is the rise of an era of capitalist prone, privately planned *anti-cities* that serve a select few. Transformations have in every step, challenged the urban landscape – unfortunately in no good way – and have embraced and lived up to the concept of delirium yet again; of places, cultures and people too. The focus lies on a much larger agenda – of the so called 'growth' and 'development' that gravitates around the nucleus of a small yet powerful group. In no time, Gurgaon has become this monstrosity that engulfed anything related to context, spitting out replicas of the US - Dubai - Shanghai models. The origin and growth of service villages is the perfect example as to how the surroundings of megacities have also adapted to better suit this new model of development, thereby becoming replicas of one another. The hyperactivity of Gurgaon (and other cities of the kind) may tend to a state of rupture or redundancy in near future.

5. Conclusion

The story of Gurgaon traced through its migrants, presents one with the layered history of the city. Of religious infusions and strong trade routes, of British Raj and changing community profiles, of transforming sectors and shifting loci of urban centres — this land has been one with constant flow of activity flux. With neo liberal policies lined up for the country, and the state propagating a new wave of growth and development, one however is left with the question of 'what from the past was left behind in the run?' A new phase to the city, or an interstice of uncertainty – one is pushed into a state of indecisiveness to judge the newness that Gurgaon and its surroundings is today.

The developments in Gurgaon post the millennial year have been disturbingly absurd as they in no way relate to the history, architecture or urban form of the old city or its villages. The

engulfment by the private was so fast that one is unable to evaluate the way in which the villages around it have changed. These transformations have added a new layer to the 'urban fabric' of these so called 'urban villages'. Today, being in Gurgaon means something. The picture that an outsider has of the city is of flashy building facades, sky-high flyovers and high end living. The fabric – both built and social – has changed and is in a constant phase of experimentation and exploration. The outsider is no longer an outsider, neither is a villager any more a villager; both have access to something that previously they have not had, which brings them to a common platform under the large umbrella of the new global city that Gurgaon is today. The cosmopolitanism that the shifts have brought to these villages is worth mentioning; whether it is or not by choice is however a point of further discussion and debate.

The transforming neighbourhoods due to accelerated urbanisation in Chiang Mai (Thailand), the historical urban patterns and socio-cultural identities challenged by development pressures in Ho Chi Minh (Vietnam), the contingent socio-urban reforms giving way to gentrification in Philippines — are all indicators to the emergence of such privately planned cities all over the world. (The Southeast Asia Neighborhoods Network)

The seduction of this colonial language could be escaped only through agency[3] or autonomy. The approach should primarily be bottom up – using the lessons from ground reality rather than from constructed imagery. Urbanism and architecture – like art and cinema – should engagingly explore the idea of subjectivity[4] and self-empowerment. Concepts like local area planning (LAP) which directly communicate with the context and people should be extended to the master planning bodies of all areas. UDRI, a Mumbai-focused organisation has all of its members from Mumbai who know the city well; organisations like these could be studied to develop similar context-specific groups in other cities. COSTFORD, a non-profit voluntary organisation set up in 1984 by Center for Developmental Studies in Kerala, works with alternative design philosophies and materials developed by Laurie Baker. With the involvement of The Department of Science and Technology and The Department of Rural Development of the Government of India, The Department of Local Self Government of the Government of Kerala, Housing and Urban Development Corporation (HUDCO), and numerous experienced and young professionals, COSTFORD has over the years worked on remarkable rural development projects and schemes at both the Centre and the State. Turning 50 this year, the Aurovillian thought of an alternative, universal town to realise human unity, was an experimental step towards autonomy. One could learn from these narratives. Our profession needs to re-invent itself to cultivate meaningful and efficient patronage for now and the future. One should be able to address his city and its people, and should be able to wade his way out of social inequity and corporate fascism.

Is the projected future of redundancy of such cities and villages a fact; or a mere perception, too adamant to accept the new base layer these cities have become for newer divergent layers to be added on and grow forward? Nevertheless, it's high time we withdraw ourselves from layering the incompatibilities of environment and growth that create toxi**cities**.

[3] Ability to act or perform an action; the facility to do in a political scenario.

[4] Subjectivity or the idea of self; as explained by French philosopher René Descartes - "I think therefore I am". The concept could also be linked to Marxist way of how to construct individuals or how to be, as opposed to capitalist hegemony of domination by consent.

6. References

Auroville, the city of dawn
Available at: https://www.auroville.org

Bhoria, K. S. & Bajaj, B. R., (1983) Gurgaon District Gazetteer, Chandigarh: Government of Haryana.

Gramsci, A., (1971) Selections from the Prison Notebooks, New York: International Publishers.

Guha, R., (1995) "Mahatma Gandhi and the environmental movement in India", Capitalism Nature Socialism, Vol.6 No.3

Jameson, F., (1991) Postmodernism, or, the Cultural Logic of Late Capitalism, Durham, North Carolina: Duke University Press.

Koolhaas, R., (1978, 1995) Delirious New York, New York: The Monacelli Press.

McNeill, J. R., (2001) Something New Under the Sun, New York: W. W. Norton & Company.

Mehtani & Chowdhary, P., (2012) Growth, development and sustainability of cities: a case study of Gurgaon, New Delhi: University of Delhi.

Case Study / Project

Just Schwerin

Balanced urban-rural development?

Thomas WEITH, Meike FIENITZ

Abstract

The study uses the case of the German city Schwerin and its surroundings to analyse current challenges, conflicts and approaches to solutions regarding an integrative urban-rural development. The focus is on the question in how far solutions for conflicts between city, surroundings, and rural areas can be just. Additionally, the project discusses how regional justice can be defined in the context of spatial and landscape development, and how it can be implemented in practice. This approach promises to generate new solutions for balanced urban-rural development because it recognizes that land use systems and land use governance are strongly influenced by values and norms (Seidl et al. 2012, Davy 2012). Yet up to now a broader discussion about theoretical approaches and conceptual consequences in land use contexts is missing. Important discourses reflect the ethical dimension of justice, especially about environmental justice and spatial justice (e.g. Basta 2016, Edwards/Reid/Hunter 2015). In order to create applicable solutions, the project uses an approach which from the very beginning brings together research and practice. Thanks to transdisciplinary collaboration, the different actors and their perspectives are included early on in the development and testing of solutions for land use conflicts. Thus the case study of the Schwerin region will encourages regions to discuss interrelations and to engage in questions regarding regional justice.

Case Study Paper

Planning Practice in Areas Beyond Megacities under the Rural Revitalisation Strategy in China

Case Study of the New Jijiadun Village

--A Concept of "Co-Creation Community for Rural Life"

Xiaoyi Wen, Shanghai Tongji Urban Planning & Design Institute CO.,LTD.; CHINA

Ye Liu, Shanghai Tongji Urban Planning & Design Institute CO.,LTD.,; CHINA

Abstract

Under the global trends of urbanisation, rural development has posed a global challenge. As the Chinese government has continued to take invested in its rural areas, the Chinese urban and regional planners have also been presented with a series of questions: How to avoid the withering of rural communities due to urbanisation? How to build rural brands and form a new focus? How to maximize the utilisation of resources and regenerate the "hollow" villages? How to create the new ecosystem and change the rural outlook?

Based on the theories indicated in the books by Piro and Ganser (2016) and Scott, et al. (2019) regarding the rural community planning, this paper uses a qualitative approach by conducting a case study of the new Jijiadun Village, describing an emerging pattern of rural life in areas around Shanghai, under the background of the Chinese Rural Revitalisation Strategy. With reference to the theories, the paper establishes the concept of "Co-Creation Community for Rural Life (乡村生活共创集群)", which refers to a new type of rural community formed by rural life enthusiasts and investors in an existing village, integrating multiple dimensions like rural homestay industry, cultural business, catering industry, organic agriculture, and family activities based on a platform built, planned and operated by an operating company.

Particularly, the paper explains how the Chinese planners have created the impetus for the rural industrial development based on the rural homestay industry. And it focuses on how these planners have broken the boundaries between the urban and rural areas, taking the city dwellers back to the rural and natural life while bringing vitality to the rural areas, which means to build a new path to rural innovation and urbanisation equilibrium with Chinese characteristics. Furthermore, combined with the authors' practical experience in the field of rural planning, the paper shares the models and approaches available for rural regeneration, which are applicable to rural areas and/or urban fringe seeking innovative development beyond megacities.

Keywords

Rural Revitalisation, Rural Community, Development Model, Urban-rural Rebalance

1. Background

With the development of industrialization and urbanization in China, the rural population is constantly shifting to cities, and the rural land is constantly swallowed up by cities. As the carrier of China's five thousand years of agricultural civilization, rural areas cannot catch up with China's modern development. As the carrier of traditional civilization, rural areas will fall into ruin in the process of urbanization, which is a foreseeable outcome.

As of 2017, the number of villages in China was about 2.45 million, while in 2000 there were about 3.6 million, which means a decrease by nearly 1.15 million in merely 17 years. About 185 natural villages are disappearing each day. By the end of 2018, China's urbanization rate reached 59.58 %, and China has entered a stage of integrated urban and rural development. On the one hand, rural culture is withering, and "hollow villages" keep appearing. In the meantime, the population surge has brought more stressors to human society, such as urban air pollution and living cost, making the urban living environment increasingly worse. How to revitalize the countryside, motivate people to return to the countryside, and relieve the pressure of the city, has presented a universal challenge.

In September 2018, the Chinese government released the "Strategic Plan for Rural Revitalization (2018-2022)", which indicated that "the rural area is a complex of natural, social, and economic features, involving multiple functions such as producing, living, as well as ecology and culture, which interacts and co-exists with the urban area, to constitute a main space for human activities together". The proposal of this strategy puts forward the requirements of implementing the rural revitalization strategy, particularly for the planning managers, practitioners and planners throughout the country, and clarifies the direction and focus of rural revitalization in China in the future.

Prior to this, the Chinese planners and cultural tourism companies had already gone deep into the rural area. In the past few decades, through rural design and construction practices, they have sought ways and methods of rural revitalization. These successful practices and cases have then been integrated into rural revitalization. Under the background of such times, it will provide a reference for the rural areas in need of development in the future.

2. Observation: *From Minshuku Design to Rural Revitalization*

From the historical perspective, the urban-rural relations have been constantly changing with the development of modern civilization. Having gone through the stages of opposition, balance and integration, the ideal urban-rural relationship should be the integration with each other, namely, the urbanization of the rural area and the ruralisation of the urban area. The cultural penetration that occurs between the rural and the urban areas can bring the two even closer. Driven by this, rural tourism developed around the metropolis has experienced rapid growth. As these tourists come and go, the urban trends, lifestyles and public resources are gradually brought to the rural areas. In this sense, rural tourism has presented an important opportunity to promote the coordinated development of urban-rural relations.

2.1. Moganshan Program

The keen planners took the lead in investing in the rural life. In 2001, they created an ideal minshuku in a beautiful countryside in the Moganshan area of Zhejiang, China. On the basis of the existing empty houses and old buildings in the local communities, their program has managed not to destroy the original village structure and created a comfortable rural community with low-density buildings. After creating Minshuku (homestay or guesthouse) brands such as the Lost Villa and Yuanshe (Fig. 1-2), the planners have set up the Minshuku Alliance and launched the “Moganshan program”. More designers, artists, cultural scholars, and green life advocates have begun to take part in the program which has gathered a variety of themes and formats during the process. They worked together to renovate the abandoned rural public buildings in Moganshan and include more significant functions such as cultural display and art parks, rural education and training, catering facilities, and art hotels, to create China's first cultural marketplace, the “Yucun1932”, which aimed to rebuild the rural areas (Fig. 3-6). Since its launch, this innovative cultural marketplace has been attracting tourists and culture enthusiasts from major cities in the Yangtze River Delta as well as other regions of China. This program has become a symbol and benchmark in the field of cultural creation and the Minshuku or guesthouse industry in rural China; moreover, it has practically facilitated the interactions between the rural and urban areas, creating a sense of belonging for both rural and urban populations.

Fig. 1 Lost Villa in Moganshan, http://lostvilla.cn/

Fig. 2 Yuanshe in Moganshan, http://xband.club/

Fig. 3 Folk culture exhibition hall in YuCun 1932, http://travel.qunar.com/youji/7048720

Fig. 4 Minshuku college in YuCun 1932, http://travel.qunar.com/youji/7048720

Fig. 5-6 External view of YuCun 1932, http://travel.qunar.com/youji/7048720

2.2. Songtsam Model

Along the Dian-Zang line (Yunnan-Tibet line) in China, there has been an innovative tourism model, namely, the "hotels+tourism" model by the Songtsam Hotel, which integrate varied themed hotels into the tourist spots. In 2000, Pema Dorje, a TV producer, established the Songtsam Hotel after he left Beijing and returned to his hometown, a rural region in Tibet. Since then, he introduced a modern model of hospitality operations, designing and creating more comfortable hotels based on the traditional Tibetan buildings in the rural Tibet. In the past ten years, dozens of Tibetan-style hotels have been created along the the Yunnan-Tibet line (Fig. 7). Geographically, each hotel is connected to the fields, canyons, snow mountains, lakes and forests on the Tibetan Plateau (Fig. 8-9); Culturally, each of them is connected to Tibetan temples, villages, arts and crafts, as well as the local cuisine. These hotels can be set as separate tourist destinations; or they can be integrated into a travel loop.

Songtsam will continue to build more hotels along the Dian-Zang line, known as the world's most beautiful road. It intends to rebuild the "the Ancient Tea Horse Road", and form a world-class tourist route. The Songtsam Series Hotels have not only attracted more tourists to come to the rural Tibet, but also put a focus on maintaining the local cultures and traditions by recruiting local employees. Trip Advisor has ranked Songtsam as the top 25 hotels in China for nine consecutive years. The attraction of cultural tourism comes from the culture itself, and the rural revitalisation will be enabled with the cultural revitalisation in the rural areas.

Fig. 7 The map of Songtsam Yunnan-Tibet line, https://www.songtsam.com/

Fig. 8 Songtsam in Tacheng, Tibet , https://www.songtsam.com/

Fig. 9 Songtsam in Shangri-la, Yunnan , https://www.songtsam.com/

The success of the Moganshan program is due to the professional sense of the planners; and the success of the Songtsam model cannot be separated from its respect for culture. What is common is that they both have initiated urban-rural interactions and introduced the urban civilization and industrialization into the rural areas. While recreating the rural life, the rural spirit will also relieve the increasing pressure of the urban areas. They put forward the concept of rural ecological circle and promotes a model integrating production, life and business that can be a virtuous circle and create value.

3. **Experience:** *"Co-Creation Community for Rural Life (乡村生活共创集群)"*

Rural tourism is changing because of the involvement of cultural creation and guesthouse development. Specifically, rural tourism has been shifting its focus from traveling to vacationing, featured with scale development, ecological environment protection, emerging business mode and rural construction. However, these forms of business are fragmented and scattered. So the question is how to integrate them as a whole and present a replicable model of rural revitalisation.

In February 2017, the Chinese government released the concept of "ecological pastoral complex", which can be expressed by a formula, namely: "agricultural science and technology + agricultural production + agricultural tourism + agricultural culture". The

ecological pastoral complex includes three industrial sectors of agriculture, cultural tourism and real estate.

Based on the successful experience of the Moganshan program and the support of national policies, the XBAND Group (xband.club) has been trying to explore new ways of rural cultural tourism development. As an operator of rural pastoral complex, it has tried to renovate the traditional villages in rural or suburban areas where the residents have mostly migrated to the urban areas, by developing the boutique homestay clusters that are well equipped with facilities like amusement park or playground for children, coffee shops, restaurants, handicraft workshops, outdoor sports, specialized retail stores. In the meantime, the surrounding environments like farmlands, forests and waters are undisturbed while developing these vacation destinations in the suburbs to serve tourists from the urban areas. Such an idyllic complex project usually covers an area of several hundred acres and has a business area of 5,000 to 50,000 square meters. It is positioned as a Co-Creation Community for Rural Life (乡村生活共创集群), also known as the “ideal village”.

3.1. Project Overview

As the first practice of the “ideal village”, the Jijiadun Village has the outstanding geographic advantages with convenient transportation since it is east to Shanghai, the most famous international metropolis in China, and west to Suzhou, the famous historic and cultural city. As the first “ideal village” practice place, Jijiadun Village has convenient transportation and obvious location advantages. It is east to the international metropolis Shanghai and west to the historical and cultural city of Suzhou. It is a scarce resource due to its connection with Shanghai, since the transportation from Jijiadun to Shanghai takes less than one hour (Fig 10). The Jijiadun Village has taken a typical pattern of Jiangnan Water Township, with abundant natural resources and tourism resources (Fig. 11-12).

The Jijiadun Administrative Village covers an area of 1.7 square kilometres and consists of two natural villages. To be specific, there are 142 houses in the Jijiadun Natural Village, with a construction land area of 5.7 hectares. Since most of the residents in the village moved to towns and cities, the village was nearly empty. The government has relocated the remaining households at the end of 2014 upon their consent, and the land of the village has been state-owned. Instead of adopting the traditional approach of returning farmland to the forestry, the local government decided to develop the village with limited capital by collectively using the land, focusing on cultural tourism and attracting people to the village, so as to revitalise the village and the neighbouring areas.

Fig. 10 The Location Map of Jijiadun Village

Fig. 11 The Micro-location Map of Jijiadun Village

Fig. 12 Aerial view of Jijiadun Village, Xband.club

3.2. Project Planning

As for the "Planning of Jijiadun New Rural Life Project in Jinxi, Kunshan", at the level of overall planning, it has integrated the existing conditions and the regional resources, to maintain the existing water township pattern and pastoral landscape as well as present the unique local features. According to the plan, the Jijiadun Village will be the core area, around

which there are eight functional areas, including: the rural industrial demonstration area, the sightseeing agriculture demonstration area, the theme ecological park, the residential area, the Zhangnan Featured Village and the ecological agriculture demonstration area (Fig. 13).

residential area, the Zhangnan Featured village and the Eco agriculture demonstration area. The local government undertakes the infrastructure construction of the surrounding supporting sections and core areas, and the township accompanying cultural brigade conducts overall planning and design, project investment, investment construction and operation management for the core area (Jijiadun Village). The local government is responsible for the construction of supporting infrastructure in the core area as well as the surrounding functional areas, while the XBAND Group is responsible for the overall design and planning of the core area (namely the Jijiadun Village), attracting businesses and investment for the project, as well as operations management.

The project has adopted an innovative model that consists of entering with scattered capital, development of rural complex, and reconstruction of the cluster community. It tries to integrate and reuse the collective assets and resources in the rural area; in the meanwhile, it also tries to integrate the abundant social resources, absorbs the intellectuals and technologies from the urban areas. Based on the capability in planning and development, the professional operations management, and the diverse financing channels, the project aims to realize the coordination of investment, construction, and operations.

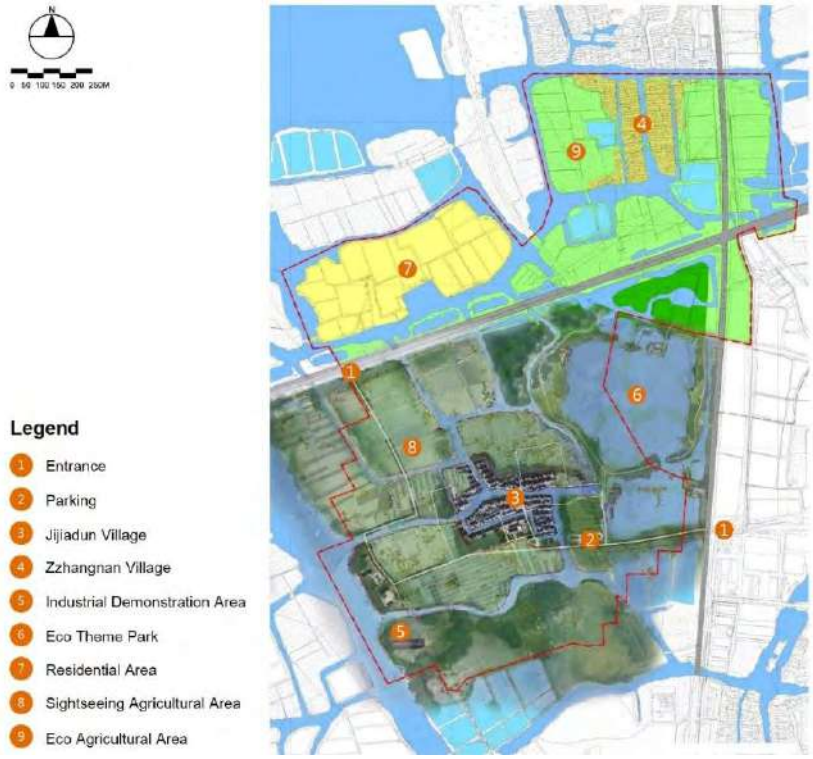


Fig. 13 Master Plan of Jijiadun Village, Planning of Jijiadun New Rural Life Project in Jinxi, Kunshan

In the core area (Jijiadun Village), through the analysis and calculation of the current situation, 121 households were retained on the basis of the 142 houses, and the other 21 households were returned for agricultural land. The planned construction land area is 4.92 hectares (Fig. 14-15).

The planning has comprehensively evaluated the houses retained in the core area, and make overall arrangements according to the needs of the construction stage and the development needs of the resident business. The houses that basically meet the development needs of the layout are reserved, while structural reinforcement and decoration are planned as needed. For houses that do not meet the needs, renovations will be carried out within the scope of their original house sites.

Fig. 14 Homestead Utilization Analysis Diagram, Planning of Jijiadun New Rural Life *Project in* Jinxi, Kunshan

Fig. 15 Core Area Plan of Jijiadun Village, Planning of Jijiadun New Rural Life Project in Jinxi, Kunshan

3.3. Business Model

An innovative model, namely the "1+X" cultural and rural model of the Jijiadun Co-Creation Community (Fig. 16) has been developed:

1: Taking the business of the hotel as the core, it has integrated varied functions such as the cultural business, themed restaurants, leisure experience, organic agriculture and other functions of cultural tourism, so as to form a complete cluster of cultural tourism.

X: It stands for a specific theme related to the rural cultural tourism, such as education and training, exhibitions, art performances, etc.

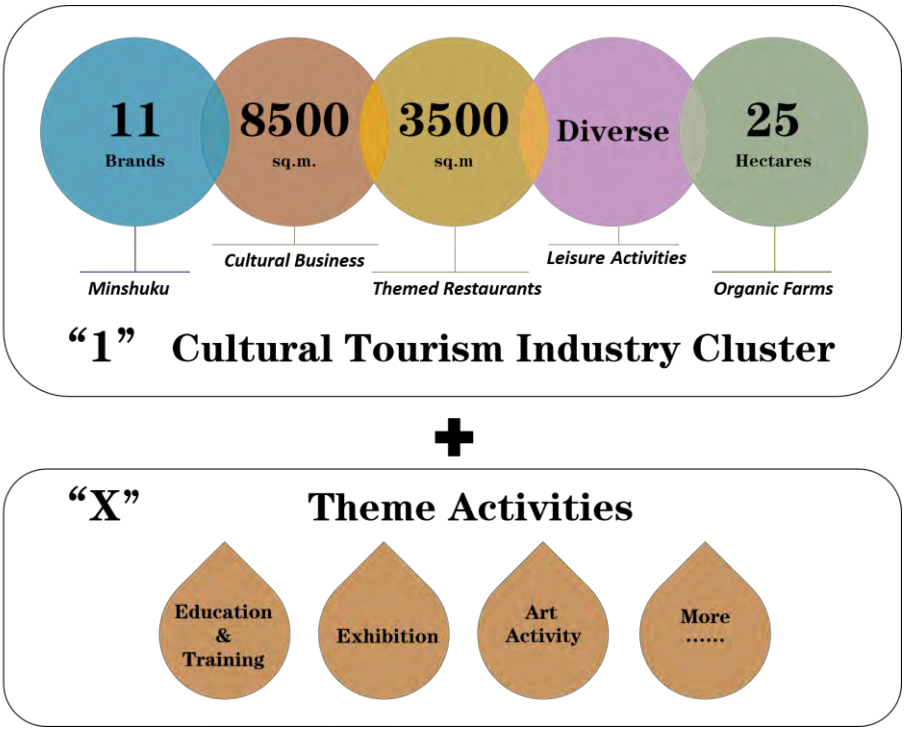


Fig. 16 Model Canvas of the Jijiadun Co-Creation Community

On the basis of revitalizing the rural collective stock assets, this model introduces the cultural tourism of diverse features to redevelop the Jijiadun Village and reuse its resources, so as to improve the living environments and infrastructure in the rural area, which would again attract and guide the local residents to return and invest themselves into the construction and operations management of the rural tourism. At the same time, the project can upgrade the rural tourism industry from the three basic stages of agritainment (rural entertainment), sightseeing tour and family trip; the upgraded rural tourism is also known as the rural tourism 4.0, namely, the Co-Creation Community for Rural Life. Further, the project has a purpose of attracting attention to the rural areas and attracting people to return, which tries to facilitate those aware of the new rural lifestyle concept to invest in the rural areas, and enrich the operations of the Co-Creation Community for Rural Life, ultimately revitalise the rural areas.

3.4. Development Status

At present, the first phase of Jijiadun Village has been completed and has operated 7 branded homestays with 180 rooms in total. Successively, it has attracted the entrance of varied businesses, such as pottery, woodworking, handmade ships, café, restaurants and natural farms. In the village (Fig. 17), there have been a series of themed activities successfully held, such as the Rural Life Festival, the Field Music Festival, the Parent-Child Summer Camp, and the Water Market, which have attracted abundant new villages from Shanghai and its surrounding areas.

With the continuous improvement of the infrastructure and the continuous construction of the village, the Jijiadun Co-Creation Community is expected to have a maximum flow of 3,000 people per day after the completion of the overall development, including 500 hotel guests. Generally, the annual number of tourists is expected to achieve 300,000。

As part of the exploration in rural revitalisation, it has made adequate achievement. The XBAND Group regards the Co-Creation Community for Rural Life as the ideal village, which has been promoted in many rural areas in China as a replicable, promotable and sustainable rural development mode.

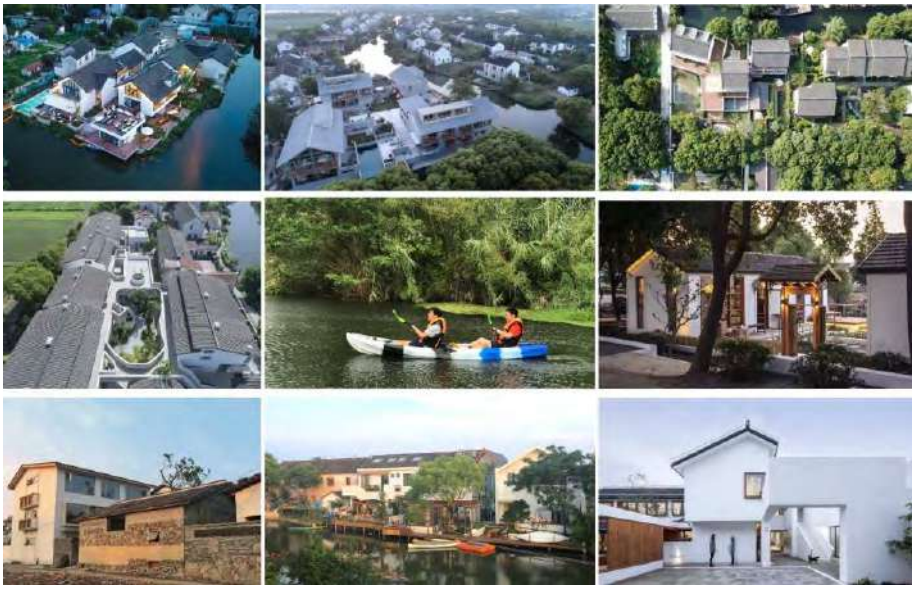


Fig. 17 Post-construction Photo of Jijiadun Co-Creation Community, Some of the photos are from Xband.club

4. Conclusion Rural Revitalisation Outlook

From the Moganshan Program to the Jijiadun Co-Creation Community for Rural Life, the emerging industrial and business modes like Minshuku, rural tourism, cultural creation and others have blurred the boundary between the rural and urban areas. The urban and rural lifestyles and cultures have integrated with each other, which are not limited by their

geographical features. The exploration of the emerging modes will influence and inspire the planning for the rural revitalisation in the future. The planning for rural areas should not be limited to traditional landscaping, but take more perspectives, to focus on the local environments and conditions. According to the practices and cases demonstrated above, there are several recommendations for rural revitalisation.

1) Cultural Reconstruction and Rural-Urban Integration

Focus on culture and explore the distinctive features of the local area, to maintain the strengths and overcome the weaknesses. Establish the cultural creation platform, to attract external talents and young labourers to return to the rural areas and form their new rural cultures. Facilitate interactions and bonds between the original residents and new incomers as well as the integration between the urban and rural lifestyles, so as to gradually shorten the distance between the urban and rural areas.

2) Spatial Planning with Rural and Pastoral Landscape Maintained

The uniqueness of a rural area from its spatial dimension and arrangement carries the humanity and memory of the local rural life. The planning should abandon the external biases and respect the originality of each rural area. On the basis of the unique rural and pastoral landscape of a specific rural area, it is recommended to use low-density buildings to maintain the intimacy and affinity of the rural area, and create a rural community of ecological vitality.

3) Resources Integration and Modular Development

Integrate internal and external resources and establish the industrial platform of rural recreation to motivate the development of the tertiary industry and promote the overall value of the rural lands. Meanwhile, the rural areas can facilitate modular development of the rural cultural tourism, to rapidly revitalise the rural areas with the well-developed operation modes and customer groups.

4) Planning Oriented, and Multi-party Coordination

Use planning as a means of regulation, to comprehensively integrate the industries and establish feasible models of rural development featured with scientific layout and orderly construction, as well as optimized rural environments. Establish an interactive mechanism that involves the government, enterprises, planners and local residents, using the quality platform and advanced concepts from the external parties to satisfy the local needs and guide the local development with characteristic industries.

5. References

[1] China Urban-Rural Construction Statistical Yearbook,MOHURD,Beijing,2010,2017.[中国城乡建设统计年鉴 2010，2017]

[2] Planning of Jijiadun New Rural Life Project in Jinxi, Kunshan,2015.[昆山锦溪计家墩新乡村生活项目规划]

[3] Wei Hongjian, Analysis the Planning of Moganshan on the Development of “B&B” from the Perspective of Rural Ecology, 2017, No.78(11):36-39.[卫宏健，乡村生态圈视角下的“民宿+”发展—浅析乡伴莫干山计划,IDEAL SPACE，2017, No.78(11):36-39]

[4] Zhu Shengxuan, Yang Xiaozhe, Wu T , et al. ,Moganshan Program, Designer & Designing, 2015(4):64-73. [朱胜萱, 杨晓哲, Wu T , et al. 望山,依田,归乡——莫干山清境·原舍/清境·农园/庾村 1932 文创园[J]. 设计家, 2015(4):64-73.]

[5] Garva Tashi, Pema Dorje, Founder of Somtsam Hotel, Tibet Magazine, 2016(4):48-53. [噶哇扎西, 白玛多吉. 从央视纪录片导演到藏式精品酒店创始人——白玛多吉[J]. 中国西藏, 2016(4):48-53.]

[6] Zhu Shengxuan, Zheng Guangqiang, Wei Hongjian, Zhang Qingqing, Ideal Village Jijiadun:A Rural Recitalization Practice from Perspective of Culture and Tourism,Landscape Architecture, 2018, Vol.25 No.154(5):55-60.[朱胜萱, 郑光强, 卫宏健,等. 计家墩理想村:文旅视角下的乡村振兴实践[J]. 风景园林, 2018, Vol.25 No.154(5):55-60.]

[7] Zhang Wei, Xu Shanshan, Yuan Xiaoxiao, The Designer’s Mission under the Background of Rural Revitalization [J]. Development of Small Cities & Towns, 2019, 37(02):58-64.[张伟, 许珊珊, 袁晓霄. 乡村振兴背景下的设计师使命[J]. 小城镇建设, 2019, 37(02):58-64.]

[8] Scott M., Gallent N., Gkartzios M., The Routledge Companion to Rural Planning. New York: Routledge, 2019

Research Paper

Exploration and practice of formulating strategic planning for rural revitalization in the Shanghai metropolitan area

——take the rural revitalization of Jinxi town in Kunshan as an example

Xiaoyi Wen, Shanghai Tongji Urban Planning & Design Institute CO.LTD; China
Guoquan Zhang, Shanghai Tongji Urban Planning &Design Institute CO.LTD; China
Qiuyi Jiang, Shanghai Tongji Urban Planning &Design Institute CO.LTD; China

Abstract

China's urban and rural development has entered a new stage of comprehensive transformation. The advent of the era of metropolitan development and the strategy of Rural Revitalization are two important national strategic backgrounds of this study. As the highest urbanization rate in Southern Jiangsu, rural and urban development needs synchronous resonance. Rural areas, as an important role in the integration of the Yangtze River Delta and the development of Shanghai Metropolitan Area, play an important role in regional cohesion and complementary functions, and are an important part in the overall construction of the metropolitan area. Jinxi Town is located in the southern end of Jiangsu Province, bordering Qingpu District of Shanghai, and between Suzhou and Shanghai. In ancient China, Jinxi was a traditional town of fish and rice and water culture. During the period of reform and opening-up, Jinxi worked closely with surrounding cities to create a brilliant chapter of "Sunan Model" and "Kunshan Model". In the new stage of development, Jinxi Town shoulders the heavy responsibility of more ecological functions and reduction of construction land indicators. It is not only more responsible for ensuring food production safety and protecting ecological functions, but also more demanding for rural revitalization. It is also more urgent to study its development path and strategy. Firstly, this paper takes Jinxi's contemporary mission as the starting point, secondly, through the analysis of Jinxi's function orientation, population, industry and space, and then puts forward the general strategic requirements of Rural Revitalization according to these four aspects. Thirdly, it demonstrates several different types of villages in Jinxi town, respectively. The cases of upgrading agriculture, industrial integration and development, demonstration of rural community and industrial retreat to build Jinxi Town to revitalize villages in the countryside. Finally, through the follow-up revision and improvement of planning formulation, to help the effective implementation of Jinxi Town's Rural Revitalization strategic planning.

Through this study on the Rural Revitalization of Jinxi Town, on the one hand, it comprehensively implements the national deployment and the task of Jiangsu as a benchmark; on the other hand, it earnestly follows the law of rural self-development, and in the theoretical category of regional economy, it is based on the development of metropolitan area and the background of Rural Revitalization era, with Chinese characteristics, Shanghai. The road of Rural Revitalization in metropolitan area. At the same time, this paper expects to provide ideas and

methods for the compilation of strategic planning for Rural Revitalization in metropolitan areas.

Keywords

rural revitalization, Shanghai metropolitan area, Kunshan Jinxi

1. Basic overview

Jinxi is in the Core Hinterland of Yangtze River Delta Metropolitan Circle——Shanghai Metropolitan Circle, arounding dian Shanhu Strategic Cooperative Zone.As an important role in the integration development of the Yangtze River Delta and the development of Shanghai Metropolitan Area, rural areas play an important role in linking up and complementing each other's functions. They are also an important part in promoting the overall construction of the Metropolitan Area.

Therefore, on the basis of clarifying the future development direction of Jinxi, how to strengthen the regional interaction and connection with the metropolitan area and strengthen the integration of urban and rural areas is of great significance for activating the vitality of the countryside, promoting the realization of the goal of eliminating urban-rural dualization in the metropolitan area, and how to take the step of Jinxi rural revitalization.

Figure 1: Location Map of Jinxi Town

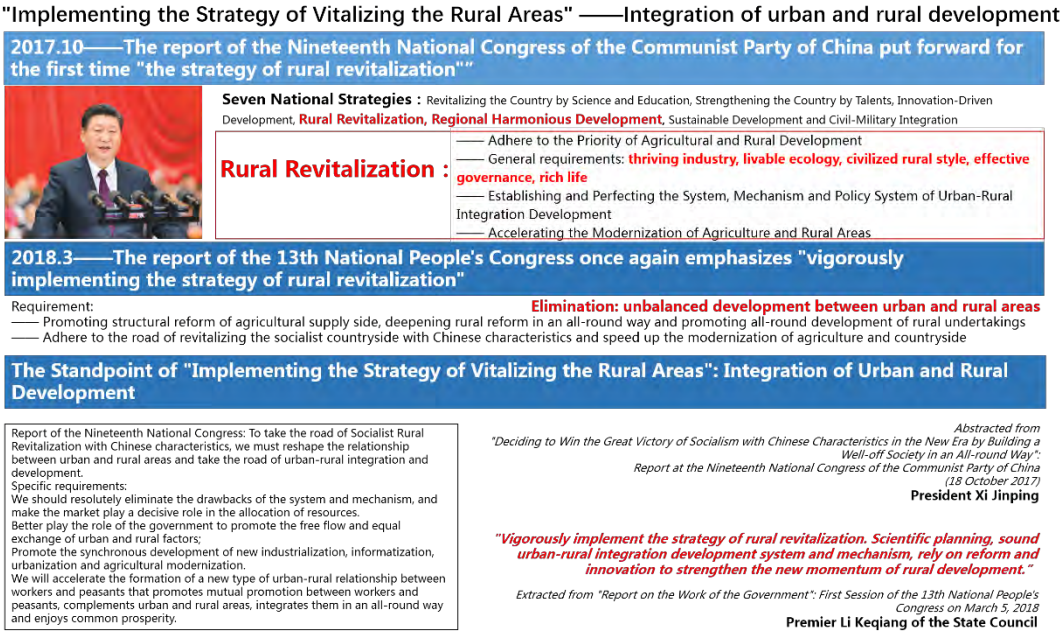


Figure 2: Overall requirements of national strategy

2. Mission

2.1. Historical Review

Jinxi Town is located in Kunshan City, between Shanghai and Suzhou, belonging Jiangsu Province. Jinxi Town has a total area of 90.69 square kilometers. It has Unique Humanistic Landscape, and be famous of Folk Museums. When we talk about the word”canal”, then we think about The most biggest and greatest Canal in China. The China’s earliest national space strategy : It is (the Beijing-Hangzhou Grand Canal) ,as much important as the Great Wall.

In the Spring and Autumn Period, the State of Wu dug a canal from Yangzhou to Huai'an, Later on, the canal had been successively restored and expanded in several dynasties to the existing Beijing-Hangzhou Grand Canal. At that time, the southern part of the Yangtze River was the economic center of the empire, with the most abundant sources of wealth and food. One of the purposes of the construction of the Grand Canal is to transfer food and wealth from the south of the Yangtze River to the political center in the north of China, to provide economic support and food supply. The reason for choosing canal transportation is that it costed less and saved more time than land transportation. This project takes many years and it worded. Because of Jinxi is close to Chenghu Lake and has abundant rainfall and water resources, People worked hard and kept digging, the nature small lakes had been dug into lardge ones ,in Local language which called ”Dang”. and people dug canal to their homes, which called”bang”, so they used family names plus “bang” as villages’names. Such as zhujia bang , gujiabang, These village names are still in use today, until now, jinxi also Retains the typical " bridge, water, house” of the traditional Jiangnan water village style.

The canal created Jinxi: High-quality ecological background, traditional land of fish and rice: fertile land fit for farming. So in the past, In the National Land Planning of the Beijing-Hangzhou Grand Canal, Jinxi thrives in response to water. The most important responsibility

of Jinxi is to provide food and economic contributions. Advantages and Past: Setting the tone of Jiangnan Water Township and Fish and Rice Township for Jinxi. After the founding of New China and the reform and opening-up, the economic development of the eastern coastal areas has been rapid. Jinxi is close to Shanghai, and has the advantage of location and policy of getting a month ahead of others. Under the background of the rapid development trend of the "Southern Jiangsu Model" and "Kunshan Model", Jinxi has achieved good development results.

Figure 3: Schematic Map of Beijing-Hangzhou Grand Canal

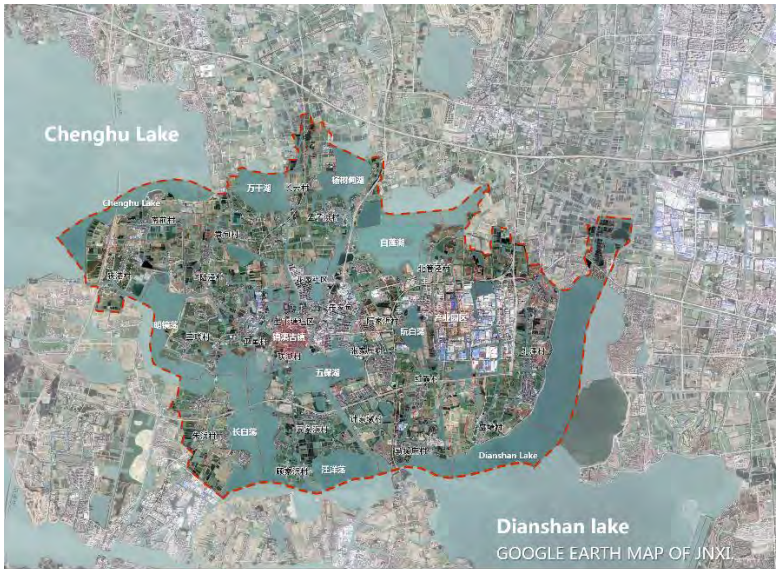


Figure 4: Research Scope of Jinxi Town

2.2. Trend analysis

Jinxi is in The Core Hinterland of Yangtze River Delta Metropolitan Circle——Shanghai Metropolitan Circle , according to Shanghai Master Urban Planning (2017-2035) ,jinxi belongs“New Economic Zone of Ecological Civilization”. In the Upper Planning of Kunshan City, The Nature of jinxi is to be the famous historical and cultural towns in China, the towns

of folk museums, and the famous tourist towns in the south of the Yangtze River with abundant lake resources. Kunshan has established the urban nature of "livable and industrial big cities with high quality development, famous international intelligent manufacturing cities, important strategic fulcrum linking Shanghai and Jiangsu, green ecological city with Jiangnan characteristics". The general plan also proposes to further dock with Shanghai and integrate into Suzhou, and strive to build Kunshan into a pilot demonstration area for the Yangtze River Delta to implement new development concepts, achieve higher quality development and a higher quality of life.

National level: preserving grain production function - 100,000 mu of good farmland in Kunshan and 1000 hectares of good farmland in Jinxi. Consensus at the regional level: At present, the premise of rural development, regional ecological maintenance is an indispensable function.

Ultimate goal: The experience of developed countries can eliminate the gap between urban and rural areas and achieve the goal of "integration of urban and rural life with differences, no gaps, mobility and barriers". So, Is it most likely that the integration of urban and rural life will be the first to achieve "difference, no gap, mobility, barrier-free"?

2.3. Contemporary Mission

Rural rejuvenation adheres to the guiding ideology of socialism with Chinese characteristics in Xi Jinping's new era, deeply implements the spirit of the Nineteenth National Congress of the Party and the Party congresses of provinces and municipalities, adheres to the combination of macro-policy orientation and local actual conditions, bases itself on "new background, new opportunities and new requirements", and avoids "urbanization, disorder and homogenization". Constructing the Rural Revitalization space to develop as a breakthrough, realizing the "three transformations" in planning orientation, and promoting the whole rural revitalization of Jinxi Town.

Thought change one: More importantly, high-quality development should be made from the perspective of developing the new ecological economy to find breakthroughs.

Second, we should explore the characteristics of the countryside. The countryside is no longer just a dependency of the city.For example, tapping rural leisure and recreation functions, preserving the regional characteristics and cultural heritage of Jiangnan Waterfront, improving rural living environment, improving agricultural quality, improving people's lives, and ultimately achieving the same level between urban and rural areas.

Figure 1: Current situation and trend & Main features and challenges

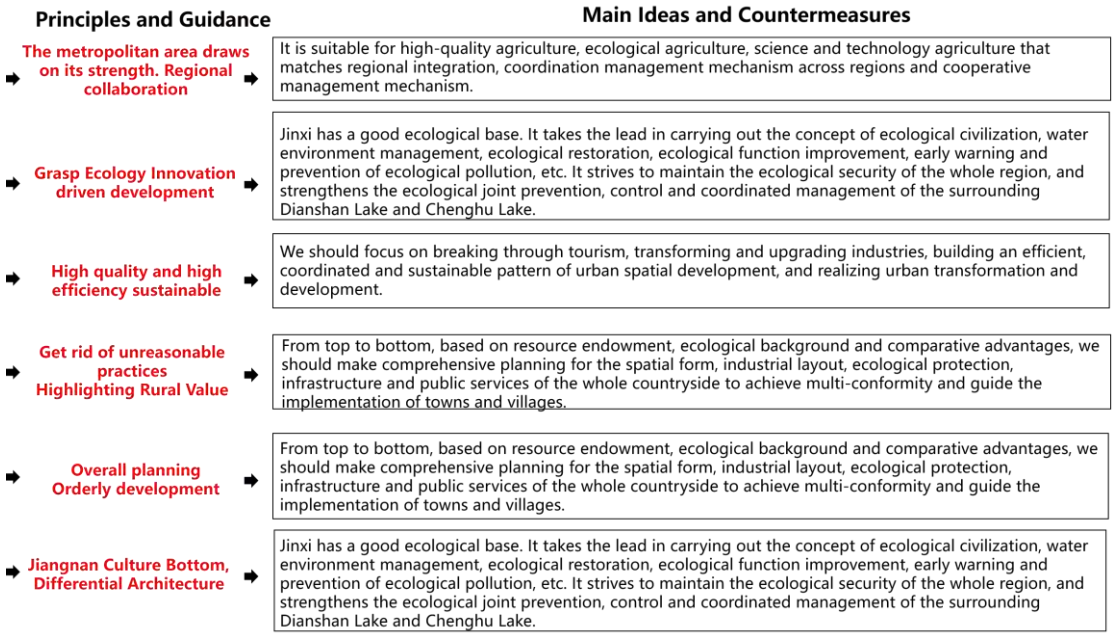


Figure 1: Principles and Guidance & Main Ideas and Countermeasures

3. Survey: the current situation of rural development in Jinxi Town

3.1. Functional positioning

lack of coordination between urban areas and rural areas at the macro level, failure to highlight their own characteristics at the village level, weak implementability, and weak links at the town level.In the latest Kunshan Master Plan, The Nature of jinxi is to be the famous historical and cultural towns in China, the towns of folk museums, and the famous tourist towns in the south of the Yangtze River with abundant lake resources.

At present, the planning of Jinxi can be summarized into four main areas.： Living Area、Eco-industrial Park Area、 Lake-side Area and Rural area.

The positioning of the area around Dianshan Lake considers the cooperation relationship with its surroundings carefully. However, from the current positioning of the living area of ancient towns, the collaborative area around Dianshan Lake, the eco-industrial area and the surrounding rural planning, it is found that there is no close cooperation between them, and it is difficult to cohesive and develop, thus forming a competitive development trend. In addition, the importance of Jinxi as an important ecological conservation area around the lake has not been reflected, and the characteristics of the water towns in the south of the Yangtze River are not obvious.

Functional positioning

The lakeside tourist resort mainly consists of recreation and ecological sightseeing.

Development orientation

Planning and utilizing rivers, lakes, wetlands and green spaces in the plot to create eco-tourism sightseeing areas.

Source: Controlled Detailed Planning of Lake-side Resort in Jinxi Town, Kunshan City

Functional zoning map of lakeside resort

Land use planning map of lakeside resort

Functional partition

Four districts:

1.Dianshan Lake Resort: Depending on the beautiful natural scenery along the coast of Dianshan Lake, it mainly serves the accommodation, catering and leisure of the tourist population.

2. Chessboard Waterfront Recreation Area: Build lake-side eco-agricultural sightseeing, resort hotels, wetland parks and water experience centers.

3.Wangyangdang Ecological Conservation Area : Popular science education in conservation.

4. Changbaidang Ancient Kiln Art Area: Combining the ancient kilns near Zhujiadian, Zhubang and other villages, as well as the southern part of the town, the ancient kiln art zone is developed to form a kiln-themed tourist area.

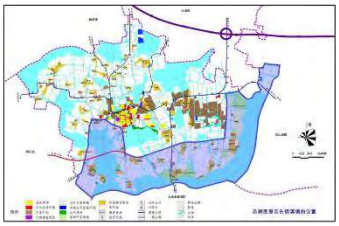


Figure 5: Detailed Control Planning of Jinxi Town Living Area in Kunshan

Functional positioning

It is a small town comprehensive area with the characteristics of giving priority to the comprehensive service function of cities and towns and taking into account the leisure tourism of water towns as a whole.

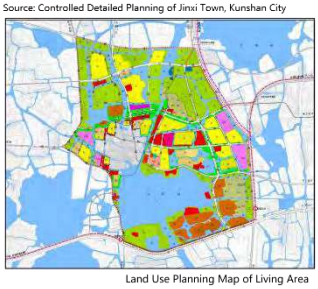
Development orientation

Promote people-oriented and smart growth model to form small towns with tourism characteristics under the background of new urbanization.

Functional partition

Generally speaking, the river system and main traffic arteries are divided into five functional areas. Four urban living areas and one tourist and leisure area.

Source: Controlled Detailed Planning of Jinxi Town, Kunshan City



Land Use Planning Map of Living Area

Location Map of Living Area in Jinxi

Figure 6: Detailed Control Planning of Lake-side Resort in Jinxi Town,

3.2. Population problems:

the income gap between urban and rural areas causes regional population factors to flow, which leads to the restructuring of rural social structure in Jinxi Town; self-built houses have high cost, high idle rate and low utilization rate.

The total population base of the town area is small, ranking behind Kunshan, and the population growth rate is slow. In 2017, the total registered population of the town was 446,000. The total population ranks seventh in 11 towns and districts of Kunshan City. Jinxi local aging phenomenon is prominent, in 2017, the proportion of the elderly over 60 years old is as high as 31%. Kunshan is one of the 10 cities with the highest proportion of migrants in China, and ranks fourth. Jinxi Town has a smaller migrant population than the immigrant population, and belongs to the population-importing region. Local young people in Jinxi go to the surrounding big cities to develop, while young people who come to work here come to Jiangsu Province or Anhui Province and Henan Province from farther regions. In 2017, the temporary population of Jinxi Town was 254,000, which reached half of the total household registration population. The proportion of young and middle-aged people from other places was high, reaching 95%.

The total population base of the town area is small, ranking behind Kunshan, and the population growth rate is slow. In 2017, the total registered population of the town was 446,000. The total population ranks seventh in 11 towns and districts of Kunshan City. Jinxi local aging phenomenon is prominent, in 2017, the proportion of the elderly over 60 years old is as high as 31%. Kunshan is one of the 10 cities with the highest proportion of migrants in China, and ranks fourth. Jinxi Town has a smaller migrant population than the immigrant population, and belongs to the population-importing region. Local young people in Jinxi go to the surrounding big cities to develop, while young people who come to work here come to Jiangsu Province or Anhui Province and Henan Province from farther regions. In 2017, the temporary population of Jinxi Town was 254,000, which reached half of the total household registration population. The proportion of young and middle-aged people from other places was high, reaching 95%.

Therefore, improving the disposable income of Jinxi's rural areas, introducing, cultivating and perfecting the rural talent echelon, achieving the continuous increase of rural residents'income, ensuring and improving the living safety and quality of the people living and working here are also the problems to be solved in this rural revitalization.

rank	city	administrative level	province	The proportion of immigrants to permanent population
1	Dongguan	Prefecture-level cities	Guangdong	75.68%
2	Liuyang	County-level city	Hunan	72.06%
3	Shenzhen	Planned separate cities	Guangdong	67.71%
4	**Kunshan**	**County-level city**	**Jiangsu**	**50.21%**
5	Zhongshan	Prefecture-level cities	Guangdong	50.08%
6	Foshan	Prefecture-level cities	Guangdong	46.38%
7	Jinjiang	County-level city	Fujian	45.87%
8	Xiamen	Planned separate cities	Fujian	43.74%
9	**Shanghai**	**Municipality**	**Shanghai**	**40.08%**
10	Yiwu	County-level city	Zhejiang	38.39%

Table 1：Ten cities with the highest proportion of migrants in China

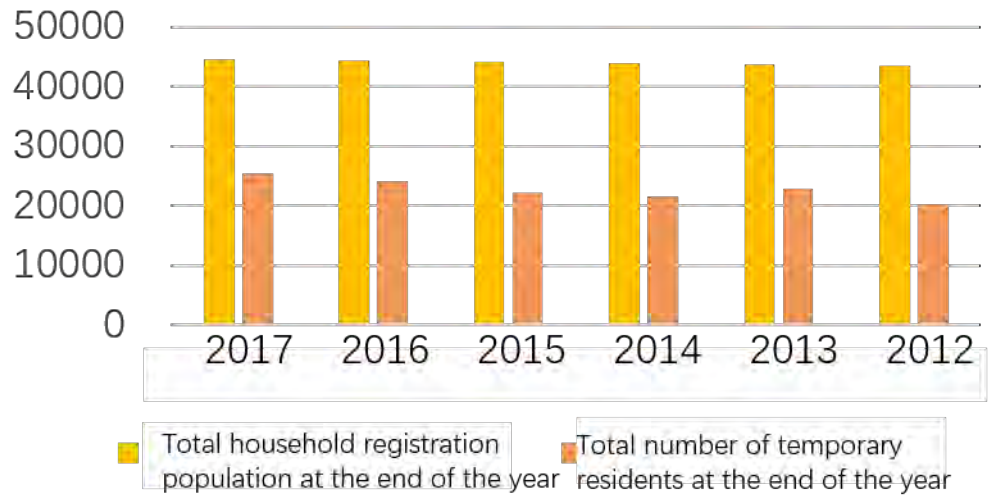


Table 2：Household Registration Population and Temporary Resident Population in Jinxi Town, 2012-2017

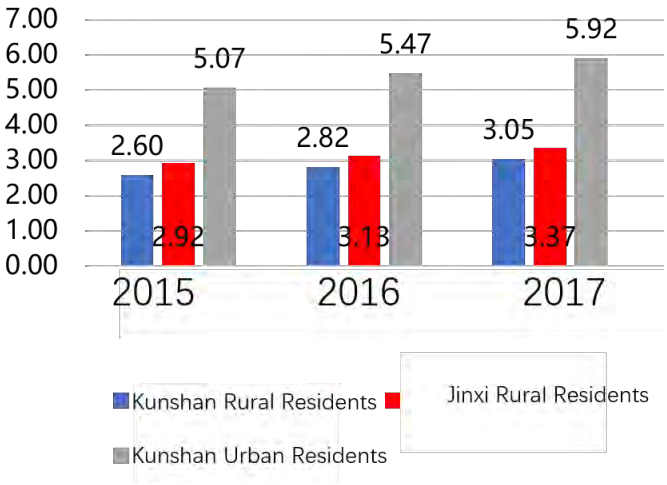


Table 3: Per capita disposable income of Kunshan urban and rural residents and Jinxi rural areas from 2015 to 2017(ten thousand)

3.3. Industrial problems:

agricultural growth is weak, the transformation of village industry is imperative, the service industry of tertiary industry is showing a growth trend, and has the potential and trend of creating "ecological new economy"

Kunshan City has long been in the forefront of the county economy in China. The land transfer of Kunshan City has basically been completed, and is operated by village land joint-stock cooperatives and various professional cooperatives. Kunshan Development Zone and High-tech Zone are the leading industrial parks in which the industrial manufacturing industry is developed; the modern service industry represented by Huaqiao Jingkai District is developing rapidly; and the tourism industry of ancient towns represented by Zhouzhuang is deeply rooted and flourishing.

Jinxi's total economic output is not high, but its agricultural performance is outstanding. According to the level of modern agricultural equipment, the total power of agricultural machinery and the number of large and medium-sized tractors in Jinxi Town are in the front rank among the districts and towns, and the proportion of primary industry is the highest. Compared with 11 towns and districts in Kunshan City, Jinxi Town ranks third, seventh and ninth in total grain output, total output value of agriculture, forestry, animal husbandry and fishery, and total GDP in 2017, respectively. Kunshan City vigorously promotes the development of green transformation of agriculture. Jinxi Town has also taken measures such as reducing fertilizer and pesticide, green ecological three-dimensional agriculture and so on to improve the quality of agricultural development. Farmers are not satisfied with the dividend distribution of cooperatives. The main reason is the efficiency of land management and the fairness of distribution. It is suggested that the quality of agricultural products be improved and local brands be promoted.

Jinxi's total economic output is not high, but its agricultural performance is outstanding. According to the level of modern agricultural equipment, the total power of agricultural machinery and the number of large and medium-sized tractors in Jinxi Town are in the front rank among the districts and towns, and the proportion of primary industry is the highest.

Compared with 11 towns and districts in Kunshan City, Jinxi Town ranks third, seventh and ninth in total grain output, total output value of agriculture, forestry, animal husbandry and fishery, and total GDP in 2017, respectively. Kunshan City vigorously promotes the development of green transformation of agriculture. Jinxi Town has also taken measures such as reducing fertilizer and pesticide, green ecological three-dimensional agriculture and so on to improve the quality of agricultural development. Farmers are not satisfied with the dividend distribution of cooperatives. The main reason is the efficiency of land management and the fairness of distribution. It is suggested that the quality of agricultural products be improved and local brands be promoted.

In summary, the development of primary production agriculture is limited by the area of cultivated land (water surface). Agricultural economy will show weak growth depending on traditional operations, and new agricultural growth paths need to be explored. It is imperative for the industrial transformation of the second industry to take place in the village, and the service industry of the third industry is showing an increasing trend. Generally speaking, Jinxi does have the potential and trend to build a "new ecological economy".

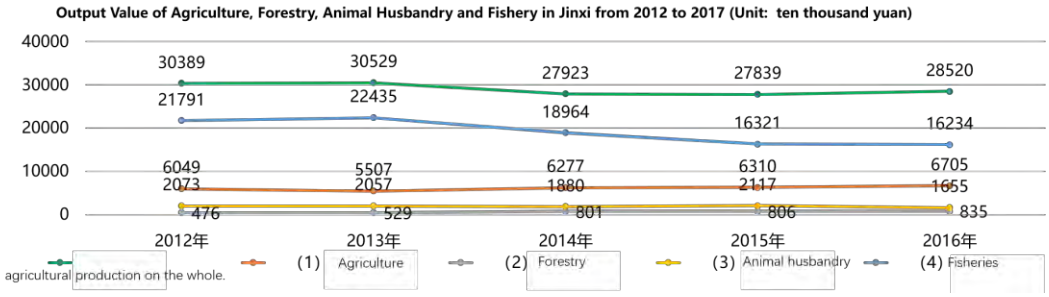


Table 4: Output Value of Agriculture, Forestry, Animal Husbandry and Fishery in Jinxi from 2012 to 2017

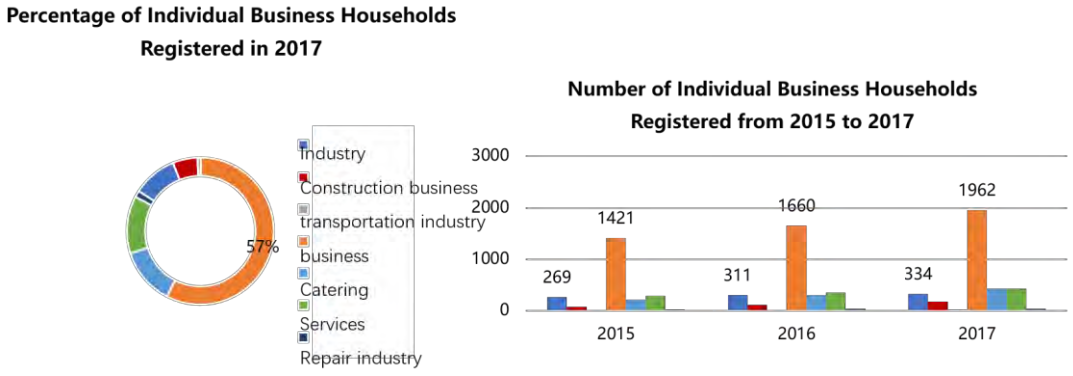


Table 5: Percentage of Individual Business Households Registered in 2017

Table 6: Number of Individual Business Households Registered from 2015 to 2017

3.4. Spatial problems

too dispersed space, resulting in the lack of organic links between the districts; land use indicators reduction, affecting the re-allocation of small public facilities, production facilities, and the problem of idle space resources.

The current spatial structure lacks support for future diversified industries, and because the space is too dispersed, the linkage between villages and communities is not strong, and the utilization rate of public facilities is not high. It is necessary to strengthen the linkage between villages and communities and promote the rational use of space resources.

In order to achieve the overall target of grain production security in Kunshan City, the cultivated land area of Jinxi increased year by year. From 2012 to 2016, the average annual growth rate of cultivated land area in Jinxi Town was +4.22%, and the production space increased. However, the lack of new land indicators led to the shortage of production facilities, such as grain dryers. In the future, the reduction of industrial land in villages will lead to severe transformation of enterprises in villages. According to the questionnaire survey, villagers hope that villages/communities need to increase public activity venues: parking lot, rice milling center, public activity space, garbage collection points, vegetable cultivation space, etc. Because of the lack of new land indicators in villages, it is impossible to allocate them.

Part of the idle space resources mainly come from the plot land after the closure of the village enterprises, which is temporarily idle due to the need for high-cost land restoration investment to return cultivated land, and the idle workshop of some large industrial districts. The other part is the outsourced project land, which is idle due to the enterprise's own business reasons.

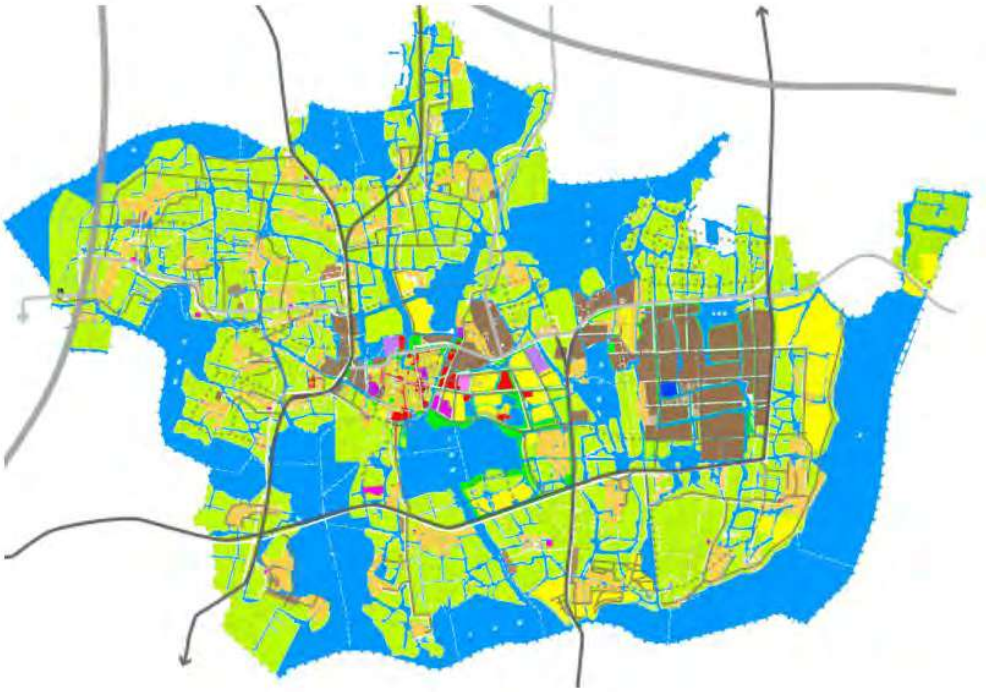


Figure 7: Current Situation of Jinxi Town in 2018

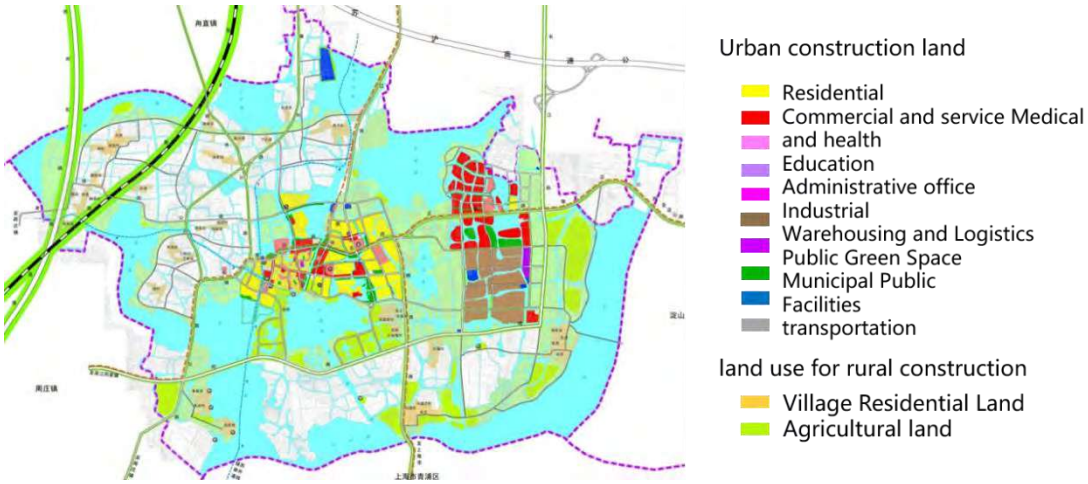


Figure 8: Planned Land Use of Jinxi Town in 2030

4. Strategy: Development Strategy of Rural Revitalization

4.1. Development Orientation Strategy

4.1.1. Development Orientation

New Jiangnan Water Village as Beautiful as Poetry and Painting

4.1.2. Development Goals

1) Shanghai Metropolitan Cooperative Development Zone New Jiangnan Water Town Model

2) The Benchmark of Agricultural and Rural Modernization in Suzhou

3) Model of Urban-Rural Integration Development in Kunshan City

4.1.3. Staging objectives

1) New Form of Business: A Model of Urban Modern Agriculture Development

- We will promote structural reform of the agricultural supply side. Around promoting the upgrading of the industrial system, production system and management system of agriculture, the modernization level of agriculture will be further promoted.
- Promote the integration of agriculture, commerce, culture and tourism, promote the development of modern services such as tourism, exhibition and cultural creation, and promote the integration of Rural three industries.

2) New Life: A Model of Urban-Rural Integration Development

- We will further promote the development strategy of urban-rural integration, promote the free flow and balanced allocation of urban and rural factors, and build a new urban-rural relationship with mutual interaction and complementary symbiosis.
- To meet the needs of accelerating the transformation of the age structure, employment characteristics, lifestyle and quality of life of new rural people, and to build a new way of production and life in rural areas.
- It meets the requirement of two-way interaction between urban and rural areas. Improve the level of infrastructure and supporting services, attract urban capital and residents through high-level livable environment construction, and promote urban-rural integration.

3) New Jiangnan: A Model of Spatial Form of Water Township in New Jiangnan

- Rehabilitation of local ecology, inheritance of local culture, protection of local form, with the concept of global landscaping, scenic spots, accessibility and participation, shape Damei agricultural water form.
- Strengthen the comprehensive improvement of rural human settlements environment, build a new beautiful countryside (block), repair soil, control water quality, and build a beautiful local environment.
- Combine the functional format with the shape shaping to ensure the strategy of shaping the differentiated style of production, life and ecology.

4.2. Population structure optimization strategy

4.2.1. Promoting population mobility and optimizing population system

To cope with the needs of citizenization, innovation and entrepreneurship, equalization of basic public services in urban and rural areas, the trend of aging, and population mobility, we should reduce the cost of withdrawal from rural areas by replacing urban housing with rural property and land replacement, and reduce the cost of urbanization through household registration reform. We should innovate the mechanism for the introduction and cultivation

of rural talents, and comprehensively cultivate new types of professional peasants, professionals and scientific and technological talents. The basic services of employment, social security, housing, education and medical care should be guaranteed, and a complete policy system should be formed to ensure equal treatment for transfer residents and local residents.

4.2.2. Guarantee public service facilities and create a rural public activities circle

To cope with the needs of citizenization, innovation and entrepreneurship, equalization of basic public services in urban and rural areas, the trend of aging, and population mobility, we should reduce the cost of withdrawal from rural areas by replacing urban housing with rural property and land replacement, and reduce the cost of urbanization through household registration reform. We should innovate the mechanism for the introduction and cultivation of rural talents, and comprehensively cultivate new types of professional peasants, professionals and scientific and technological talents. The basic services of employment, social security, housing, education and medical care should be guaranteed, and a complete policy system should be formed to ensure equal treatment for transfer residents and local residents.

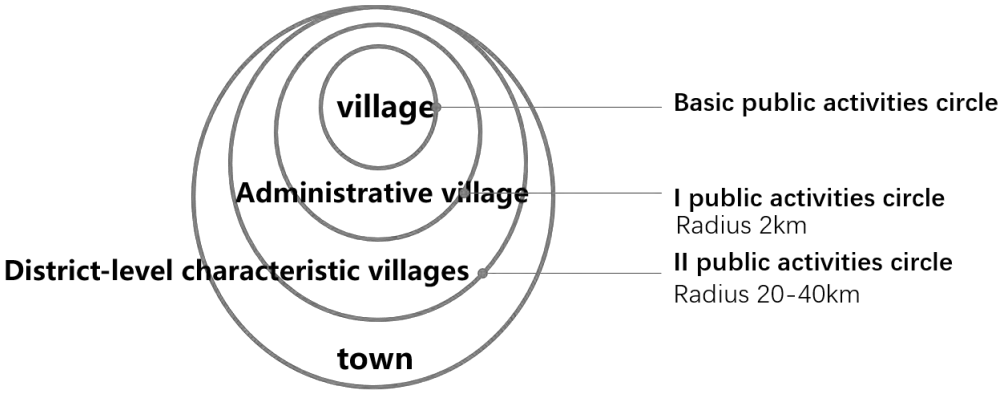


Figure 9: public activities circle in Rural Community

4.3. Industrial Development Strategy

To excavate the cultural value, leisure value, ecological value and economic value of the countryside, take building "one town and one product" of Jinxi Town as a breakthrough point, take the lead in realizing agricultural modernization town and sharing pastoral water villages around Dianshan Lake area as the goal, and realize the sustainable development of the new ecological economy.

4.3.1. Deep integration and upgrading of industrial system

To consolidate the agricultural foundation and further promote the integration of primary, secondary and tertiary industries. With modern agricultural parks, new rural pastoral complexes and characteristic rural areas as the main carriers, we should guide and support industrial and commercial capital and social forces to participate in Rural Revitalization and the integration and development of rural primary, secondary and tertiary industries.

4.3.2. Ecological wisdom and optimization of production system

Rooting in the ecological concept, using modern technological means to comprehensively improve the production level.

1) Agricultural development model green: improve the quality of cultivated land, high-standard farmland construction; reduce inputs to achieve zero growth of fertilizers and pesticides; recycle waste, improve the utilization of straw and other resources; industrial ecological coupling, the development of ecological recycling agriculture.

2) Intelligent agricultural production and operation: agricultural technology and equipment, mechanized intelligent equipment; the development of agricultural Internet, rural e-commerce and so on; information-based circulation supervision, implementation of quality and safety traceability system, etc.

3) Agricultural management service informationization: agricultural socialization service, the establishment of information system to serve agricultural production; villagers in the palm of Jinxi, to build a government service system of mobile micro-messaging.

4.3.3. Cooperation and Sharing to Activate Business System

1) Give full play to the leading role of the new business entities, and realize the organic connection between small farmers and the development of modern agriculture. Innovation and development of rural cooperative economic organizations. Supporting the well-conditioned community joint-stock cooperatives to explore the establishment of modern enterprise management system in the mode of joint-venture development.

2) Optimizing the quality of collective economic development. Appropriate development and construction of agricultural and trade markets, urban complexes, science and technology entrepreneurship parks and other business projects to increase collective income. For the development of residential and pension projects using idle farm houses, support rural collective economic organizations to activate the utilization of idle farm houses and homesteads, develop resi dential and pension projects by means of leasing, pooling and equity.

4.3.4. Supporting and perfecting the industrial chain of Agricultural Engineering in an all-round way

1) Give full play to the leading role of the new business entities, and realize the organic connection between small farmers and the development of modern agriculture. Innovation and development of rural cooperative economic organizations. Supporting the well-conditioned community joint-stock cooperatives to explore the establishment of modern enterprise management system in the mode of joint-venture development.

2) Optimizing the quality of collective economic development. Appropriate development and construction of agricultural and trade markets, urban complexes, science and technology entrepreneurship parks and other business projects to increase collective income. For the development of residential and pension projects using idle farm houses, support rural collective economic organizations to activate the utilization of idle farm houses and homesteads, develop residential and pension projects by means of leasing, pooling and equity.

3) ndustrial Platform Construction Project. At present, there are about 1500 rice processing enterprises in Jiangsu Province, with an annual output of 25 million tons, accounting for 9.3% of the country. However, there are many small and bulk processing factories with low equipment level. There are only a handful of large-scale precision processing enterprises such as grain and oil in northern Jiangsu, rice cultivation in Sukeng, Jiangnan Spring in Changzhou and Baoying Baobao grain and rice industry. The

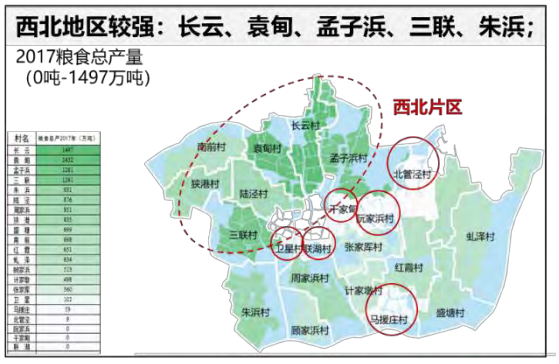
idle rural collective construction land can be replaced, and the grain processing base in Jinxi Town can be established to be responsible for production and grain processing, the entity marketing platform for exhibition, and the township founding base for publicity and promotion, so as to form a perfect industrial engineering chain.

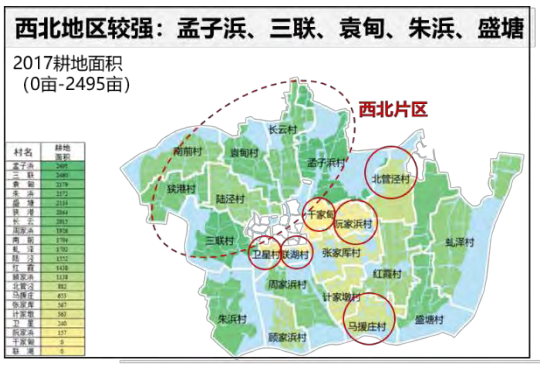
4.4. Space Development Strategy

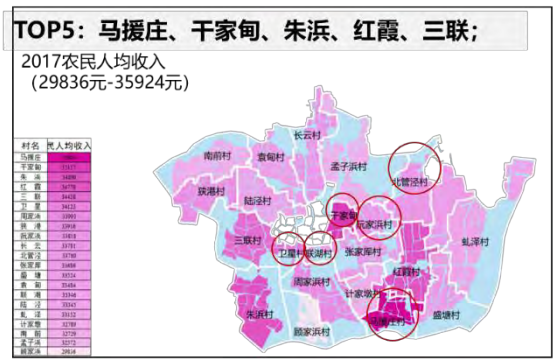
Based on the principle of layout optimization and sharing of public service facilities, we should guide spatial renewal, maintain the leading role of agricultural production function, improve the service quality of the three industries, reduce the consumption of land and open space, improve the utilization efficiency of existing land and open space, and reconstruct villages in various ways with "industrial transformation" as the core. Material space environment, activating the vitality of traditional culture. Improving the rural human settlement environment and forming a sustainable development pattern of urban and rural ecological environment integration and complementarity, economic, social and ecological coordination.

4.4.1. Spatial Assessment and Classification of Rural Areas

From the analysis of gross national product, population statistics, industrial statistics, agricultural land area, gross grain production and per capita income of farmers, the relationship between industrial functions and spatial distribution is obtained. For example, the overall cultivated land area and yield in the northwest region are relatively high (7 villages); other villages (9 villages) with agricultural production function as the main function, and villages (6 villages) with non-agricultural production function as the main function; the overall economic strength of villages is proportional to the population (3 villages).Only a small number of villages have weak secondary industry (5 villages) and the tertiary industry around the lake region has more development potential (3 villages).







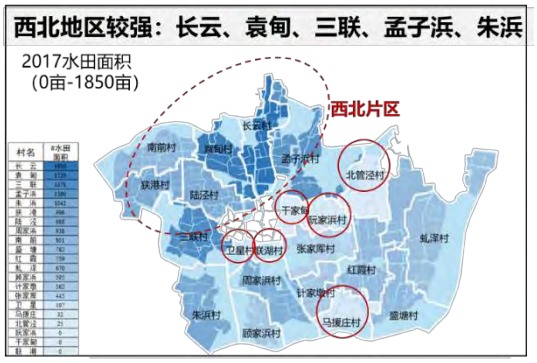


Figure 10: Sketch map of spatial assessment: Agricultural land area (arable land area, paddy field intensive); gross grain production; spatial assessment of per capita income of farmers

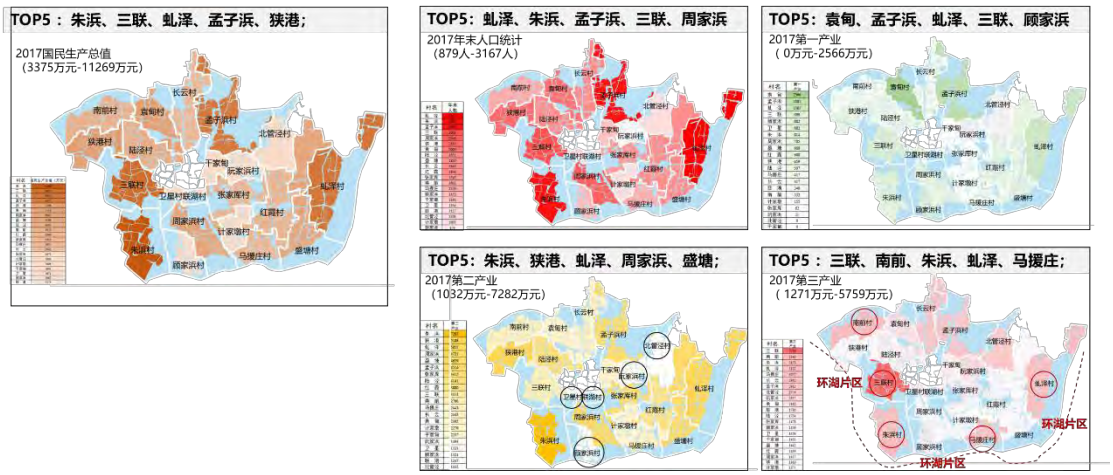


Figure 11: Sketch map of spatial assessment: GNP; demographic statistics; output value of first, second and third production

4.4.2. Strengthen the implementation of space use control

On the basis of the delimitation of "three districts and three lines", we should strictly protect the lake wetland, coordinate the protection of Dianshan Lake and Chenghu Lake, and control and manage the internal lake. Strictly abide by the permanent basic farmland red line, basic farmland management and control standards.

4.4.3. Optimizing Rural Development Space

1) Reconstructing the planning structure of rural revitalization: one center, one corridor, two axes and four districts.

- One Heart: Jinxi Ancient Town Comprehensive Service Center
- One Corridor: Huanjinxi Vigorous Corridor
- Two axes: along the Jin-Shang road Development Axis and Bailian Lake Ecological Development Axis
- Four Areas: Modern Agricultural Production Zone, Ancient Town Comprehensive Service Zone, High-tech Industrial Zone, Lake Rim Leisure Resort.

Figure 12: Structural sketch of Rural Revitalization Planning in Jinxi Town

2) Create efficient and intensive rural production space. Build Jinxi model of linkage among agricultural production area, rural community, Jinxi town area and Rural Creative Zone. Rural Creative Zone: Develop into an ideal life village cluster with multiple meanings; develop scientific and technological agriculture in agricultural production areas; build 22 rural communities around comprehensive service centers in villages; and form a more complete supporting area with the focus of Jinxi town.

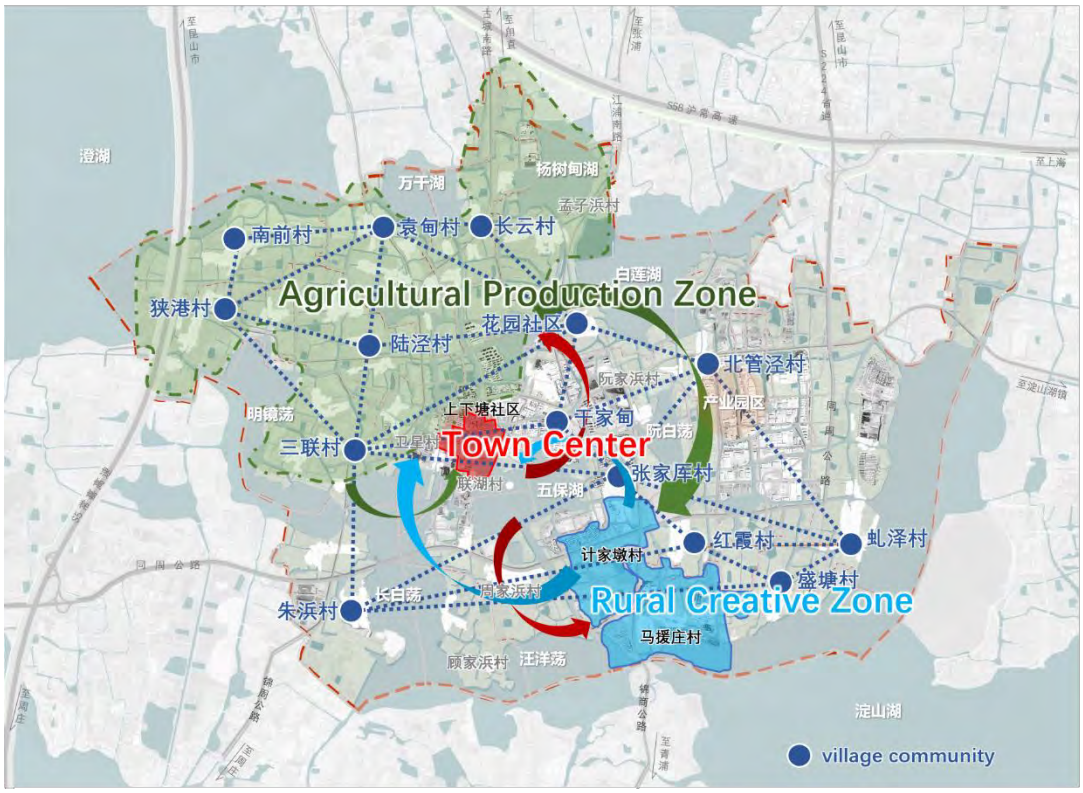


Figure 13: Four-zone linkage diagram

3) Build a suitable living space in the countryside. According to the characteristics of each village, there are high-quality fields, farmland and water scenic spots, green exhibition and marketing areas, community living areas, ancient village tourist areas, ancient kiln art areas, lakeside resorts, etc.

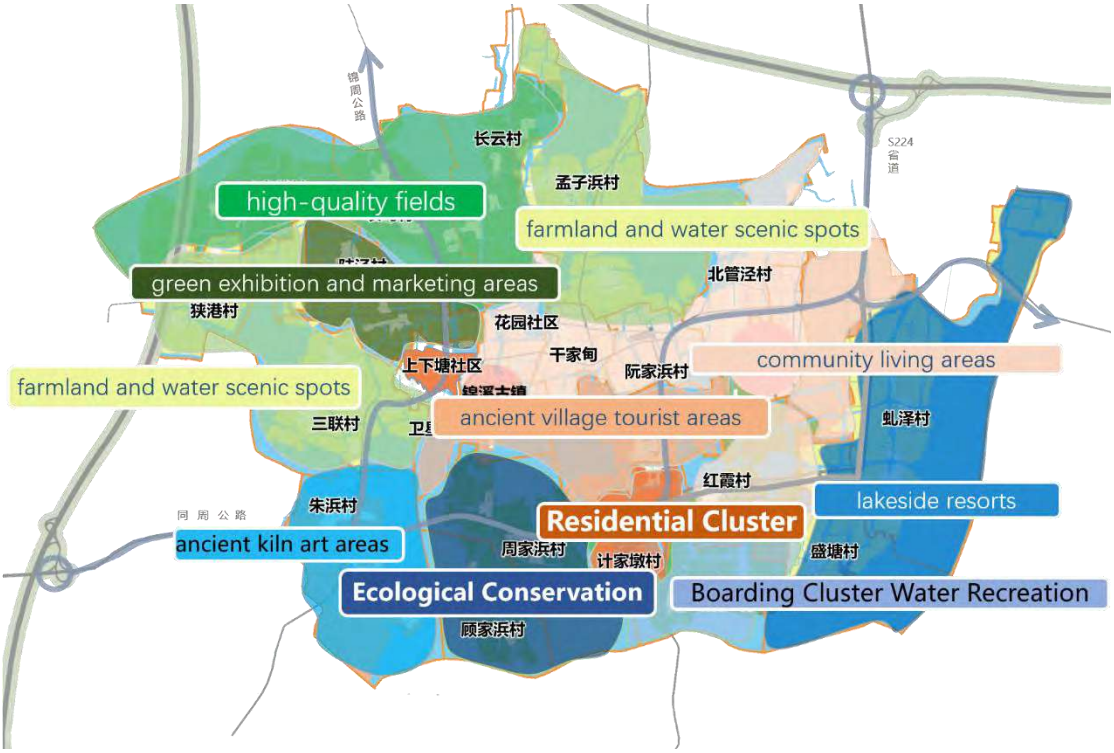


Figure 14: Distribution of Village Characteristics

4) Create a blue-green interwoven Shuimei Jinxi. Improve environmental quality. Water environment: "Five lakes, three ripples, six pools and five patches" regionalized regulation, proposed integrated watershed protection mechanism, control of agricultural non-point sources, enhance runoff control, establish a rainwater runoff management system consisting of roads, water system vegetation buffer zones and rainwater gardens. Ensuring biodiversity of farmland ecosystem, improving and restoring farmland soil, and strictly controlling chemical fertilizer, agricultural waste and agricultural water discharge.

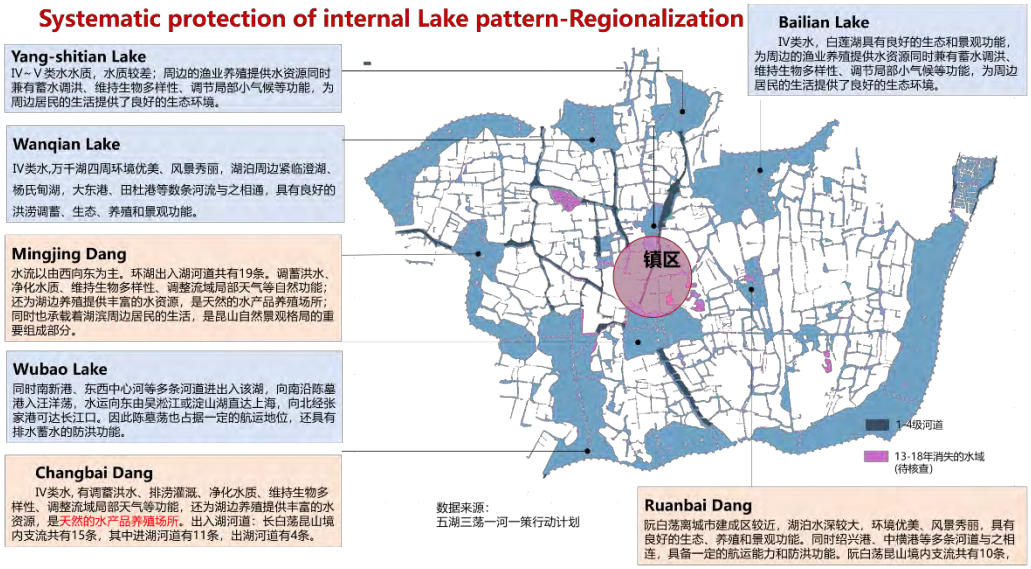


Figure 15: Schematic Map of Regional Renovation of "Five Lakes and Three Dangs"

5. Case Study: Villages Revitalized in Rural Areas

5.1. Case Study of Agricultural Upgrading Village: Changyun Village

5.1.1. Target positioning

High-efficiency and High-quality Agricultural Benchmarking

5.1.2. Staging objectives

1) Leading Party Construction Policy Innovation
2) Technology Agriculture & Application Practice
3) Stereoscopic Agriculture
4) Re-upgrading Changyun Model

5.1.3. Main paths

Continue to give full play to the advantages of Changyun's state-level cooperatives, continue to upgrade policies, agriculture and operation

1) Scientific and Technological Agricultural Experimental Field
2) Upgrading Crab Culture in Paddy Field
3) Renewal of duck farming in paddy fields

5.1.4. Strategies

Strategies for Agricultural Industry Upgrading: Leading the Application of Agricultural Technology; Developing Three-dimensional Agricultural Economy with Ecological Circulation ; Creating Urban Leisure Agriculture.

Changyun Model Upgrading Strategy: Upgrading the Model of "One Town One Product"; Constructing Cooperative Development Mechanism; Shaping the Brand Characteristics of Changyun.

5.2. Case Study of Industrial Integration Village: Xiagang Village

5.2.1. Target positioning

Eco-oriented Agricultural Park

5.2.2. Staging objectives

1) Ecologically Beautiful Leisure Fishing Village
2) North Portal of jinxi
3) important Eco-node of Chenghu Lake
4) Best natural outdoor classroom

5.2.3. Main paths

1) Restoring Ecology

Combining the construction of Chenghu ecological conservation area, Ecological Corridor around the lake and small industries that have been cleared away, we should further expand ecological effects, strengthen ecological conservation and control, and build demonstration

sites for ecological civilization construction. At the same time, we should attract tourism with ecology, introduce green tourism products, and attract tourists to increase vitality.

2) Expanding Industry

On the basis of the current agriculture, we should supplement the service industry and tourism industry, re-integrate the resources with the idea of "agriculture + tourism", dig the tourism resources in depth, and promote the transformation of regional industries and expand employment opportunities.

5.2.4. Strategies

Core development issues: through an ecological chain, a cultural chain, protecting the ecological background, coordinating spatial elements, transforming traditional agriculture, innovating urban and rural co-ordination

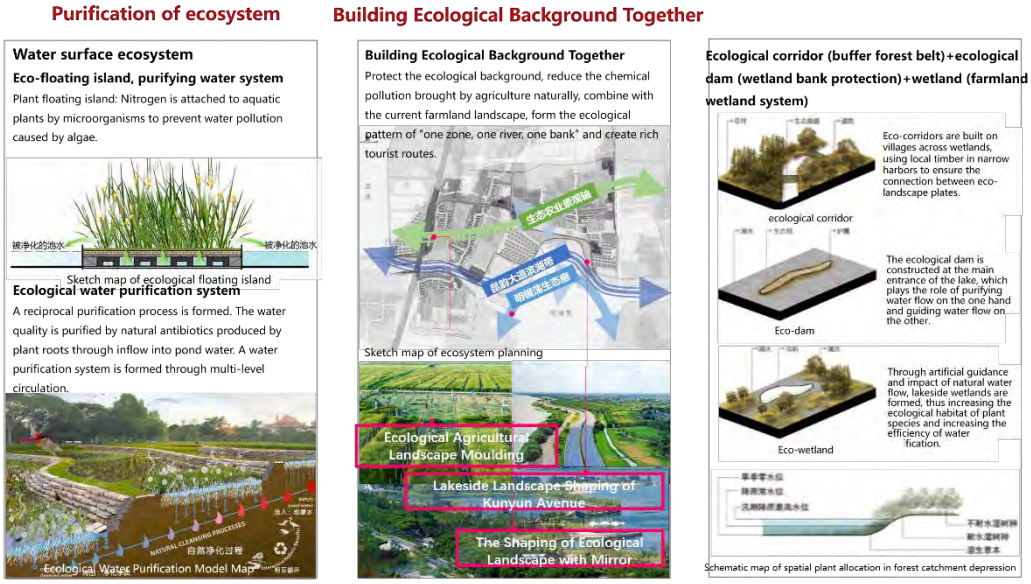


Figure 16: Strategy schematic

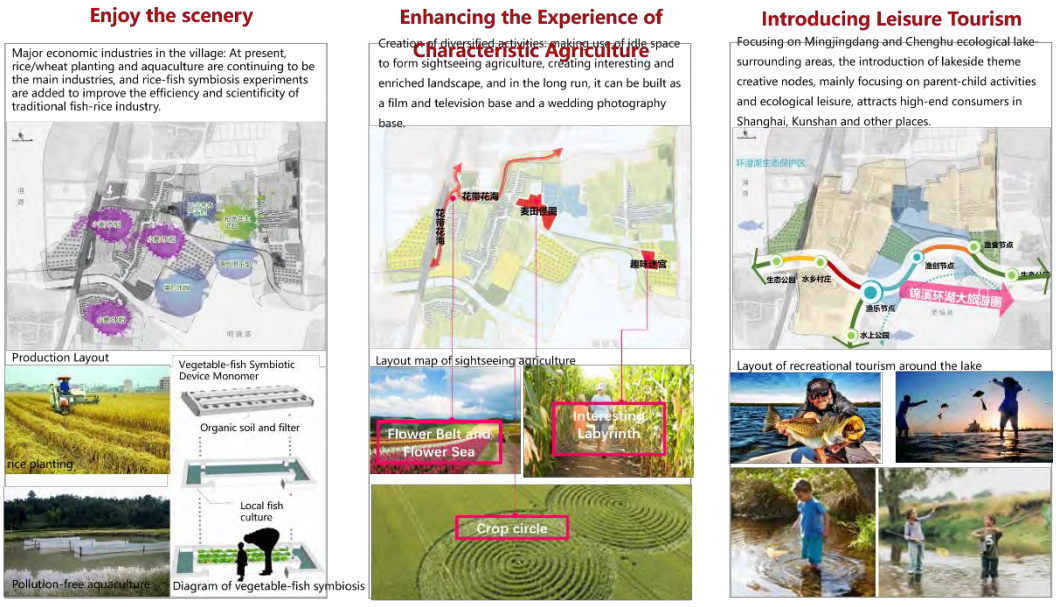


Figure 17: Strategy schematic

5.3. Case Study of Village of Village Community Type: Zhangnan Village

5.3.1. Target positioning

Demonstration Village of Renovation of Human Settlement Environment in Water Township of Jiangnan

5.3.2. Staging objectives

1) The most livable pastoral community
2) rural tourism Leisure destinations
3) Shanghai Suburbs Living in Water Township
4) The Experience of Slow Life

5.3.3. Main paths

1) Village upgrading and environmental optimization
2) Business Form Introduction and Crowd Attraction

- Link up with Jijiadun to build an international Fanxin Jiangnan on the west side of Dianshan Lake.
- By virtue of the location advantage close to the international metropolis, we can gather the strength and wisdom of different groups, and provide "golden tricks"“
- Attracting and retaining international villagers, returning visitors, elderly people, tourists and local villagers

5.3.4. Strategies

1) Leisure tourism Countermeasures

- Improvement of water environment
- Space Node Optimization-Sharing
- Restoration of ecosystems

2) Countermeasure of Village Promotion

- Traffic network of dredging Road
- Supporting High-end Service Facilities
- Optimizing Public Activity Space

3) Measures to Improve Human Settlement Environment

- Improvement of water environment
- Space Node Optimization-Sharing
- Restoration of ecosystems

5.3.5. Master plan

Figure 18: Zoning format layout of ZhangNan Village

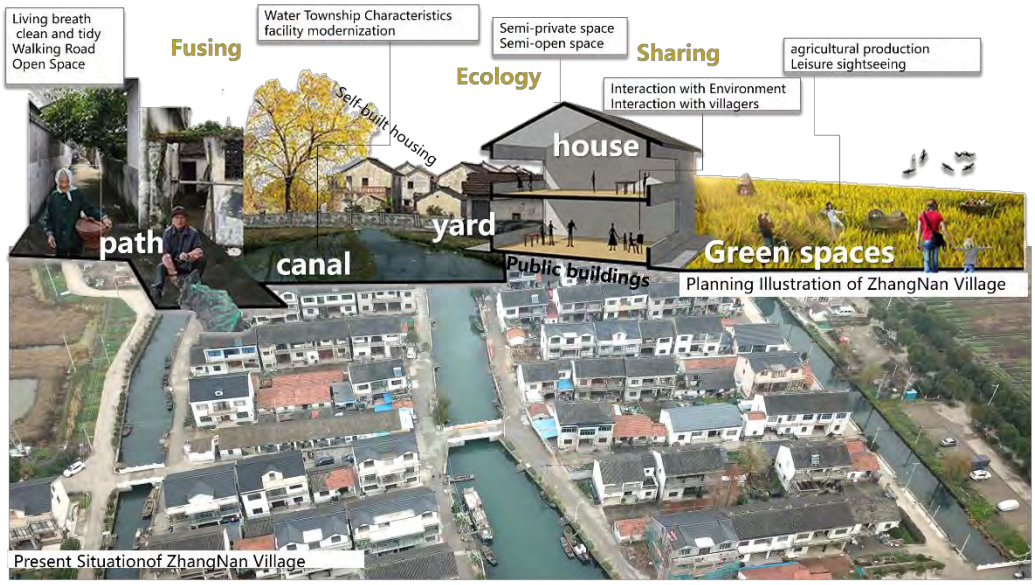


Figure 19: Design Concept- New Jiangnan Water Township

5.4. Case Study of Industrial Returning Village: Zhubang Village

5.4.1. Target positioning

1) Jinxi Town Industrial Transformation Demonstration Village

2) Agricultural Creation, Cultural Creation and scientific Creation Fusion Creative Culture Park

5.4.2. Staging objectives

1) Industrial Sites Thematic tourist destination
2) Art and Culture Exhibition Settlement
3) History and Culture Exhibition Museum Group
4) Highlands of Kunshan's innovation

5.4.3. Main paths

Plant renovation, facility matching and environmental renovation

Combining Zhudianyao ancient kiln art culture and Jinxi township enterprise culture, introducing R&D companies and universities, leading the transformation and operation of local enterprises, taking into account the comprehensive format, focusing on the transformation of scientific research results, and setting an example of Jinxi industrial transformation.

5.4.4. Strategies

1) Regional Linkage Countermeasure

- Space-Culture Linkage Axis
- Lakeside Scenic Belt and Great Tourist Circle Around the Lake
- Integration of Four States and Three Creations
- Space renovation of workshop

2) Strategies for Cultural Inheritance

- Comprehensive Culture and Activating Space
- Integrating Innovation and Exploiting Potential
- Organic Renewal and Vitality Promotion

3) Strategies for Space Upgrading

- Forming Industrial Heritage Cluster
- Constructing landmarks of landmark Tourism
- Completing the Historical Mission of the New Era

Figure 20: Current Situation and Problems Analysis

Figure 21: Master plan

6. Conclusions

At present, the proposal of the national strategy of Rural Revitalization is of great significance to realize the integration of urban and rural areas and the modernization of agriculture and rural areas in China. As the villages in the core circle of Shanghai Metropolitan Circle, we should take "industrial prosperity, ecological livability, rural culture, effective governance and rich life" as the general requirement, seize the opportunities for development within the circle of Shanghai Metropolitan Circle, take "ecology, sharing, integration and high quality" as the core concept, adhere to the agricultural standard, and adhere to urban and rural areas. Overall planning, from the "positioning, population, industry, space" four aspects of an all-round strategic deployment, to promote institutional innovation of the physical mechanism. Meanwhile, the strategy of Rural Revitalization should respect history and local customs, adhere to the idea of urban-rural co-ordination according to different types of villages, put forward planning strategies according to local conditions, so as to make rural revitalization into an acceptable, concreted and operable strategy system, and help Jinxi become a blue-green interweave in the future, glowing brilliant and vigorous——New Jiangnan Water Township.

7. References

Li Hongbo, Zhang Xiaolin, Wu Jiangguo, & Zhu Bin. (2014). Spatial pattern and driving mechanism of rural settlements in southern Jiangsu. Geographic Science, 34 (4).

Xu Zhanchun. (2007). Township Enterprises and the Urbanization of Rural Population in the Yangtze River Delta - Take Southern Jiangsu as an Example. Yangtze River Forum (6), 24-28.

Li Kaiming, & Liu Jun. (2018). Study on Rural Tourism Layout Planning of Metropolitan Cities Based on Implementation Orientation: Taking Shanghai Rural Tourism Layout Planning as an Example. Small Town Construction (1).

Zheng Biyun. (2015). Enlightenment of International Metropolitan Area Transportation System to Shanghai Metropolitan Area. (Doctoral dissertation, Zhejiang University)

Li Songbai. (2012). A study on rural leisure care for the elderly in the metropolitan area of the Yangtze River Delta. Economic geography, 32 (2), 154-159.

Ruan Yisan, & Yuan Fei. (2010). Towards the New Jiangnan Water Township Age - Protection and Rational Development of Ancient Towns in Jiangnan Water Township. Journal of Urban Planning (2), 35-40.

Chen Yang. (2015). New Exploration of the "Three Centralizations" Model in Southern Jiangsu in the Transitional Period - Taking Jinxi Town of Kunshan City as an Example. New Normal: Inheritance and Change - Papers Collection of the 2015 Annual Conference of Chinese Urban Planning (11 Planning Implementation and Management).

Changyun Village, Jinxi Town, Kunshan City, Jiangsu Province Agricultural Land Share Professional Cooperatives. (2017). Exploration and Practice of Collective Management Model of New Cooperative Farms --- Development of Changyun

Village Agricultural Land Share Professional Cooperatives, Jinxi Town, Kunshan City. Chinese Farmer Cooperatives (2), 24-25.

Case Study Paper

Construction and Empirical Study of Evaluation Index System of Rural Revitalization in China's Metropolitan Areas from the Perspective of Social Ecosystem

-- Taking Villages and Towns Around Shanghai as Examples

Dianhong ZHAO, Shanghai Tongji City Planning and Design Research Institute Co., Ltd..; China

Abstract

Since the reform and opening up, the development of township enterprises is the core of southern jiangsu in Shanghai metropolitan area, which has experienced rapid urbanization and industrialization, and the urbanization rate has reached 75. The high level of 9%. While great achievements have been made in urban and rural development, rural revitalization still faces many challenges, such as environmental pollution, local population loss, migrant population agglomeration, social structure reconstruction and other issues in rural settlements. Realizing sustainable development of rural settlements has become an urgent goal of rural revitalization in southern Jiangsu. Based on understanding of the metropolitan areas around the country revitalization of the Chinese built from rural agricultural modernization and new Jiangnan water to the three dimensions of urban and rural integration development 4 levels of hierarchy model of rural revitalization of the top as the goal layer index, followed by rule layer contains a prosperous industry, ecological livable, local custom civilization, effective governance, well-off five first-level indicators, again for child criterion layer contains rural industrial structure, agricultural science and technology level, rural marketization, livable natural environment, artificial environment livable, social environment livable, culture education 24 secondary indexes such as the construction of public cultural development, Finally for solution layer contains characteristic industrial output value accounted for the proportion of total output, non-agricultural production value accounted for the proportion of total output, proportion of total labor force non-agricultural industry practitioners, comprehensive agricultural mechanization level, per million population the number of agricultural science and technology personnel, agricultural science and technology innovation achievements conversion, forage-livestock system of agricultural products and farmers credit loans into 116 tertiary indicators. At the same time, an empirical study was conducted on the revitalization of 20 villages in Jinxi town around Shanghai, China, to test the feasibility and application value of the evaluation index system, and also to suggest the direction of policy intervention.

Key words

rural revitalization, Social ecosystems, Evaluation index, South Jiangsu

1. Revitalization background

1.1. The overall requirements of the National Rural Revitalization Strategy

Rural revitalization calls for giving priority to development in agriculture and rural areas. We need to establish and improve systems, mechanisms and policies for integrated urban and rural development, and accelerate the modernization of agriculture and rural areas.

1.2. Mission deployment of the rural revitalization strategy in Jiangsu Province

Based on the five aspects of rural revitalization, the general plan of rural revitalization strategy of Jiangsu province (2018-2022) puts forward the main indicators of rural revitalization strategy implementation plan based on the actual situation of Jiangsu province.

Table1：Jiangsu province rural revitalization strategy implementation planning major indicators

	serial number	Main indicators	unit	attribute
Prosperous industry	1	Comprehensive grain production capacity	Ten thousand tons	binding
	2	Contribution rate of agricultural science and technology progress	%	prospective
	3	Agricultural labor productivity	RMB ten thousand/person	prospective
	4	The ratio of processing output value and total agricultural output value of agricultural products	——	prospective
	5	Leisure agriculture and rural tourism receptions	Thousands of people	prospective
Ecological livable	6	Village green coverage	%	prospective
	7	The proportion of villages that deal with household waste	%	binding
	8	The proportion of villages that treat domestic sewage	%	prospective
	9	Comprehensive utilization rate of livestock and poultry pollution	%	prospective
	10	Rural sanitation toilet penetration rate	%	prospective
Local custom civilization	11	Village comprehensive cultural service center coverage	%	prospective
	12	The proportion of civilized villages and towns at or above the county level	%	prospective
	13	The proportion of full-time teachers in rural compulsory education schools with a bachelor's degree or above	%	prospective
	14	The proportion of cultural and entertainment expenditure of rural residents	%	prospective
Effective governance	15	Rural planning and management coverage	%	prospective
	16	The proportion of villages with integrated service stations	%	prospective
	17	The villagers committee shall autonomously meet the standard rate according to law	%	prospective
	18	The proportion of villages where the secretary of the village party organization concurrently holds the post of director of the village committee	%	prospective

	19	Rural harmonious community construction compliance rate	%	prospective
	20	The proportion of villages with strong collective economy	%	prospective
Life rich	21	The engel coefficient of rural residents	%	prospective
	22	Per capita disposable income of rural residents	Ten thousand yuan	prospective
	23	Income ratio of urban and rural residents	——	prospective
	24	Regional water supply household rate	%	binding
	25	Administrative village dual - lane four - level road coverage	%	binding
	26	Standardization of basic public services in rural communities	%	binding

1.3. Action initiatives for rural revitalization in Suzhou

The people's government of Suzhou municipal party committee of the communist party of China (Suzhou about implement the strategy of rejuvenating the country to speed up the opinions on promoting the development of the urban and rural integration, to encourage deeply involved in the country revitalization of the industrial and commercial capital, innovative rural talents cultivating mechanism, the village-level collective economy development, promote the construction of county-rural beautiful four aspects as the realization of Suzhou rural revitalization of the main measures.

1.4. Kunshan City Implements Rural Revitalization Strategy

The implementation plan of Kunshan city's three-year promotion project to implement the strategy of rural revitalization is a top priority. The specific performance is "four hundred thousand mu" agricultural industry pattern, the improvement of modern agricultural park, the construction of agricultural product quality and safety system, the utilization of idle farm houses and homestead, community cooperative joint development and other related measures.

2. Interpretation of the Jinxi

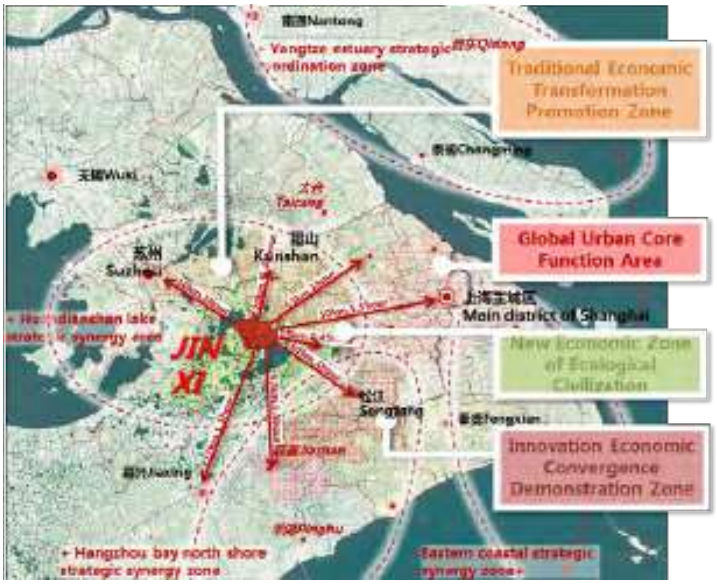
2.1. Jinxi Cognition

2.1.1. Location Features: Around the Lake, Shanghai, Shanghai and Su 1h

Jinxi town is located in the south of Kunshan city, Jiangsu province, bordering Dianshan lake in the east and yicheng lake in the west, bordering jinze town, qingpu district, Shanghai city in the south, and adjacent to luzhi town, wuzhong district, Suzhou city and zhangpu town, Kunshan city in the north. Jinxi town covers a total area of 90.69 square kilometers. Jinxi town has jurisdiction over 3 communities and 20 administrative villages. There are 65,997 permanent residents in Jinxi, including 43,283 registered residents.

Jinxi is located in a superior location, which is located in Jinxi town, an ancient water town in the south of the Yangtze river between the international metropolis Shanghai and the famous historical and cultural city Suzhou. It belongs to Kunshan city, Jiangsu province. It is 50 kilometers away from Shanghai downtown in the east, 30 kilometers away from Suzhou downtown in the west, and 20 kilometers away from Kunshan downtown.

Figure 1: Jinxi location analysis chart



2.1.2. Traffic characteristics: high-speed surround, five vertical and four horizontal

Jinxi town is adjacent to huchang expressway (S58) in the north and changjia expressway in the west. Intercity railway (planning) and track S3 (planning) : from wujiang along tongzhougong road to tongli, zhouzhuang, Jinxi and Dianshan lake, east to Shanghai.

In the town area, the north-south jinzhou gong road and jinshang highway lead to zhouzhuang, while the east-west puqing road, zhengwei east road and the same zhou road lead to zhouzhuang and Suzhou. Kunzhou line (the planned five-level channel) of the main waterway in the town runs through the town, connecting the sushen inner harbor line of the third-level channel in the north and the sushen outer harbor line of the third-level channel in the south.

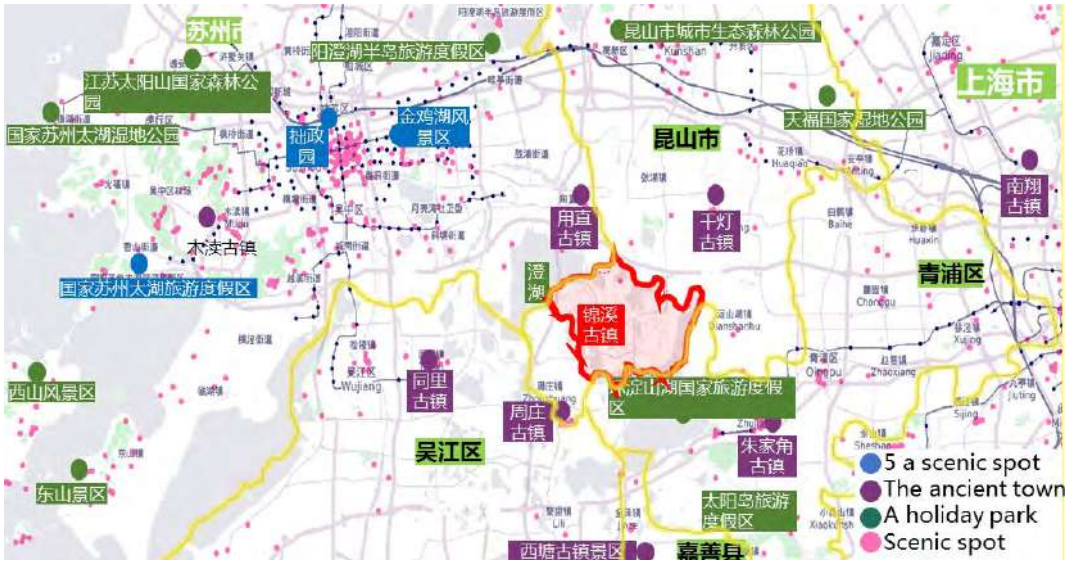
Figure 2: Traffic Analysis Diagram of Jinxi Neighborhood

2.1.3. Cultural Characteristics: Ancient Kiln Town, Art Town

(1) long historical context and rich historical relics. Jinxi has a long history of more than 2500 years. The water network and stone Bridges are interwoven all over the town. The buildings are built along the river and by the water, forming a pleasant environmental landscape of "small Bridges and flowing water", with typical characteristics of Jiangnan water town. There are one provincial cultural protection unit in Jinxi -- zhudian ancient kiln site group, 13 municipal cultural relics protection units such as Chen concubine watermound, Jinxi ancient inland river waterway, tongshendao courtyard and wenchang pavilion, and 4 municipal control and protection units such as wine workshop. In addition, there are a number of historical and cultural value of conservation buildings.

(2) there are many intangible cultural heritage projects. Jinxi town has the largest number of intangible cultural heritage projects in Kunshan, including Jinxi xuanjuan and Jinxi brics. Jinxi has long been known as the hometown of Chinese folk museums. Jinxi has 11 folk museums, such as zhang provincial art museum, China ancient brick museum, maroat mud zen workshop, China Jinxi xuanjuan art museum, China yixing purple sand museum, Jinxi outstanding figures museum and modern folk pot ware museum.

Figure 3: tourist resources distribution around Jinxi



2.2. Development status

2.2.1. Economy: Rural Watchman of China's Most Developed County Economy - Jinxi Agricultural Color

Kunshan: the vanguard of China's county economy. The industrial manufacturing industry in Kunshan is developed with Kunshan development zone and high-tech zone as the leading industrial parks. The modern service industry represented by the huaqiao economic development zone has developed rapidly. Zhouzhuang as a representative of the ancient town tourism and deep.

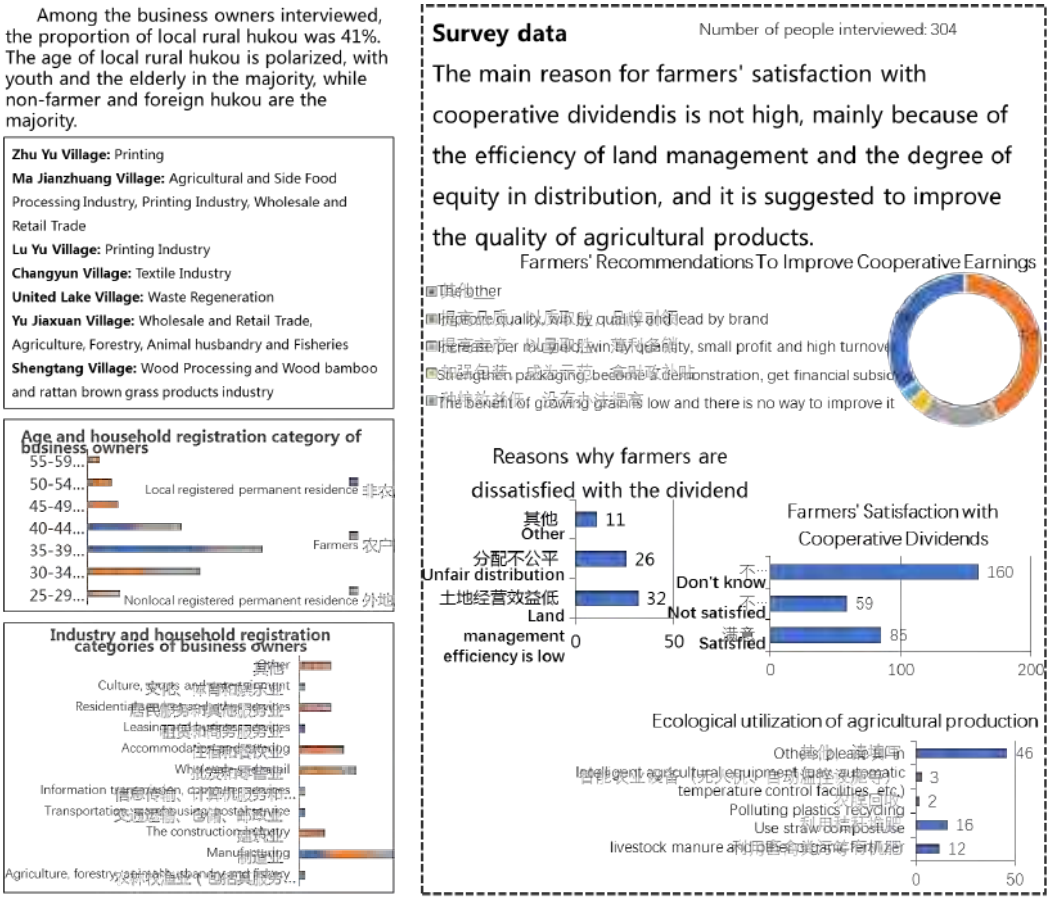
Jinxi agricultural nature. In 2017, the GDP of Jinxi town was 7.511 billion yuan, higher than that of zhouzhuang town. The per capita GDP of registered population is 168,500 yuan; The primary industry accounted for 2.86%, the highest proportion. In 2017, the number of rural households in Jinxi town was 11,822, accounting for 76.46% of the total, ranking third and second respectively in Kunshan. The rural population is 36,904, accounting for 82.77% of the

town, ranking 5th and 3rd respectively in Kunshan. In the case of near-regional urbanization in Kunshan and even Suzhou, Jinxi rarely retains a quiet countryside.

(1) Jinxi agriculture, forestry, animal husbandry and fishery is relatively balanced, but its comparative advantage is not prominent enough. In 2017, the total output value of Jinxi agriculture, forestry, animal husbandry and fishery reached 271 million yuan, ranking the 7th, and there was a significant gap between Jinxi and baicheng (strong fishery), a big agricultural town, and zhangpu (strong rice). Jinxi ranks third in total grain output, third in rice area and sixth in per mu yield.

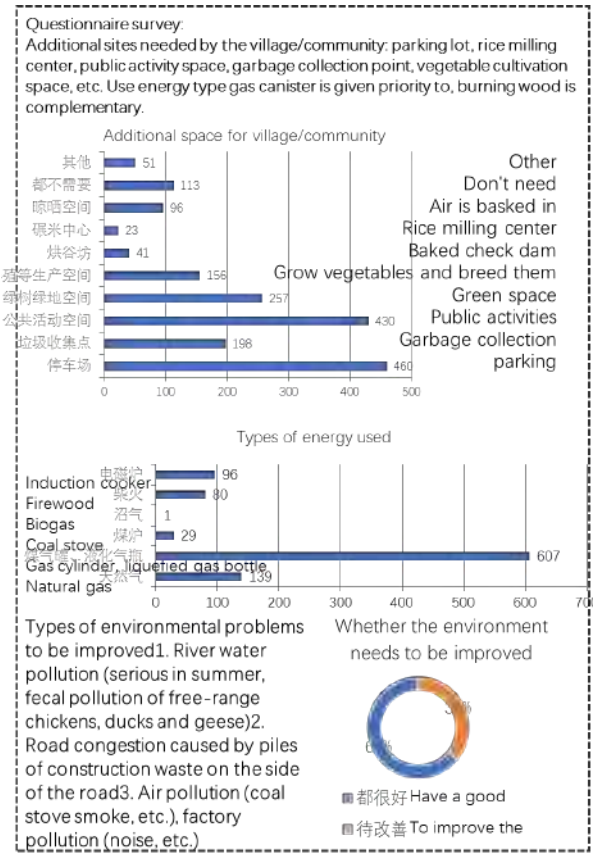
(2) the growth of all industries in agriculture is sluggish, and new growth points need to be explored to break bottlenecks. Modern agricultural equipment level, Jinxi town agricultural machinery total power and the number of large and medium-sized tractors in the district in the forefront. The operation level of moderate scale agriculture is relatively close to each district and town in theory. The transfer of land in the whole city is basically completed, and it is operated by village land joint-stock cooperatives and various professional cooperatives. Kunshan city vigorously promotes the green transformation of agriculture, and Jinxi town also takes measures to reduce chemical fertilizers and pesticides to improve the quality of agricultural development.

Figure 4: jinxi economic survey chart



2.2.2. Space: Jinxi, which relies on traditional development paths, needs to seek new development paths under the goal of land reduction and value-added

Figure 5: jinxi Space survey chart

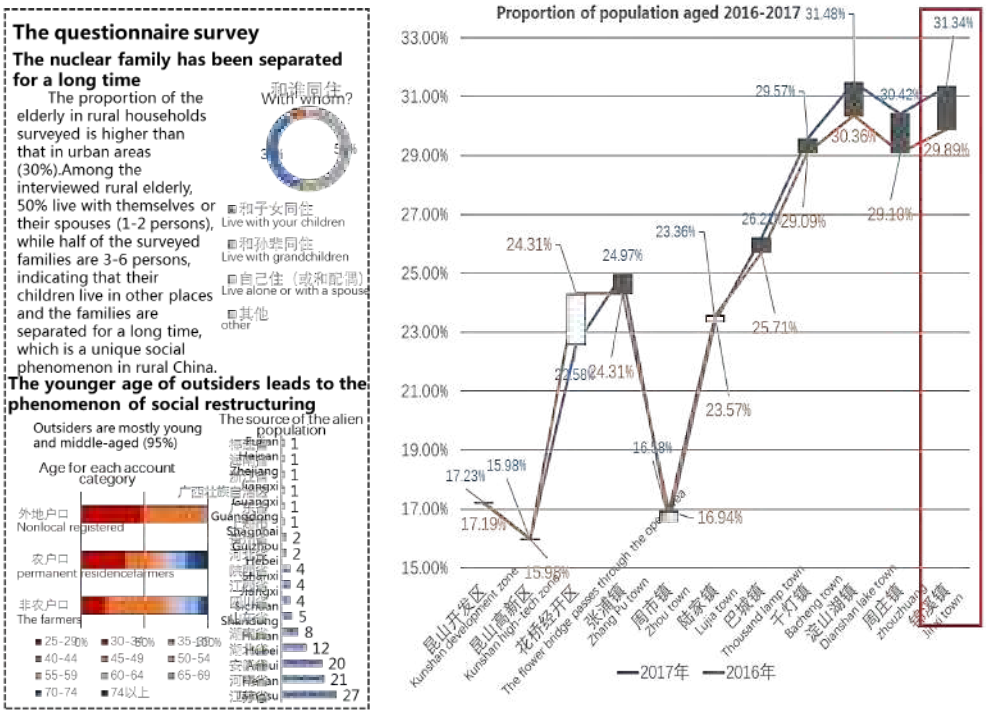


The cultivated land area of Jinxi town increases year by year: from 2012 to 2016, the average annual growth rate of cultivated land area of Jinxi town is +4.22%, which is negative only in 2017. Jinxi water environment ranks first with zhouzhuang in Kunshan city: the water quality of rural river in Jinxi town reaches the standard rate up to 98%, and the water quality of river in market towns reaches the standard rate up to 96%. Limited by the cultivated land (water surface) area, the path of agricultural economic appreciation is difficult: the cultivated land area and the breeding water surface area have a certain correlation, and there is a game between the policy guidance of "returning the pond to the field" and the farmer "changing the field to dig the pond"; The area of rice was basically stable, while the area of rape and vegetables decreased sharply. Jinxi local agricultural products brand less. Under the target of reduction planning, it is imperative to "move" village industrial land: Kunshan master plan proposes that the construction land scale will be reduced from 433 square kilometers to 406 square kilometers at the end of the planning period, so as to achieve the "reduction" of construction land and energy consumption emissions and the "increment" of spatial benefits.

2.2.3. Population: Regional Population Factor Flow, Triggering The Reconstruction of Rural Social Structure

The aging phenomenon in Jinxi is prominent: in 2017, the proportion of the elderly over 60 years old in Jinxi town was as high as 31%, second only to Dianshan lake town, but the growth rate was the fastest in the past two years, and the proportion of the elderly over 60 years old in each district of Kunshan town was more than 15%. At present, Jinxi town is Kunshan city aging phenomenon prominent district town. About half of the registered population live in Jinxi, ranking last in Kunshan: in 2017, there were 25,400 temporary residents in the town. It ranks 10th among 11 towns and districts in Kunshan, with about 170 people settling down in Jinxi every year. "Structural adjustment of rural community and liquidity society" : because a two-way flow of Jinxi town population and the villagers' social and economic attributes of the differentiation and broken reconstruction, based on the relative weakening of family, based on all kinds of industry cooperation to strengthen the industry margin, new geopolitical bond formation, therefore, and translated into a half open half an acquaintance social relations.

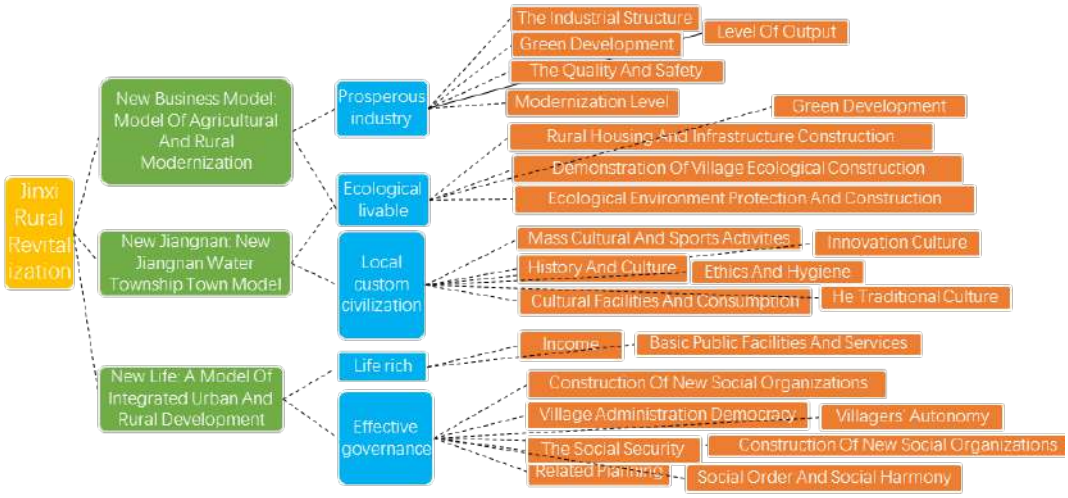
Figure 6: jinxi Population survey chart



3. Construction of evaluation index system of rural revitalization in Jinxi

The plan integrates five secondary indicators, 24 tertiary indicators and 116 tertiary indicators of Jinxi rural revitalization from the perspectives of agricultural and rural modernization, new Jiangnan water township and integrated development of urban and rural areas.

Figure 7: structure chart of rural revitalization evaluation index system



3.1. Industry Prosperity： Benchmark for Agricultural and Rural Modernizatin

3.1.1. further consolidate agricultural scale, intensification and mechanization, and improve agricultural production efficiency; We will accelerate efforts to make agriculture smarter, greener and better branded to improve the quality of agricultural development. We will make agriculture more integrated, organized and Shared, and give small farmers a greater sense of achievement

According to the requirements of relevant national policies, the follow-up work of land right confirmation shall be promoted to consolidate the results of land circulation and proper scale operation of agriculture since the eleventh five-year plan. We will further strengthen development of high-standard farmland, fish ponds and vegetable plots, and promptly update some obsolete equipment and facilities. We will build a service center of "whole-process mechanization + comprehensive farming", and accelerate the integration of the links of efficient planting and protection of rice and wheat, drying of producing areas, straw treatment and mechanization of farming and harvesting, so as to form a whole-process mechanization solution of grain, oil and crop production with characteristics of water villages.

We will make full use of modern information technology, build demonstration bases for smart agriculture (fishery), and promote the application of information technologies such as the Internet of things, intelligent control, and satellite positioning in agricultural machinery equipment and operations, so as to realize precise cultivation of field crops, smart fish pond breeding, and intelligent production of fruits, vegetables, flowers and plants. The work requirements of "one control, two reduction and three basic measures" should be implemented in the whole town, that is, the total amount of agricultural water and the pollution of agricultural water environment should be controlled, the use of chemical fertilizers and pesticides should be reduced, and the waste of livestock and poultry, agricultural film and crop straw should be basically recycled, comprehensively recycled and harmless. Promote the construction of public brand, enterprise brand and "three products and one standard" products in Jinxi town in different levels, with emphasis on rice, duck and aquatic products.

On the basis of agricultural production, we will promote the processing and marketing of agricultural products (e-commerce), develop leisure agriculture, extend the industrial chain and increase added value. On the basis of existing village cooperatives, Jinxi agricultural cooperative association is established to realize re-organization, coordinate agricultural resources and jointly develop market. We will improve the mechanism for linking the interests of village-level cooperatives, strengthen the governance of cooperatives, ensure fair and reasonable distribution of surplus, and increase the dividend income of rural households.

3.1.2. Jinxi industry prosperity indicator system

Figure 8: Jinxi industry prosperity indicator system

Level Indicators	The Secondary Indicators	Unit	Attribute
The Industrial	Output Value of Agriculture, Forestry,	One Hundred Million	Prospective

Structure	Animal Husbandry And Fishery	Yuan	
	Among Them: Fishery Proportion	%	Prospective
	The Ratio of Processing Output Value And Total Agricultural Output Value of Agricultural Products	/	Prospective
	Agricultural Product Processing Conversion Rate	%	Prospective
	Rural Leisure Tourist Reception	Thousands Of People	Prospective
Level Of Output	Comprehensive Grain Production Capacity	Ten Thousand Tons	Binding
	Output Value Per Unit Area of Aquatic Products	Ten Thousand Yuan/Hectare	Prospective
	Vegetable Output Per Unit Area	Ten Thousand Yuan/Hectare	Prospective
	Agricultural Labor Productivity	RMB Ten Thousand/Person	Prospective
Green Development	Fertilizer	Kg/Ha	Binding
	Pesticide Use	Kg/Ha	Binding
	Agricultural Diesel Fuel Consumption	Kg/Ha	Binding
	Film Recovery	%	Binding
	Comprehensive Utilization Rate of Breeding Waste	%	Prospective
The Quality And Safety	Overall Qualified Rate of Agricultural Product Quality And Safety Monitoring	%	Binding
	Increase the Number Of Certification Of Pollution-Free Agricultural Products	Number	Prospective
	New Green Produce Attestation Quantity	Number	Prospective
	New Organic Produce Certification Number	Number	Prospective
	Increase The Number of Product Certification Of Geographical Indication	Number	Prospective
Modernization Level	Contribution Rate of Agricultural Science And Technology Progress	%	Prospective
	Comprehensive Mechanization Rate of Farming And Harvesting	%	Prospective
	Appropriate Scale Farming Accounted for The Proportion	%	Prospective
	Scale of Aquaculture	%	Prospective
	Increase the Number Of Key Leading Enterprises Above The Provincial Level	Number	Prospective

3.2. Ecological livable: A Model of The Famous Town of Xinjiang South Water Township

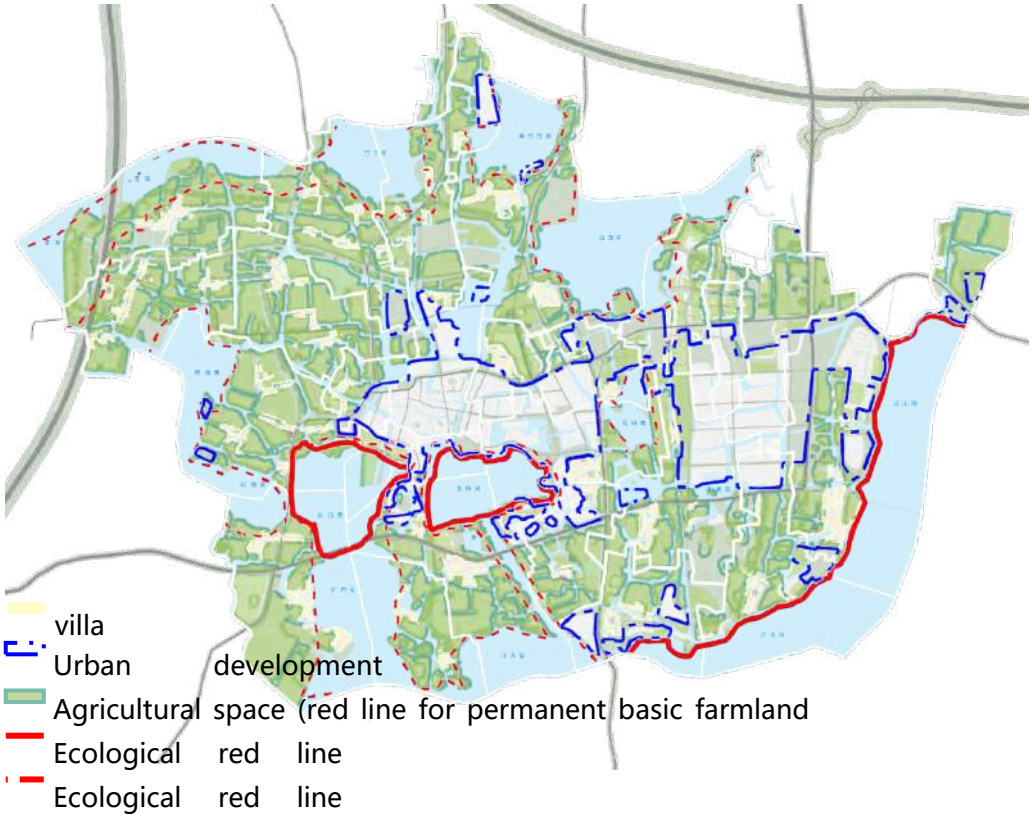
3.2.1. Deline the three zones and three lines, strictly observe the ecological bottom line, and construct a symbiotic, blue-green interwoven tour system

The demarcation of "three districts and three lines" is the core content of land space planning, which plays a guiding and limiting role in rural revitalization planning in space, especially the demarcation of permanent basic farmland red line and agricultural space,

which should be strictly followed in the follow-up rural functional unit planning and village planning.

First-level control area of ecological protection red line: Wubao lake, northern waters of Changbaidang and Dianshan lake; Secondary control areas of ecological protection red line: Chenghu lake, wanhua lake, Yangshitian lake, Bailian lake, Mingjingdang, Wangyangdang and the southern waters of Changbaidang.

Figure 9: Jinxi three-district diagram



3.2.2. Jinxi Ecological livable indicator system

Figure 10: Jinxi Ecological livable indicator system

Level Indicators	The Secondary Indicators	Unit	Attribute
Demonstration of village ecological construction	Village planning rate	%	binding
	Rural revitalization model village	number	prospective
	Demonstration village of ecological civilizatio	number	prospective
	Beautiful and livable model village	number	prospective
Ecological environment protection and construction	Village green coverage	%	binding
	Tree cover	%	binding
	Natural wetland protection rate	%	binding
	Water quality compliance rate in water function areas	%	binding
	Urban sewage treatment rate	%	binding
	Rural sewage treatment rate	%	binding
	Harmless disposal rate of urban and rural household garbage	%	binding

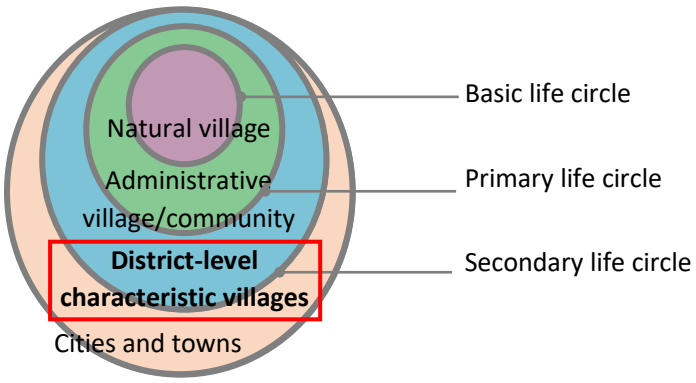
	The proportion of household waste disposal villages	%	prospective
Rural housing and infrastructure construction	Proportion of renovation of dilapidated houses in rural areas	%	
	Rural beautiful courtyard proportion	%	
	Rural high-quality courtyard proportion	%	
	Rural sanitation toilet penetration rate	%	prospective
	Administrative village dual - lane four - level road coverage	%	
	Rural highway maintenance rate	%	
	Hardening rate between natural villages	%	
	Length of hydrophilic shoreline through Dianshan lake	km	prospective
	Greenway network length	km	prospective
	Intensive water supply in urban and rural areas		binding
	Fiber to home coverage (urban residents)		binding
	Wireless network coverage in public places		binding
	Domestic waste classification facilities coverage		
Green development	Overall energy consumption per unit of GDP decreased	%	binding
	Industrial pollutants (chemical oxygen demand/ammonia nitrogen/nitrogen oxide/sulfur dioxide) emissions reduction	%	binding
	Concentration ratio of industrial enterprises to industrial parks	%	binding
	Agricultural standardization production base area ratio	%	prospective
	The rate of decrease of fertilizer application intensity	%	binding
	Comprehensive utilization rate of main crop straw	%	
	Comprehensive utilization rate of livestock and poultry manure	%	binding
	Scale farm (village) control rate	%	

3.3. Life Rich: Increase the supply of rural public services and improve the level of supporting facilities

3.3.1. guarantee public service facilities and create rural community living circle

The planning forms the public service circle based on the activity path of people, takes the travel convenience as the principle, generates the public service facility space system of the district-level characteristic village based on the radiation range, population scale, constructable land scale, existing service facilities and other factors, and repeatedly checks the selection of the central village through overlapping or lack of service circle .

Figure 11: Model diagram of Jinxi public service system



3.3.2. Jinxi Life Rich Indicator System

Figure 12: Jinxi Life Rich Indicator System

Level indicators	The secondary indicators	Unit	Attribute
income	The engel coefficient of rural residents	%	prospective
	Per capita disposable income of rural residents	ten thousand yuan	prospective
	Income ratio of urban and rural residents	%	prospective
Basic public facilities and services	Regional water supply household rate	%	binding
	Administrative village dual - lane four - level road coverage	%	binding
	Standardization of basic public services in rural communities	%	binding
	Rural elderly demonstration point	%	prospective
	Village clinics are staffed with village doctors	%	prospective
	Bus stops are 5 minutes' walk away	%	prospective

3.4. Local Custom Civilization: A Model of The Famous Town of Xinjiang South Water Township

3.4.1. Inherit and flourish rural culture, develop and activate innovative culture

Rural culture is the root of urban culture. We will carry forward and flourish rural culture and protect and develop traditional village resources. The revitalization of Jinxi village should sort out and inherit the rural characteristic culture; Protect and activate the use of traditional villages, pay attention to the protection and use of rural natural landscape, ecological environment, history and culture; With "industrial transformation" as the core and rural cultural landscape as the starting point, the village material space environment should be reconstructed in various ways, traditional culture should be inherited and enriched, and innovative culture should be developed and activated.

Figure 11: Jinxi regional cultural integration map

3.4.2. Jinxi Local Custom Civilization Indicator System

Figure 12: Jinxi Local Custom Civilization Indicator System

Level indicators	The secondary indicators	Unit	Attribute
Cultural facilities and consumption	Coverage rate of village comprehensive cultural service center (service function compliance rate)	%	prospective
	The proportion of civilized villages above the county level	%	prospective
	The proportion of rural residents' expenditure on education, culture and entertainment	%	prospective
Mass cultural and sports activities	The number of fairs or festivals held	number of times	prospective
	Cultural auditorium	number of times	prospective
	Moral class	number of times	prospective
Innovation culture	Entrepreneurship + new type of professional farmers accounted for the proportion of permanent residents	%	prospective
	Innovation environment renovation rate	%	prospective
History and culture	Establishment of agricultural civilization memory museum	%	prospective
	Canton	%	prospective
The traditional culture	Number of traditional folk customs projects	%	prospective
	Will follow villager	%	prospective
	Manual of civilized customs	%	prospective
	Cultural activities in the countryside	%	prospective

	Cultural skills school (wenxin lecture hall)	%	prospective
	"One about four meetings"	%	prospective
Ethics and hygiene	The proportion of civilized villages at or above the county level	%	prospective

3.5. Effective governance： Model of integrated urban and rural development

3.5.1. Jinxi model integrating agricultural production area, rural community, Jinxi town and rural innovation park

Jinxi ancient town "small bridge and flowing water family" features Jiangnan water town, improving the quality of folk museums with a collection of people, supporting urban communities in the evening; With Jijiadun village and ma Yuanzhuang village as the focus, it has developed into an ideal life village cluster with multiple meanings. South front village, Xiagang village, Lujing village, Yuandian village for the development of scientific and technological agriculture; Build 22 rural communities around the village comprehensive service center.

3.5.2. Jinxi Effective governance Indicator System

Figure 13: Jinxi Effective governance Indicator System

Level Indicators	The Secondary Indicators	Unit	Attribute
Related planning	Village planning and management coverage	%	prospective
	The proportion of villages with integrated service stations	%	prospective
Construction of new social organizations	The villagers committee shall autonomously meet the standard rate according to law	%	prospective
	The proportion of villages where the secretary of the village party is also the director of the village committee	%	prospective
	Rural harmonious community construction compliance rate	%	prospective
	The proportion of villages with strong collective economy	%	prospective
Village administration democracy	Township party committees and governments are in power according to law	%	prospective
	Harmony degree of "township government and one village governance"	%	prospective
	Villagers on the township (town) government affairs, financial awareness	%	prospective
	Social organizations, villagers can effectively supervise the township government	%	prospective
	Social organizations and villagers are satisfied with the work of township cadres	%	prospective
Villagers' autonomy	The proportion of villages with village rules and regulations	%	prospective
	Direct election of "village committee" members	%	prospective

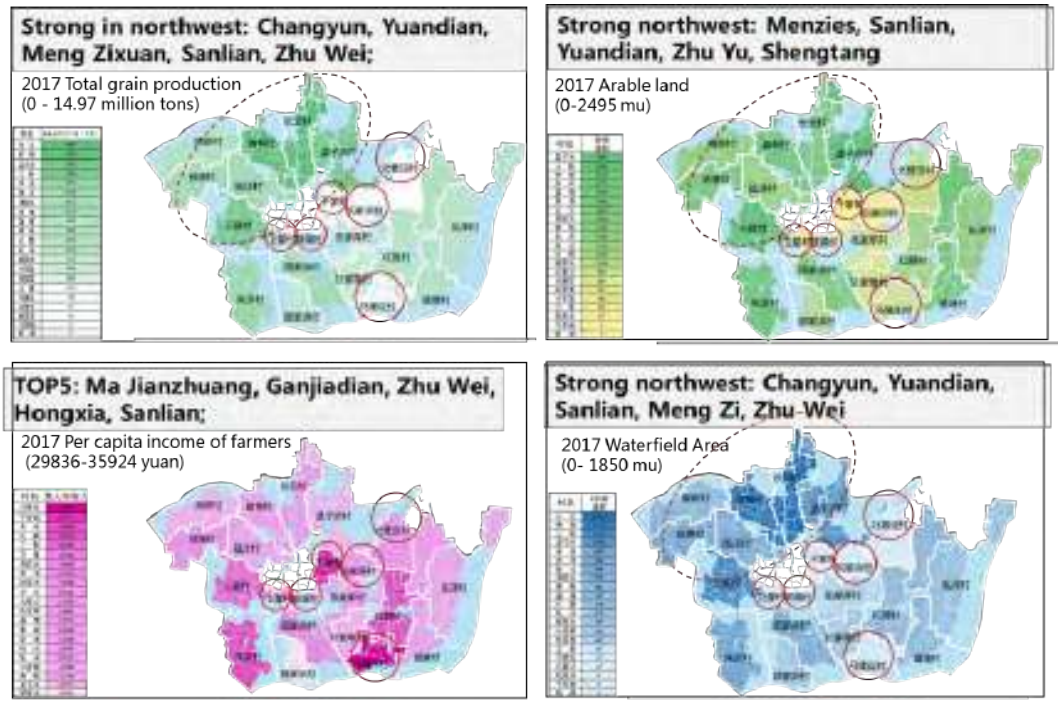
	Village affairs, financial disclosure and supervision effective supervision	%	prospective
	Village affairs participation	%	prospective
	Satisfaction with village affairs	%	prospective
Construction of new social organizations	The number and scale of new rural social organizations	number	prospective
	The influence of new social organizations and their supervision of township and village activities	%	prospective
	The support degree of township governments and village committees to the new social organizations	%	prospective
	The ecological environment of the new social organization	%	prospective
The social security	Supervision and administration of rural production safety	time	prospective
	Rural food and drug safety prevention and control	time	prospective
	Rural "sky net" and road safety	%	prospective
	Allocation of rural community policing and timely dispatch rate	%	prospective
	Rural community safety patrols and their effectiveness	%	prospective
Social order and social harmony	Villagers petition rate	%	prospective
	Dry group tension	%	prospective
	Timely handling of conflicts and disputes	%	prospective
	Solutions to mass incidents	%	prospective
	Rural crime rate	%	prospective
	Villagers' sense of security	%	prospective
	The degree of harmony between villagers and neighbors	%	prospective
	Villagers' satisfaction with social order	%	prospective

4. An empirical study on the rural revitalization of 20 villages

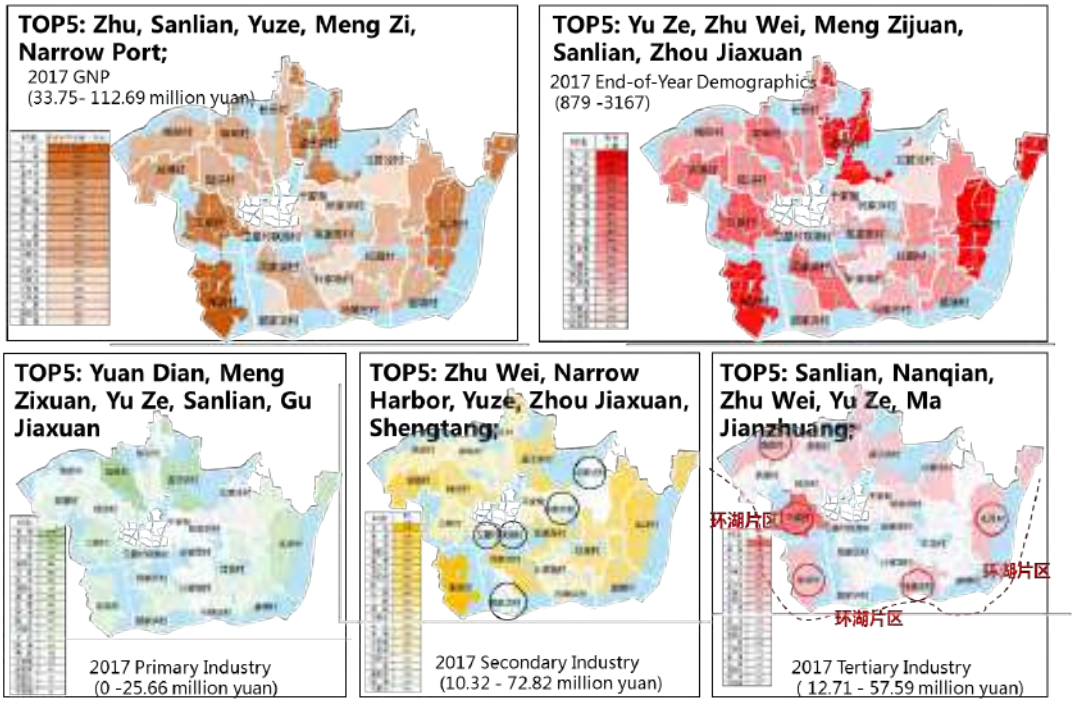
4.1. Co-ordinating urban and rural development space

4.1.1. Quantitative assessment:

Through the research on the cultivated land, paddy field, population and other relevant data of Jinxi town in 2017, it is concluded that the 7 villages in the northwest of Jinxi, such as Mengzibin, Changyun and Yuandian, have prominent agricultural production functions due to the reasons of cultivated land and paddy field area. The proportion of residents' construction land in Ganjiadian, satellite village, Beiguanjing and other villages adjacent to the township and industrial park increased significantly, showing a weak agricultural production function.



The overall economic strength of Zhubang, Sanlian and Qiuze villages with relatively developed secondary industries is in direct proportion to their population. The tertiary industry in the area around the lake is generally developed.



4.1.2. Improving the urban and rural planning structure

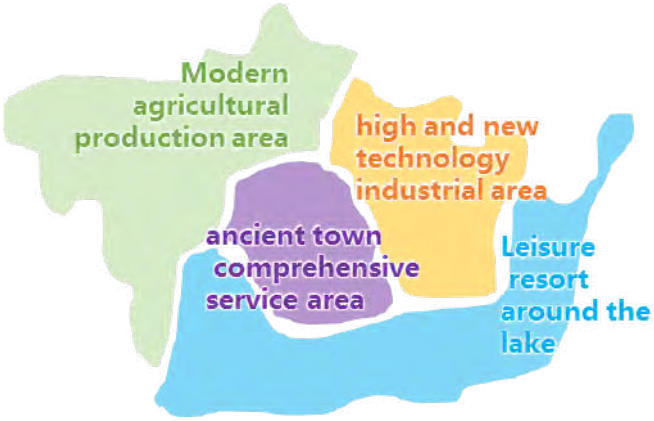
The planning has formed four functional zones, including modern agricultural production area, ancient town comprehensive area, high and new technology industrial area and surrounding lake leisure and resort area, to effectively guide the development of each area and village.

The modern agricultural production plate in the north with ecological agriculture as the main body. With high-quality ecological agriculture background, to ensure food production safety, apply for "Jinxi rice" and "Jinxi barb fish" green brand, brush Jinxi "rural rice fragrance" name card, with Jinxi water charm rice fragrance town, provincial agricultural characteristics in the national "double innovation and innovation" exposition, demonstration of modern urban agriculture development.

Ancient town tourism as the main body of the central town comprehensive plate. With rich tourism and cultural resources, Jinxi is the base for developing watertown cultural tourism resort and developing cultural tourism industry.

High-tech industry sector in the east with science and innovation industry as the main body. To improve the level of intelligent manufacturing and build a high-level r&d center is an important path for Jinxi enterprise transformation and upgrading. Through the elimination of backward production capacity, in the industrial structure optimization and upgrading to obtain greater initiative; We will actively promote the three-year project of accelerating innovation and transformation to promote high-quality economic development, and promote high-quality economic development through innovation and transformation.

Lakeside holiday as the main body of the southern lake leisure holiday plate. Relying on the beautiful natural scenery along Dianshan lake, carry out ecological agriculture sightseeing around the lake, popular science education, ancient kiln art exhibition, leisure vacation, wetland tour and water experience activities.



4.2. Classification to promote rural development

4.2.1. Villages in agricultural production

Changyun, path and Sanlian village, with rice as the main agricultural products, will focus on developing green three-dimensional agriculture (shrimp farming in rice field, crab farming in rice field, duck farming in rice field and other demonstration fields of three-dimensional farming), rape flower sightseeing, agricultural experience and agricultural science and education. The path relies on the advantages of convenient transportation and industrial land stock, and makes use of the opportunity of industrial district reconstruction to build the promotion platform of real agricultural trade exhibition and exhibition. Relying on Mingjingdang and Changbai dang, Sanlian has built leisure agriculture, lake-dang sightseeing

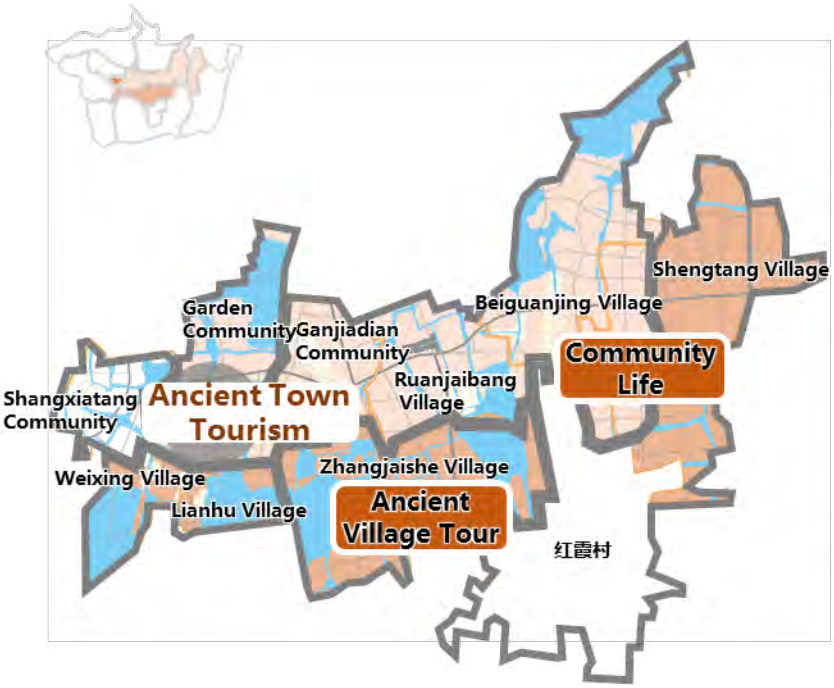
and tourism vacation, focusing on the construction of lakeside health inn, four seasons orchard, four seasons flower sea, flower nursery base, slow post and other tourism projects.

The four villages of yuandian, menzibang, nanqian and xiagang mainly produce rice and ecological aquatic products. Yuandian village relies on wanqian lake to develop efficient fishery and ecological agriculture. Relying on bailian lake and yangshi tian lake, mengzibang develops water leisure tourism, urban leisure fishery and water sightseeing market. Xiagang village and nanqian village, relying on chenghu, focus on the cultivation of efficient fishery and breeding, the development of lake fishing and recreational fishing, especially the construction of ecological vegetable base and sightseeing corridor around the lake.

4.2.2. Community Living Villages and high-tech industrial zone

In the future, shangxia pond community and garden community can develop homestay, catering and other tourism activities in combination with ancient town tourism. Satellite village can be combined with ancient town tourism, moderate war farmhouse, slow post; Lianhu village will increase the richness of ancient town tourism with water recreation and other activities.

Ganjiadian, ruanjiabang, beiguanjing and other villages should reasonably resolve the impact of "landlord economy" on the rural landscape and safety, share service facilities for high-tech industrial parks, and develop homestay and catering appropriately. Zhangjiaku village focuses on developing tourism projects such as ancient village tour, declaration and other intangible cultural heritage display.



4.2.3. Resort villages along the lake

Qiuze village and shengtang village build the dam view scenic area relying on the coast of dianshan lake. This area relies on the beautiful natural scenery along the coast of dianshan lake, mainly providing accommodation, catering and leisure services for the tourist population. Jijiadun village, hongxia village and ma yuanzhuang village rely on the chessboard water surface reconstruction to build the ecological agriculture sightseeing around the lake, the resort hotel, the wetland park and the water experience center. This region mainly provides catering, leisure, entertainment, accommodation and other services for tourism. Gu jia bang village and zhou jia bang village mainly rely on the existing ecological resources of wang Yang dang to carry out conservation science education; Zhubang village mainly focuses on tourism accommodation and sightseeing vacation, and the ancient kiln in the south of the town, develops the ancient kiln art area, and forms a sightseeing and tourism area with kiln as the theme.

5. Reference

1. Gladwin, Christian H., et al. "Rural entrepreneurship: one key to rural revitalization." American Journal of Agricultural Economics 71.5 (1989): 1305-1314.

2.Smith, Kerry Douglas. A time of crisis: Japan, the great depression, and rural revitalization. Vol. 191. Harvard Univ Asia Center, 2001.

3. Knight, John. "Rural revitalization in Japan: Spirit of the village and taste of the country." Asian Survey 34.7 (1994): 634-646.

4.Kieselbach, S. R., and P. T. Long. "Tourism and the rural revitalization movement." Park s & Recreation (Arlington) 25.3 (1990): 62-66.

5.Yuan Xiaojun & Tan Weiping. Preserving Village Characters in Fast Urbanizing Region: Kunshan Case. Planners. 2013(4):42-47.

6.Zhangyi. Exploration on The Kunshan Model of New-Type Urbanization: Reorganization and Reflection on Future Planning and Development of Kunshan District. Urban Research. 2015(02): 97-101.

7.Dong Chenglin. The Protection and Development for Traditional Village Against New Urbanization. Architecture & Culture.2014(02):109.

8. Zhang hong, Huang zhenfang & Jv shengli. An Analysis of the Influential Factors of Low Carbon Travel Behavior of Tourists in Ancient Water Towns: A Case Study of

Zhouzhuang, Jinxi, and Qiandeng in China. Tourism Science. Vol.31, No.5. 2017(10):46-64.

Research Paper

URBANIZATION MECHANISM STUDY UNDER THE DYNAMIC OF STATE CAPITAL

A Case Study about Northeast China with the Construction of the Chinese Eastern Railway in the Early of 20th Century

Haixuan ZHU, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, China

Sai LIU, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, China

Xiaoyu JIA, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, China

Jiang Chang, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, China

Abstract

Since the industrial revolution of the 18th century, the modern economic system gradually matured and rapidly expanded in the world, especially the state capital investment relying on the railway, which drastically changed the urbanization process and city agglomeration pattern around the world. At the end of the 19th century, due to the important strategic value of the Far East, Russia raised state capital, built the Siberian Railway directly to Vladivostok, especially the C.E.R. across Northeast China, induced capital competition among China, Japan and Russia around the port and railway construction right and management right, formed the SMR system centered on Dalian, the C.E.R. system centered on Vladivostok, and the Chinese railway system centered on Huludao, laid the city structure of the "hub-railway network-hinterland" model centered on the port city in Northeast China, which promoted the development of commercial cities, hub cities and industrial and mining cities. Under the special tariff system, China, Japan and Russia relied on port-railway capital competition, forming the city development dynamic mechanism oriented by the export-oriented economy, that has the important theory value for how to effectively use the state capital advantage to promote the development of the macro-regional city system in the context of economic globalization.

Keywords

State Capital, Urbanization Mechanism, the Chinese Eastern Railway, Hub-Network-Hinterland Structure, Northeast China

Foreword

After the industrial revolution of the 18th century, the modern economic system gradually matured and rapidly expanded worldwide. In the 19th century, in the context of the Russian Far East Policy and the Japanese Mainland Policy, the Far East, Especially Northeast China, gradually became the focus of international competition due to its special geographical location and abundant natural resources. Under the joint participation of China, Japan, Russia and other countries, with the national military strength as the backing, the state capital penetration as the means, and the harbor and railway construction as the carrier, a fierce competition of rights and interests had been launched, which promoted the rapid modernization and urbanization of Northeast China, which gradually became the region with relatively developed social economy in the Asian, and even in the world in the early 20th century, that has important value and significance in the history of modern human social development and urban development. Based on this, the paper, taking the expansion of the Russian and Japan colonialism in the Far East in the early 20th century as the background, and taking the port and railway construction under the support of state capital as clue, with literature research methods and field investigation methods, systematically sorts out the urbanization process of modern Northeast China, explores the dynamic mechanism of national capital on regional urbanization, to enrich the history study of urban development in the modern Far East.

1. Natural and Historical Background of Modern Northeast China

In the early Qing Dynasty, according to the Sino-Russian Treaty of Nibuchu, the Northeast China, east to the Sea of Japan, southeast to the Tumen River, northeast to Okhotsk Sea and the Sakhalin Island, north to Waixinganling mountain, northeast to the Gelbiqi River, is extremely large. (Ping Bu etc., 1987) After the Second Opium War, China and Russia signed the Aihui Treaty and Beijing Treaty in 1958 and 1860, Russia occupied the vast land which north of Heilongjiang River and east of the Wusuli River. (Ping Bu etc., 1987) Northeast China of this paper, including today's Liaoning, Jilin, Heilongjiang provinces, and Chifeng, Tongliao, Xingan league in eastern Inner Mongolia and northeastern parts of Hebei Province. At the end of Qing Dynasty, where was the jurisdiction of the Shengjing general, Jilin general, Heilongjiang general, in addition, included the Inner Mongolia's Zhelimmu League, Zhaowuda league and Zhuosuotu league. During the Republic of China, where was Fengtian, Jilin, Heilongjiang Province and northeastern part of Rehe Province.

1.1. Natural Geographical Environment of Modern Northeast China

The development of modern cities in Northeast China is restricted and supported by natural geographical environment. In the Northeast China, the west part is the Daxinganling Mountains, the north is the Xiaoxinganling Mountains, and the east part is the Long White Mountains, which are the watersheds of the Liaohe, Sungari, and Inner Mongolia Plateau rivers, the Heilongjiang main stream, the Suifen River, the Tumen River and the Yalu River, (Fig.1)"the mountains are not very high, all have a large forest, one of the rich sources of Manchuria and Mongolia."(Fujioka, 1929) The central part of the three major mountains is the Songliao Plain, with the Changchun-Tongyu Line, the southern part is the Liaohe Plain, the northern part is the Songnen Plain, accounting for about one-third of the Northeast

China, also accounting for one-third of Chinese plain, “this vast wildness, producing a large amount of food, makes Northeast eligible to China’s barn.”(Chengjing Wang, 1947) “The vast plains are not only suitable for agriculture, but also buried unmeasurable minerals.” (Fujioka, 1929) In modern times, the reserves of coal had been explored were 15 billion tons, the iron ore reserves were not less than 2.7 billion tons, and the distribution of coal and iron resources is very concentrated, laying the natural foundation for the development of modern industry.

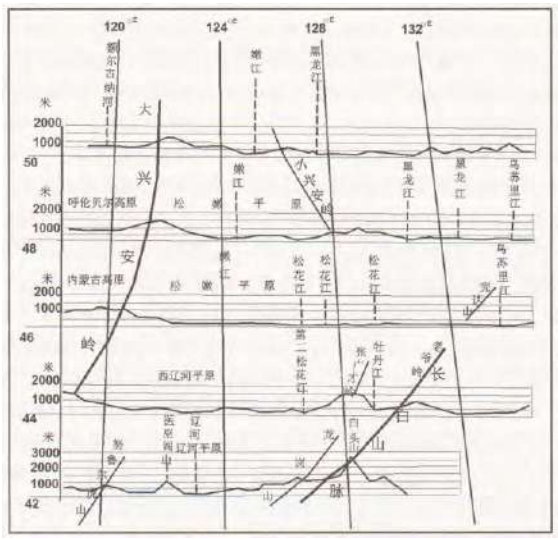


Figure 1 Schematic Diagram of the Natural Geographical Environment in Northeast China (Zhen Li, 1993)

1.2. Urban Development in the Early and Middle Qing Dynasty

Northeast China, as the birthplace of the Qing Dynasty, began to build willow walls in the early Shunzhi period, to prohibit the inside residents from crossing the wall for harvesting, farming, hunting and grazing. The willow walls started from the south of Phoenix city, turn to northeast to Xinbin, then turn to northwest to Kaiyuan, and then turn to the southwest to Shanhaiguan connecting the Great wall. (Fig.2) During the Kangxi period, the new willow walls were built from Kaiyuan to the Jilin. The interior of the walls was the jurisdiction of Shengjing general, one side of the walls was the Mongolian pasture, the other side is the royal paddock, the people of Han, Man and Mongolia were not allowed to cross the wall at will. The willow walls were roughly build along the boundaries of natural climate, vegetation, soil, etc. which were also the tangible economic zone, political system and cultural and traditional boundaries.

1.2.1. City Development Status in the Southern Liaoning Region

The middle and lower reaches of the Liao River in the southern Region of the Northeast China are located in warm temperate zones, with superior agricultural resources. In the first year of Shunzhi, a large number of Manchus moved to China proper, led to the land ridiculous. In the 10th year of Shunzhi (1653), due to financial difficulties, Liaodong Reclamation Recruitment Order was issued, Liaoyang Fu was set up to lead Liaoyang Xian and Haicheng Xian, and manage the local Han nationality. In the 7th year of Kangxi (1668), the recruitment was stopped and the ban was imposed, but it did not prevent the Han people from moving to the Northeast China. In the 10th of Xianfeng (1860), when Yingkou

was opened, Shengjing General governed Fengtain, Jinzhou 2 Fu; Liaoyang, Fuzhou, Yizhou, Ningyuan 4 Zhou; Xingjing, Xiuyan, Phoenix, Cahngtu, Xinmin and Jinzhou 6 Ting; Chengde Haicheng, Gaiping, Tieling, Kaiyuan, Jinxian, Guangning 7 Xian. All of these Fu, Ting, Zhou, Xian, the Han area were mainly distributed on the banks of the Liao River and the coastal Plain, where were the main agricultural area in the Northeast China.

Figure 2 Schematic Diagram of the Distribution of the Willow Wall (Qijun Zhang, 1966)

1.2.2. City Development Status in the Eastern Jilin Region

The eastern region of the Northeast China included the Long White mountain area, the vast plains of the middle and lower reaches of the Sungari River and the Heilongjiang River, where as the home of the Manchu ancestors, regarded as the holy land of Qing Dynasty, full of paddocks and forests. Expect the Manchus, the residents were mainly Daurs, Ewenkis, Oroqen and Hezhe, who lived in tribal forms, mainly fishing and hunting, the social economy was very underdevelopment. Since the early of Qing Dynasty, the southern margin of Jilin and Heilongjiang had agricultural development, relying on prisoners, traders, illegally entered Han people, and the people who stole gold mines.(Tingyi Guo, 1987) During the Sino-Russian Yaksa War, in order to resist the invasion of Russia, built the Post-road and a large number of sailors and craftsmen were introduced. With the increase of immigrants, in the 4th year of Yongzheng (1726), the Qing government set up Yongji Zhou, and set up Changning Xian in Bodune and Taining Xian in Ningguta, this was the first administrative setting in Jilin since the founding of Qing Dynasty. In the 13th year of Qianlong (1748), set up Jilinn Ting. In the 5th year of Jiaqing (1800), set up Chuangchun Ting. In the 15th year of Jiaqing (1810), set up Bodune Ting. In addition, the eastern region of Northeast China was rich in ginseng, suede, antler, medicinal materials and other valuable specialty products, there were active commodity transactions with China proper. Before the 6th year of Yongzheng (1728), Ningguta was the center of specialty trades such as the fur of the

northeastern ethnic groups, every spring, the ethnic groups in the lower reaches of Heilonngiang River came one by one, paying tributes such as suede, and selling all kinds of skins in exchange for production and daily necessities. In the 7th year of Yongzheng (1729), the Qing government decided that the tributes of the ethnic groups in the lower reaches of the Heilongjiang River and the Wusuli River were managed by the Sanxing, and then Sanxing replaced Ningguta and became the largest fur trade center. The valuable products in the eastern region were sold to China proper, and exchanged for the items needed for production and life, the business travels along the Post-road flourished and promoted the cities development. (Zhaokui Xu, 1959)

1.2.3. City Development Status in the Western Heilongjiang Region

The northern part of northeast China included most of the Songliao Plain, the Daxinganling Inter-span, and Keerqin sand land in the upper reaches of the West Liao River, where had long been the cradle of the northern nomads. In the vast middle and upper reaches of the Heilongjiang River, in order to defend against the invasion of Russia, the Qing government set up Heilongjiang General in the 22nd year of Kangxi, originally stationed in Heilongjiang City (Now Aihui), in the 29th year of Kangxi move to Mergen (Now Nenjiang). In the 38th year of Kangxi (1699), as the land of Murgen could not accommodate the more people, Heilongjiang General moved to Qiqihar, in 10th year of Xianfeng (1860), who commanded Heilongjiang, Mergen, Qiqihar 3 deputy generals, Hulunbeier deputy head general manager, Butehasuolun and Dahu 2 Zongguan. In this region, except for the Heilongjiang, Mergen, Qiqihar and the Post-way station, as well as the Hulan River basin and Jieya River Basin and the farmland of the prisoner, there were a few agricultural tribes, the vast region were nomadic areas and safari areas. Inner Mongolia was adjacent to Heilongjiang Province, mainly Zhelimu League, Zhaowuda League and Zhuosuotu League. The residents were mainly Mongolian, and nomadism was the main economic mode. In the early of Qing Dynasty, in order to obtain the necessary living and production materials, the Mongolians organized the merchants went to Guihua and sold the livestock and livestock products. Later，the merchants gradually went deep into the Mongolian grassland society, “loading groceries with big wheel carriage, travelling around Mongolia.” Most of the merchants also traded in the places where the population was concentrated such as the palaces, temples, and the Post-way stations, and some also used the larger temples to hold temple trade. The increase of merchants and the prosperity of trade had promoted the rapid development of commercial cities in Mongolia. Especially from Shengjing, the Bahu Road, going north, passing the Fakumen, Zhengjiatun to Qiqihar, where mostly was grassland, the traffic conveniently, had become the important trade path. The Mongolians on the Hulunbeier Grassland often traveled thousands of miles to Qiqihar for trading, afterwards, due to difficulties in travel, they selected the land on the bank of Yimin River, where was fertile, traffic conveniently, constructed several earthen houses, to attract Shanxi merchants, and gradually developed into the Mongolian trade centre, now Hailar.

2. Modern City Development Based on State Capital Competition

The Northeast China is bordered by Japan in the south and Russia in the north. They were all ambitious countries in modern times. Japan was trying to realize the Mainland Policy since the Meiji Restoration. Russia intended to realized Peter the Great’s Eastern Estuary Plan. So

Northeast China became the battlefield for Japan and Russia hegemony in the Far East. Japan and Russia had invaded the Northeast China with Military means and then carried out large-scale capital invasions to ensure the realization of their military and political goals. Modern Japan and Russia's economic aggression was based on the intake of port and railway construction rights, focusing on railway operation and resource development, controlling trade circulation, and conducting colonial investment, especially the competition for the construction and operation rights of the port and railway, rapidly promoted the modern urbanization of the Northeast China.

2.1. Russia's Far East Policy and Capital Expansion

2.1.1. The Far East Policy of Modern Russia

In history, Russia was a continental empire, during the period of Peter the Great, who made the development strategy to find the seaport on east and west sides. In the 10th year of Xianfeng (1860), according to Sino-Russian Beijing Treaty, Russia invaded the vast area east of the Ussuri River and built Vladivostok into the military port for the Russian Far East Fleet. Since the 1980s, due to the continuous setbacks in the expansion of Europe and Central Asia, Russia actively operated the Far East. The main objectives of the Far East Policy: First, invaded Korea and Northeast and Northwest China, and took where as the basis for further encroachment on China; Second, with UK, USA and Japan to compete for hegemony in the pacific, dominating the Far East.

2.1.2. The Chinese Eastern Railway Company and the Construction of the C.E.R. and Dalian

After Russia invaded Haishenwai, renamed to Vladivostok, meaning "controlling the East." The west and southwest of Vladivostok is close to China and Korea, east facing Japan across the sea, and the south is adjacent to Peter the Great Bay, which has the important strategic position, but it has a freezing period of up to five months, this largely limits the actions of Russian warships. Furthermore, Russia planned to build the Siberian Railway, if it could pass Northeast China directly to Vladivostok and had an excellent non-freezing port, that would be ideal for Russia to implement the Far East Policy. After the Sino-Japanese War, Russia had made meritorious efforts to "force Japan to return the Liaodong Peninsula", in the 22nd year of Guangxu (1896), signed the "Sino-Russian Secret Treaty" with China, and obtained the right to construct the C.E.R. in Northeast China. (Ping Bu etc., 1987) In the same year, China and Russia signed the "Contract of Cooperation of the C.E.R. Company", "Chinese will invest 5 million Kuping silver, establish the partnership with the Russo-Chinese Bank, the profits and losses will be recognized as shares." "the Russo-Chinese Bank is responsible for the construction and management of the railway, and form the C.E.R. Company." (Ping Bu etc., 1987) In the 24th year of Guangxu (1898), Germany occupied Jiaozhou Bay, Russia took the opportunity to dispatch the fleet occupy Lushun. In the same year, China and Russia signed the "Lushun and Dalian Land Rent Treaty", the first paragraph stated: "in order to preserve the Russian Navy's sufficient land use on the northern coast of China, China leases Lushunkou, Dalian Bay and Nearby waters to Russia." The eighth paragraph stated: "from the date of signing, China allow build a branch Railway form a station of trunk railway to Dalian Bay." (Ping Bu etc., 1987) Since then, Russia realized the dream of seeking an excellent non-freezing port in the Far East and the right to build the southern branch. In August 1899, the Tsar issued the decree on the construction of Dalian Freeport, and took it as the basis for operating the Northeast China. In the 27th year of Guangxu (1901), the C.E.R.

trunk line from Manzhouli to Suifeihe and then to Vladivostok was completed and opened to traffic. In the 29th year of Guangxi (1903), the southern branch from Harbin to Dalian and Lushun was completed and opened to traffic, and the situation of the Northeast China was greatly changed. (Fig.3) At this time, Russia was in the heyday of the Northeast China, who connected the C.E.R. to Europe via the Siberian Railway and attracted the world's goods to Dalian to import and export.

Figure 3 Northeast China Railway Network in 1907 (Author Self-painting)

2.1.3. Russia Controlling the Northern Region based on Port and Railway Facilities

After the Russo-Japanese war, Russia lost all the rights in the southern region, in order to ensure the rights and interests in the northern region, who shifted the focus from Dalian to Vladivostok, and used the C.E.R.to control the northern region of Northeast China. From the perspective of specific economic behavior, the C.E.R. took Harbin as the midpoint and was divided into three parts: the west line (Harbin to Manzhouli), the south line (Harbin to Changchun), and the east line (Harbin to Suifenhe). The west line across Lubin, Hulun, Buxi, Longjiang, Anda, Zhaozhou, Hulan seven Xian, shipping goods account for two-thirds of the Heilonngjiang province. (the C.E.R. Economic Investigation Bureau, 1927) The east line, crossing the eastern mountains, was dominated by forestry output. The south line, the area is densely populated, the goods transported were mainly produced along the line. In addition, the land in the lower reaches of the Sungari River was gradually developed in the late Qing Dynasty. The C.E.R. and Sungari River shipping had established the intermodal transport. The grain produced along the Sungari River were transported by inland water to Harbin and the transported to Vladivostok via the C.E.R. (Lengjiu Yun, 1935) In order to strengthen the central position of Vladivostok and to confront the Japanese-controlled Dalian, The C.E.R. Administration had established the double freight rate standard for the south line. In order to obtain goods from Changchun to Harbin and east to Vladivostok, the freight fare of the south line was extremely low. At the same time, in order to prevent the goods in the southern part from entering the northern part via the South Manchuria Railway (SMR), which freight fare of the south line was extremely high. In 1917, the Russian October

Revolution, Vladivostok was occupied by the Allies, the port facilities were greatly damaged, and the Ussuri Railway and the C.E.R. were almost completely out of service. In 1921, the domestic situation of the Soviet Union resumed stability, the Ussuri Railway and the C.E.R. returned to besiness, and Vladivostok's trade also gradually recovered. In 1931, the Jilin-Huining Railway was opened to traffic, all the cargo was transported southward. In 1935, the Soviet Union had to sell the C.E.R. to Japan.

2.2. Japan's Mainland Policy and Capital Expansion

2.2.1. the Mainland Policy of Modern Japan

In 1868, Japan's Meiji Restoration, under the guiding principle of "expand the territory and establish the national prestige in the world," formulated the Mainland Policy, that is, using force to invade the neighboring continent. In 1985, the Sino-Japanese War broke out, Japan invaded the Liaodong Peninsula, and was interfered as conflict with the Russian Far East Policy. In 1905, after the Russo-Japanese War, Japan inherited all the rights of Russia in the southern region of Northeast China. In 1927, Japan clearly stated the aggression policy: "want to conquer the China Proper, must first conquer the Manchuria and Mongolia." After the Manchurian incident in 1931, Japan fully encroached on the Northeast China, in the course of its aggression and expansion, "Japan want to invade Manchuria and Mongolia, whether the politic, economy or military, all need rely on railway, therefore, the railway actually ranks first in Manchuria and Mongolia issue." (Qi Zhu, 1930)

2.2.2. South Manchuria Railway Company and the Construction of "Three Ports and Three Lines"

In 1905, after the signing of the Portsmouth Treaty between Japan and Russia, Japan decided to follow the British East India Company, backed by the strength of the state, and carried out railway management in the form of private company. (Chijun Hu, 2011) On June 7, 1906, the Japanese government established the South Manchuria Railway Company (SMR Co. Ltd), and passed the "SMR Co. Ltd Regulations" on August 14. According to the regulations, SMR Co. Ltd would operate the railways and affiliated businesses in northern region of Northeast China, the company's capital was 200 million yen, among which, the government invested 100 million yen (50% of the shares). Although Japan recognized that SMR was the joint property of China and Japan, but its vice presidents and directors were all appointed and removed by the Japanese government, the business policies were also decided by the Japanese government, and half of the company capital was state capital, all of these determined that it was entirely a national policy institution. As the first president of SMR Co. Ltd, Goto Shinpei said; "originally established SMR Co. Ltd and recommended me as the president, probably not to regard the SMR Co. Ltd as a profitable cause, its essence was the vanguard of the implementation of the imperial colonial policy or the empire development." (Fuquan Zhang, 1989)

In 1910, in order to compete with Russia, after occupied Korea, Japan established "Three ports and Three Lines" program for the most convenient contact with Japan. First, the south port and south line, namely Dalian port, SMR and Andong port, Angdong-Fengtian railway. After 1906, Japan took Dalian port and SMR as the basis for capital expansion, in order to control the cargo transportation of south of Changchun and compete with the C.E.R., a special freight policy of 'Dalian Centralism' was adopted. During the Russo-Japanese War, Japan built the light railway from Andong to Fengtian and forcibly rented it after the war. In

1911, the Yalu River Railway Bridge was completed, by 1913, the three-line transport of "Japan, Manchuria and Korea" was realized, the goods could be transferred from the Japan Tieshanyang railway to Busab, then to Xinyizhou railway of Korea, and then connected Andong-Fengtian railway, directly to Fengtian of Northeast China. Second, the west port and west line. In 1913, the Yuan Shikai government and Japan signed "the Summary of Railway Loan Appointment Scheme," Japan proposed the "Manchuria and Mongolia Five-Railways" plan, which included the Taonan-Chengde Railway. (Ping Bu, 1987) In 1918, the Duan Qirui government and Japan signed the "Manchuria and Mongolia Four-Railways Loan Preparation contract," Japan proposed the construction of Taonan-Rehe, and the branch to someone port. (Yuou Lan, 1932) After the establishment of the Manchukuo, the Huludao Port was expanded, and the Jinzhou-Chengde railway was built, so far, the western region of Northeast China had a complete railway network and the nearest port. Third, the east port and east line. East port took Korea Qingjin port as main port, and took Luojin port and Xiongji Port as auxiliary ports. East line planned to use the Cahngchun-Huining railway as the main line, with the Changchun-Dalai railway, Yanji-Hailin railway, Jilin-Wuchang railway as the nutrition line. (Tongwen Wang, 1933) Japan's construction of the Jilin-Huining railway had experienced a long history, in 1923, they built the Tianbaoshan-Tumen light railway in the name of mining. (Yuou Lan, 1932) By 1933, the Dunhua-Tumen railway was completed, in 1935, luojin port was put into use, the mileage from the Japan via the Jilin-huining railway to center of Northeast China was greatly shortened.

2.2.3. Japan Controlling the Southern Region Based on Port and Railway Facilities

On the basis of monopoly on ports and railway, Japan actively promoted the export of bean goods to the world, and replaced national products with Japanese goods. In 1913, SMR Co. Ltd carried out mixed storage and transportation of soybeans, soybean cakes, soybean oil and wheat, to strengthen the control of the transportation and marketing of agricultural products in Northeast China. With the cooperation of large Japanese commercial companies and many small and medium-sized commercial enterprises, SMR Co. Ltd had monopolized and controlled the commodity circulation network from ports, railways and hinterland villages.

At the beginning of the establishment of SMR Co. Ltd, the investment was mainly focused on railways, ports and other infrastructures, after the First World War, began to strengthen investment in the industry and mining use the profits of transportation. Before 1931, Japan's industrial investment in Northeast China mainly carried out by SMR Co. Ltd, accounted for 60%. (C. F. Remer, 1953) SMR Co. Ltd invested 37.96 million yen in Anshan Iron Plant in the two years of 1918 1919, accounting for 80% of the total profit. SMR Co. Ltd adopted the comprehensive operation principle, in addition to railway, port and mine, also including machinery, electricity, gas, coke and iron. At the same time, SMR Co. Ltd also invested Japan's private industry, especially the defense industry and emerging industries, for example, which directly participated in the South Manchuria Sugar Company, Manchuria and Mongolia Wool Company, Manchuria and Mongolia Fiber Company, they were known as Fengtian three major companies. By 1931, SMR Co. Ltd had actually formed a huge trust, including large and small enterprises, almost monopolized all the heavy industry in Northeast China.

2.3. China's Un-Treaty Port Policy and Capital Competition

2.3.1. Un-Treaty Port Policy in the late Qing Dynasty

Since the Sino-Japanese War, Japan and Russia had successively invaded Northeast China. In the 26th year of Guangxu (1900), the Boxer Movement broke out, Russia occupied the entire Northeast China. The important minister of the late Qing Dynasty, Zhang Zhidong, governor of Hunan and Hubei province, proposed the Qing Government: "if the Northeast China open to the world and trade with all the countries, all the interests of industry, commerce and mine will be enjoyed by all countries, we collect the tax, that is what Westerners called the opening for trade, also is the mutual containment strategy I proposed." (Modern History Data Editing Group, 1980) The Qing Government adopted Zhang Zhidong's proposal, rewarded the interests of the railway, mining, industry and commerce, and actively contacted the UK, USA, Japan to restrict Russia, at the same time, these countries had also prompted the process of opening up the Northeast China. In 1903, China and USA signed the "Continuation of the Treaty on Trade and Transportation," China opened two Un-Treaty Ports, Fengtian and Andong. After the Russo-Japanese War, in order to coordinate the contradiction among Japan, Russia and other countries in Northeast China, Zhang Zhidong once again proposed the response of "opening up everywhere". The Qing Government quickly established the principle of opening up Northeast China. In December of the same year, China and Japan signed the "Convention Treaty of the Northeast China" and "attachment". The first paragraph of the "attachment" stated: "Chinese government promised, after the retreat of Japanese and Russian Troops, that will open the following Un-Treaty ports: Phoenix City, Liaoyang, Xinmintun, Tieling, Tongjiangzi, Fakumen of Fengtian province; Changchun, jilin, Harbin, Ningguta, Hunchun, Sanxing of Jilin province; Qiqihar, Hailar, Aihui, Manzhouli of Heilongjiang province." (Ping Bu, 1987) Since then, the competition between the various countries including Japan and Russia in Northeast China had gradually turned into capital invasion from military invasion. In 1909, China and Japan signed the "China-Korea Tumen River Border Treaty," and open Longjingcun, Juzijie, Toudaogou and Baicaogou. (Ping Bu, 1987) In 1914 and 1916, Jinxian, Huludao, Taonan, Liaoyuan, Kaiyuan, Xian of Fengtian province and Chifeng of Rehe opened as Un-Treaty ports, the international trade network had been formed throughout the Fengtian province and Jilin province and parts of Heilongjiang province and Rehe province.

2.3.2. Construction of Huludao Port and the East, West and South Three Trunk Lines

After the Russo-Japanese War, in the situation of the southern region and northern region being controlled by Japan and Russia Respectively, the Qing government clearly recognized the importance of port, railway construction and management rights, hoped to use the "open door" proposal put forward by UAS to counter Japan and Russia. In terms of competition in capital, the Harriman Railway Acquisition Plan, Xinmin-Fakumen Railway Plan, Jinzhou-Aihui Railway Plan, and the Knox Railway Neutralization had been proposed, due to the change of international relations, the resolute opposition of Japan and the compromise of the Qing Government, these plans all soon died or halfway. (Chijun Hu, 2011) In the late Qing Dynasty and the early Republic of China, in order to resist the economic monopoly of Japan and Russia, China planned and implemented the Huludao port and the East, West and South three trunk Line construction plan. First, Huludao port construction plan. Huludao, about 12 kilometers form Lianshan station of Beijing-Fengtian railway, is a rare non-freezing port in the Bohai Bay. In 1908, when Xu Shichang was the governor of the Northeast China, he believed that a good seaport and a complete railway network were the key to maintaining the rights of the nation, therefore, the British engineer xiusi was hired to survey the Bohai Bay and chose Huludao as the port. Construction began in August 1910, and

stopped due to the Revolution of 1911. In 1920, Zhang Zuolin and the Beijing government negotiated that the central government and the local government each invest 5 million yuan to build the port, later as the civil war, stopped again. In January 1930, the Northeast China Transportation Committee decided to continue construction and contracted with the Dutch construction company, which was scheduled to be completed in five and a half years and built into a large port with an annual throughput of 5 million tons. Second, the east, west, south three trunk lines plan. In May 1924, in order to counter the SMR and the C.E.R., the Northeast Fengxi Regime established the Northeast Transportation Committee, which planned to build 35 railways up to 10,000 kilometers in 15 years, to form the Chinese independent railway network, including: the east trunk line, from Huludao via Jinzhou, Shenyang, Hailong, Jilin, Wuchang, Yilan to Tongjiang in the lower reaches of Hilonngjiang River; the west trunk line, from Huludao via Jinzhou, Dahushan, Tongliao, Taonan, Angangxi, Qiqihar, Nengjiang to Heihe; the south trunk line, from Huludao, via Chaoyang, Chifeng to Duolun of Inner Mongolia. In 1921-1931, the northeast Fengxi government, using national capital and technology, completed 10 railways including Dahushan-Tongliao railway, Fengtian-hailong railway, Jilin-hailong railway, Hulan-Hailong railway, Qiqihar-Keshan railway, Taonan-Suolun railway etc., the total length up to 1,521.7 kilometers, accounting for 25% of mileage of Northeast China. (Naikun Yang, Yanxiong Cao, 2005) (Fig.4)

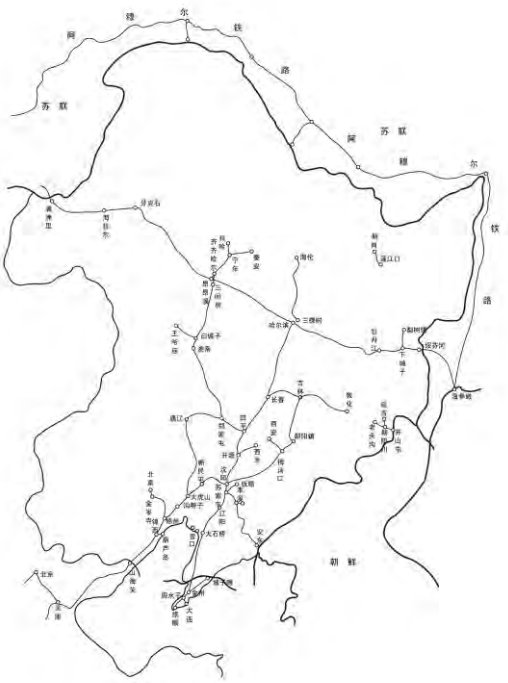


Figure 4 Northeast China Railway Network in 1931 (Author Self-painting)

2.3.3. China's Economic Confrontation Rely on Port and Railway

At the end Qing Dynasty and the beginning of the Republic of China, the Northeast China local government built Chinese own railway, breaking the situation that foreign capital monopolized the railway network, forming the SMR network under the jurisdiction of Japan, The C.E.R. network jointly managed by China and Russia, and China own self-built railway network, China had supervision and management right over two railway networks. In December 1929, in order to recover the railway controlled by the Japan, the Fengxi authority

formulated the cargo transport plan of the west four lines (Beijing-Fengtian railway, Siping-Taonan railway, Taonan-Angangxi railway and Qiqihar-Keshan railway). In January 1931, the east four lines (Beijing-Fengtian railway, Fengtian-hailong railway, Jilin-Hailong railway and Jilin-Dunhua railway) cargo transport plan was formulated, in this way, carried out fierce competition about freight rate and cargo with SMR. China railways used the silver standard to calculate the price, at that time, the price of silver was low, so the freight rate of China railway was lower than that of SMR, which based on gold standard. In addition, Fengxi authority also encircled the SMR through various administrative means, for example, set tax gate around the SMR subsidiary, all goods were taxed, as a result, the operation of the SMR became bleak, other industries, such as coal and iron, also been severely affected. For example, in 1930, the total revenue of passenger and cargo transportation of SMR was 91.307 million yen, decreasing 30.796 million yen from the previous year, SMR Co. Ltd had to adopt austerity policy and cut staff. (Shixuan Jin, 1932) In the four years before the Manchurian incident, is “the golden age of Beijing-fengtian railway, the annual profit reached more than 50 million yuan.” (Yusi Wang, 1932) As the monopoly of Dalian port and the SMR was challenged, Japan finally launched the Manchurian Incident and resorted to force to implement the Manchuria and Mongolia policy.

3. Urbanization Mechanism and Dynamic of Modern Northeast China

In early and middle Qing Dynasty, the society in Northeast China was in the stage of natural development, city is still in its infancy, the political and military functions were the fundamental driving force for the cities. During this period, in the southern region of Northeast China, some towns gradually developed into political centers due to historical foundations and immigrants, such as Fengtian, Liaoyang, Haicheng, Jinxian, Guangning and Kaiyuan etc. In order to consolidate the frontiers, the Qing government carried out military immigration and agricultural cultivation, and established military towns, which were the basis of the cities formation in northern region of Northeast China, such as Ningguta, Jilin, Bodune, Aihui, Qiqihar, Mergen and Hulunbeier, etc. In modern times, with the invasion of foreign political, military and economic forces, opening port for trade, constructing port and railway infrastructure, stopping ban, a large number of immigrants, and reclaiming the land were the driving forces of the city development in Northeast China.

3.1. Urbanization Mechanism of Modern Northeast China

3.1.1. the Intensive Birth of Modern Commercial Cities

In the early and middle Qing Dynasty, the cities in Northeast were distributed along the Post-roads, rivers and frontiers, and urban functions were dominated by politics and military. In the 8th year of Xianfeng (1858), according to the Sino-British Tianjin Treaty, Yingkou became the international trade port in the Northeast China. Under the circumstance that the western countries’s commodities dumping in and Northeast China products exporting to the world, the economic functions of Yingkou was increasing day by day, which meant that the modern cities were completely different from the traditional era in terms of the driving force. In the 24th of Guangxu (1898), Russia rented Dalian and announced open to world as free port. Later, in order to prevent Russia and Japan from occupying the Northeast China, the Qing government adopted the policy of “All-round open, countries contain”, opened up

about 30 Treaty ports and Un-Treaty ports. (Fig.5) Except for a few cities such as Phoenxi, Ningguta, Sanxing, and Aihui, which still maintained their original scale and even decline due to geographical location and improper site selection, under the promotion of the external economy, most of the cities had accelerated the development, and expanded the scale. The city form has been spatially displaced due to the planning of commercial districts, forming a new core that was strongly contrasted with the old city. The city functions were mainly from traditional politic and military to economy and politic.

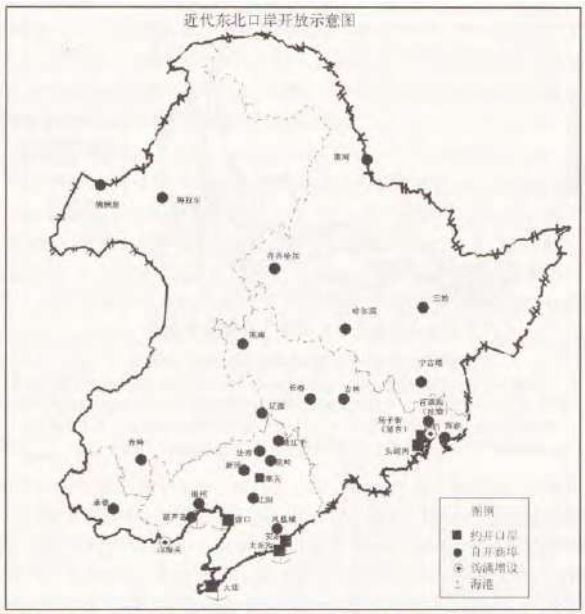


Figure 5 Schematic Diagram of Modern Northeast Opening Port (Yufu Jin, 1944)

3.1.2. the Rapid Rise of Hub Cities along the Railway

At the beginning of the construction of the C.E.R., according to the sixth paragraph of “the Contract of Cooperation of the C.E.R. Company”, “where the company builds, manages and protects the railway, and the land need to mine sand, stones, lime, etc. near the railway, if it is official land, it will be given by government, regardless of the price; if it is peoples land, it will be paid by the company at the current price, once in a lump sum or in a yearly basis.” (Ping Bu, 1987) So that Russia can form the specific railway subsidiary through various means as free occupation, purchase, and long-term lease. In fact, regardless of the C.E.R. or the SMR, their railway land was expanding through various legal or illegal means, far beyond the area required for railway construction and operation, included the land used for the city, for farm, for forest and for mine. The railway subsidiary was similar with the concession and leasehold established by western countries in China, which had had an important impact on the rise, transformation and economic development of modern city of Northeast China. (Weirong Cheng, 2008) The Russian railway subsidiary area had reached more than 1,300 square kilometers. On the eve of the Russo-Japanese War, the C.E.R. trunk line and the southern branch line had formed a series of railway hub cities, such as Suifenhe, Yimianpo, Hedaohezi, Ashihe, Manzhouli, Hailaer, Boketu, Angangxi, Anda, Yaomen, Sanchahe, Gongzhuling, Dashiqiao etc. (Xiaofan Qu, 2001) The SMR subsidiary area increased to 482.8 square kilometers in 1931, and there were 30 cities covering more than 1 square kilometer. Since 1907, the SMR Co. Ltd successively formulated and implemented the city plan for the key railway subsidiary of the SMR, such as Wafangdian, Gaiping, Xiongyuecheng, Dashiqiao,

Haichheng, Yingkou, Anshan, Liaoyang, Benxihu, Fushun, Andong, Fengtian, Tieling, Kaiyuan, Sipingjie, Gongzhuling, Chuangchun, etc. (Xiaosong Wu, 1999)

In addition, the railways built by the foreign capital, Sino-foreign capital and national capital in the eastern region and southwestern region in the early 20th century also had a significant impact on the development of modern Northeast China cities. The foreign capital and Sino-foreign capital railways mainly included the Andong-Fengtian railway, Jilin-Changchun Railway, Jilin-Dunhua railway, Siping-Zhengjiatun railway, Zhengjiatun-Taonan railway and Tannan-angangxi railway. The national capital railways were mainly the east and west lines, as well as short line such as Hulan-Hailun railway in Heilongjiang province. The east line included the Fengtian-Hailong railway and Jilin-Hailong railway; the west line from Dahushan to the west via Zhangwu to Tongliao, at Tongliao connected the Sino-Japanese Capital Zhengjiatun-Taonan railway and Taonan-Angangxi railway, and then north to Qiqihar-Keshan Railway. The Hulan-Hailun railway, from Harbin Majiakou through Hula, Suihua to Hailun. The railway drove the rapid growth of passenger and cargo transportation, promoted economic development and population growth, and made some stations develop into modern cities.

3.1.3. the Rapid Form of Modern Industrial Cities

In the early and middle Qing Dynasty, the industries in Northeast China were mainly traditional handicrafts and small coal industries. By the end Qing Dynasty, along with the large capital investment of Japan and Russia, the modern industrial and mining industry in Northeast China developed rapidly. Modern industrial enterprises used machinery to carry out large-scale social production, absorbed a large amount of labors, and promoted the development of population and cities. Fushun, Anshan, Benxi in the southern region and Zhalainuoer and Hegang in northern region were the typical representatives. Anshan is a typical city formed by Japanese capital for mining industry in the southern region of Northeast China. In August 1909, Anshan Discovered iron ore. In 1917, the Anshan Iron Institute was established by the SMR Co. Ltd, there were huge smelting furnaces, hot blast stoves, power station, and mechanical fields. In modern East Asia, it gradually became the second largest iron center after Japan's gossip, and it was known as the "Iron Capital". (Zhenfu Li, 1926) By the eve of Manchurian incident in 1931, the population had reached more than 20,000, and the prototype of Anshan city had formed. Zhalainuoer, in the eastern of Manchouli, discovered coal in 1901. According to the fourth paragraph of the Sino-Russian "Renewal Contract of the C.E.R. Company", "allow to mine the coal needed for railway, where the railway passing by." In the 28th of Guangxu (1902), started to construct the well. In 1905, the annual output reached 460,000 tons. Zhalainuoer was the center of the mining area, and the important station on the west line, it had rapidly developed into a coal mine city in modern times. Hegang was located on the left bank of the lower reaches of the Sungari River. Coal fields were discovered in 1914. In 1918, Chinses merchants raised funds to build mines. "the coal produced by Hegang is good, 140 Kilometers away from Harbin and only 17.5 Kilometers away from Sungari River." (China Second Historical Archives, 2001) In 1926, the railway reached the Lianjiang port on Sungari River, the traffic conditions were greatly improved, the number of workers and residents was increasing, and the business developed. In 1929, Hegang Coal Mine Company planned 5 streets as a commercial site. Under the interaction of the expansion of coal mines and commercial development, Hegang has become an emerging mining city.

3.2. Urbanization Dynamic of Modern Northeast China

3.2.1. the Special Tariff Exemptions and Concessions Policy

After the opening up of Treaty ports and Un-Treaty ports, the Northeast China formulated a series of tariff exemption and concession policies under the further requirements of Russia and Japan based on the extremely low tariffs of other ports in China, that promoted the rapid development of the society and the city in Northeast China. First, the land tariff system. In 1862, the Sino-Russian Land Trade Regulations stipulated that the border trade between the two countries would not be taxed within 50 kilometers. In 1907, China and Russia signed the "North Manchuria Taxation Regulations," stipulated that all goods transported by railway to the station within 50 kilometers of the junction will not be taxed, the tariffs payable in other regions shall be implemented on the principle of less than one-third. In the northern region of Northeast China, 17 cities including Harbin, Manzhouli, Hailar and Qiqihar had been implemented. (Ping Bu, 1987) Second, Exemption of the second tariff. The so-called exemption of the second tariff referred to goods that had already paid customs duties in a port in China proper, when they re-entered the other ports, that would not pay again. Under the recommendation of the Chief Tax Officer Hurd, in 1907, the Qing government promulgated the "Northeast China Ports cancel the second tariff License method", stipulated that all foreign goods in Tianjing, Niuzhuang, Andong, Dalian, etc. have already completed importing formal taxes, and that Chinese goods have already completed re-imported half-taxes, if they are transported to port of Northeast China, no matter how they are carried, all license should be issued and no tariffs would be re-applied. (The SMR Economic Survey Association, 1987) In the subsequent Sino-foreign trade, all the ports in Northeast China were implemented according to this method. Under the above-mentioned tariff exemption and concession policies, the Lushun and Dalian area in the southern region, the C.E.R. subsidiary and Sino-Russian border area, Andong and China-Korea border area, and the Un-Treaty port all had developed rapidly.

3.2.2. Capital Competition among China, Japan and Russia

Capital is the blood of social and economic development. After the open of modern Northeast China, fierce capital competition had been launched around port, railway construction and foreign international trade, forming the Chinese Yingkou Silver Financial System, the Japanese Gold Yen Financial System and the Russian Ruble Financial System, the competition of capital had rapidly promoted the social and economic development of the Northeast China.

First，Yingkou Furnace Silver financial system. In the 11th of Xianfeng (1861), Yingkou opened up and the business flourished, various domestic and foreign silver currencies poured in and there was an urgent need to establish a suitable monetary system. In the same year, the first silver furnace appeared in Yingkou. In the 3rd year of Tongzhi (1864), Yingkou's standard currency Yingbao was produced, and other currencies were exchanged into Yingbao for trading. In the early years of Guangxu, the Yingkou Furnace Silver was issued, a check credit currency. In the 9th year of Guangxu (1883), Yingkou Furnace Silver financial system was mature, that is, merchants accessing Yingbao to the silver furnace, all need be registered and can be transferred to other silver furnace accounts, the account is settled on the first day of the third, sixth, ninth, and twelfth month of the calendar, and interest is paid for the deposit at the expiration date.

Second, the Russian ruble financial system. After the Sino-Japanese War, in order to repay the compensation for Japan, in the 21st year of Guangxu (1895), China and Russia signed the "Four Percent Loan Contract" and form the Russo-Chinese Bank. The bank regulations promulgated by Russia stipulate that the bank is not only responsible for the general banking business of Russia in China, but also responsible for collecting various taxes in China, operating enterprises related to local and national treasury; casting the currency permitted by the Chinese government, returning the interest of the Chinese government's public debt; laying railways and wires in China. Any draft contract signed between the bank and the Chinese government needs to be submitted to the Russian Minister of Finance for approval in advance, in fact, it is the agent of the Russian Ministry of Finance in China. (Ping Bu, 1987) In the 22nd year of Guangxu (1896), China and Russia signed the "Contract of Cooperation of the C.E.R. Company", stipulated "Russo-Chinese Bank will be responsible for constructing the railway. And then Russia took the C.E.R. as basis to issue the ruble. (Bank of China General Administration, 1987) At the beginning of the establishment of the Russo-Chinese Bank, the registered capital was 6 million rubles, after several times direct government investments, in the 3rd year of Xuantong (1911), the circulation reached 100 million rubles in Northeast China. (Shutong Hou, 1931) Since the ruble entered the Northeast China to 1917, the Russo-Chinese Bank had the greatest influence in the financial industry, and has become the hub and medium of capital flow among Europe, the province of China proper and northern region of Northeast China.

Third, the Japanese gold yen financial system. After Russo-Japanese War, the SMR Co. Ltd took over the railways and various undertakings in the southern region of Northeast China, in order to cooperate with the expansion of the Japanese forces represented by the SMR Co. Ltd, Japanese financial institutions entered Dalian on a large scale, and gradually expanded along the SMR with Dalian as the base. After the Sino-Japanese War, the trade between Japan and Northeast China became increasingly prosperous. In the 26th year of Guangxu (1900), Yokohama Specie Bank first set up branch in Yingkou to operate trade exchanges between Japan and Northeast China. In the 20th year of Guangxu (1902), a silver check of "pay once see" was issued. After the Russo-Japanese War, in 1906, the Japanese government granted it the right to issue silver vouchers, and stipulated that the silver vouchers were the legal currency of the Japanese in Northeast China, and were forcibly circulated in Dalian and the SMR subsidiary. With the expansion of business, Yokohama Specie Bank had successively established branches in Lushun, Liaoyang, Tieling, Anton, Changchun, Harbin etc. business scope had expanded greatly. Then the Japanese government granted it the responsibility of acting as the national treasury, therefore, at that time, Yokohama Specie Bank was actually the central bank of Japan in Northeast China. In the 2nd year of Xuantong (1910) the Japanese government granted it concurrently operated long-term real estate loans on the grounds that there no similar financial institutions. In 1917, Terauchi Masatake cabinet reorganized Japan's finances in Northeast China, Yokohama Specie Bank was responsible for issuing silver vouchers, specializing in trade exchanges. Korea Bank was in the position of the central bank, acting as treasury, issuing gold vouchers, which is the central institution of commercial finance. The Toyo Colonial Society operated real estate investment and handled long-term industrial loans. Three banks had a division of labor and cooperation, each with a focus on field, under the unified guidance of the Japanese government, they work together to expand.

3.2.3. Export-Oriented Port-Railway Network-Hinterland City Structure

In the early and middle Qing Dynasty, most of the cities in Northeast China were distributed along the waterway traffic line or the land Post-road traffic line, and mainly military and political towns, although there were also close economic activities at that time, mainly followed the main political and military route, from Beijing via Shanhaiguan, Jinzhou, Shengjing to Jilin, and then from Jilin to Qiqihar, Sanxing and Ninggua respectively, was an inward-oriented defensive cities structure centered on Beijing. With Treaty port and Un-Treaty port opening and the construction of the C.E.R., Northeast China, as the water-land transport region of the Siberian Railway in the Far East, had undergone the qualitative transformation of the internal mechanism of the cities system development. Especially since the construction of the C.E.R., the railway transportation line centered on the coastal, riverside or borderside Treaty port or Un-Treaty port had been gradually extended, the medium cities and small cities along the railway were generated and rapidly developed due to the transit and distribution of the goods. First, Dalian-SMR city system. After the Russo-Japanese War, Dalian, as a port gateway city, stringed up town nodes of different levels along the railway, and formed the outward-oriented “hub-network” city structure. According to the SMR Co. Ltd investigation, the cargo of Dalian port in the 1920s swallowed the area around the SMR between Dalian and Chuangchun, as well as the surrounding areas of the branch railways such as Sipingjie-Taonan railway, Taonan-Aangangxi railway, Jilin-Chuangchun railway, Jilin-Dunhua railway, etc. (The Investigation Division of the SMR Ministry of Civil Affairs, 1923) Especially the Shenyang and Chuangchun along the railway, they were not only the core of the region, but also the important nodes affecting the secondary cities such as Siping, Jilin, Tongliao, Taonan etc. Second, Vladivostok-the C.E.R. city system. Harbin, Manzhouli and Suifenhe in the northern region of the Northeast China were the port cities, their radiation space is the hinterland of the south line, west line and east line of the C.E.R. with Harbin as the center. At the same time, the C.E.R. and the Zhuhe and Yilan etc. along the lower reaches of the Sungari river had frequent cargo transportation. (The C.E.R. Economic Investigation Bureau, 1927) In addition, the port city of the eastern region, southeastern region and southwestern region of Northeast China was also connected to the hinterland by railway, formed the “port-network” city system. For example, during this period, Andong became the hub city in the southeastern region, and was closely connected with the cities along the Yalu River, meanwhile, the hinterland cities of the Andong-Fengtian railway also developed rapidly, such as Huanren, Tonghua and Linjiang etc. (The Industrial and Commercial Division of the SMR, 1927)

Conclusion

In the early and middle period of Qing Dynasty, Northeast China, as the birthplace of Qing government, implemented the ban policy for a long time, the city development mainly relied on the Post-road system construction centered on Beijing-Shengjing-Jilin, the driving force for city development was mainly political and military. At the end of the 19th century, with Europe as the center, international capital actively expanded in the world, Russia formulated the Far East policy and built the Siberian railway to the Far East, Japan formulated the mainland policy and expanded to Korea and China, Northeast China gradually became the focus of the international geopolitics. Japan and Russia have resorted to force to invade Northeast China, after the construction of the C.E.R., that gradually evolved into the economic invasion based on state capital investment and competition for port and railway

construction rights and management rights. In order to maintain the political rights in Northeast China, the Chinese government implemented the "Open Door" policy, successively opened up about 30 Treaty Ports and Un-Treaty Ports, and raised national capital to build China's own port and railway network. In the fierce competition among China, Japan, Russia and other countries, Formed the SMR system centered on Dalian, the C.E.R. system centered on Vladivostok, the Chinese railway system centered on Huludao, also laid the city structure of the "hub-railway network-hinterland" model centered on the imported cities of the Northeast China, which promoted the development of commercial cities, hub cities and industrial and mining cities. Under the special tariff system, China, Japan and Russia relied on port-railway capital competition, forming the city development mechanism oriented by the export-oriented economy, that has the important theory value for the development of contemporary macro-regional urban systems in the context of economic globalization.

References

1 Ping, Bu; Yunshen, Guo; Dingtian, Huang (1987) Compilation and Interpretation of the Northeast China International Treaty, Harbin, China, Heilongjiang People's Publishing House.

2 Zhen, Li etc. (1993) Northeast China Natural Geography, Beijing, China, Higher Education Press.

3 Fujioka, Ziqiang, Wu (1929) Economic Outlook of Manchuria and Mongolia, Shanghai, China, Minzhi Bookstore.

4 Chengjing, Wang (1947) Northeast China Economic Resource, Beijing, China, The Commercial Press.

5 QiYun, Zhang (1966) Map of the Qing Dynasty, Taiwan, Chinese Dictionary Printing Society.

6 Tingyi, Guo (1987) The Change of Modern China, Taiwan, Taiwan United Publishing Company.

7 Zhaokui, Xu (1959) Economic Development of the Heilongjiang River Basin in the Qing Dynasty, Beijing, China, Commercial Press.

8 The C.E.R. Economic Investigation Bureau (1927) Manchuria and The C.E.R., Harbin, China, Harbin Chinese Printing Bureau.

9 Lengjiu, Yun (1935) The Past and Present of Inland Navigation in Northeast China, New Asia, Vol. 10 No. 01

10 Qi, Zhu (1930) Japan's Invasion of Manchuria and Mongolia, Beijing, China, The Commercial Press.

11 Chijun, Hu (2011) The International Background of Economic Development of Modern Northeast China, Beijing, China, The Commercial Press.

12 Fuquan, Zhang (1989) Modern Economic History of Liaoning (1840-1949), Beijing, China, China Financial and Economic Publishing House.

13 Yunou, Lian (1932) Speech on Manchuria and Mongolia, Nanjing, China, Nanjing Bookstore.

14 Tongwen, Wang (1933) Research on the Northeast China Railway Problem, School of Management, Transport University.

15 C. F. Remer. Xuekai, Jiang (1953) Foreigners Invest in China, Beijing, China, The Commercial Press.

16 Modern History Data Editing Group, Institute of Modern History, Chinese Academy of Social Sciences (1980) Mr Yang Manuscript of Gengxin year, Beijing, China, China Social Sciences Press.

17 Naikun, Yang, Yangxiong, Cao (2005) Research on Economic Problems in Modern Northeast China (1916-1945), Shenyang, China, Liaoning University Press.

18 Shixuan, Jin (1932) Discussion on the Northeast Railway Issue, Tianjin, China, Tianjin Ta Kung Pao Hall.

19 Yusi, wang (1932) The Gold Time of Beijing-Fengtian Railway, Beiping, China, Beiping XingyuTang.

20 Yufu, Jin (1944) Overview of Northeast China, Taiwan, National Northeast University.

21 Weirong, Cheng (2008) Modern Northeast China Railway Subsidiary, Shanghai, China, Shanghai Academy of Social Sciences Press.

22 Xiaofan, Qu (2001) Historical Changes of Cities in Modern Northeast China, Shanghai, China, East China Normal University Press.

23 Xiaosong, Wu (1999) History of City Construction of Modern Northeast China, Guangzhou, China, Zhongshan University Press.

24 Zhenfu, Li (1926) Northeast China Travel Guide, Shanghai, China, Shanghai Bank Travel Department.

25 China Second Historical Archives (2001) Chinese Old Customs Historical Materials (1859-1948), Beijing, China, Jinghua Publishing House.

26 The SMR Economic Survey Association (1987) Introduction to Manchukuo Customs, Internal Print.

27 Bank of China General Administration (1987) Economic Survey of Northeast China, Taiwan, Taiwan Wenhai Publishing House.

28 Shutong, Hou (1931) Introduction to Finance in Northeast China. Pacific International Society.

29 The Investigation Division of the SMR Ministry of Civil Affairs (1923) Research on the hinterland of Dalian Port, The Investigation Division of the SMR Ministry of Civil Affairs.

30 The Industrial and Commercial Division of the SMR (1927) Main city and Hinterland in Southern Region of Northeast China, The Industrial and Commercial Division of the SMR.

Track 3

Liveable places and healthy cities

Planning for people

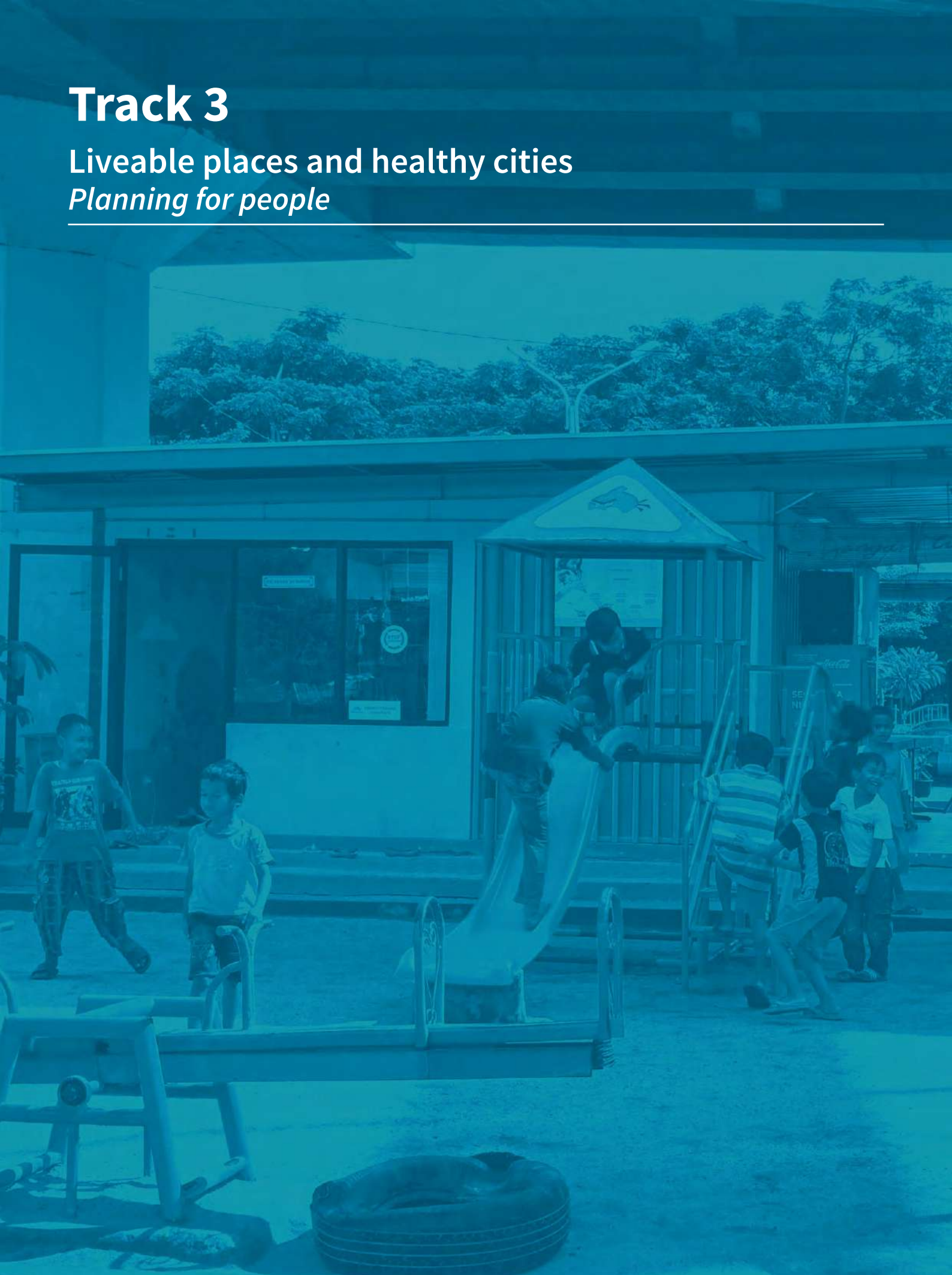


photo: Rahmatharman, Wikimedia

Case Study / Project

Training Session on Child-responsive Urban Planning

Jens AERTS

Abstract

Analysis of the main urban contexts shows that urbanization does not necessarily induce sustainable urban environments for children. Children and their families, especially the most disadvantaged, are confronted with spatial inequity in multiple ways: the high cost of living and access to urban services; the unequal geo-spatial distribution to urban services; the poor characteristics of the built environment; and the inequitable spatial distribution of land and urban space.

An unsustainable built environment constraints children's access to urban services in a physical way, due to unequal distribution, ineffective planning and lack of quality in design and construction. It leads to urban-specific environmental health problems that health support systems cannot address alone and shifts the focus from communicable to non-communicable diseases. The built environment also reveals itself as a protection issue when children and their caretakers cannot evaluate risks, be prepared or be safe. Finally, the built environment also influences to what extend children's participation is possible, in terms of public space where children can congregate and other infrastructure that allows physical, social and digital connectivity. On the positive side, the built environment offers realms of opportunity where cities commit to the respect of children's rights and planning for equity. Despite the strong correlation between the vulnerability of the most disadvantaged children and the built environment, child right and development specialists have not been familiar with the language of those who can address these issues.

Therefore, UNICEF wants to lead on developing the needed advocacy and technical support, by calling cities to commit to Child Rights and Urban Planning Principles and by offering guidance to urban planning stakeholders on how to prioritize children and thereby ensure cities thrive as homes for healthy, safe, green and prosperous communities. Amongst these stakeholders, build environment specialists working in cities, governments, community-based organisations and the private sector are key. Therefore, UNICEF and ISOCARP want to collaborate on joint advocacy and capacity development amongst its urban planning members and partners. Based on the recently published Handbook on child-responsive urban planning, UNICEF proposes to organise a half day training session to previously enrolled participants.

The training has the following format, under further development:
- Introduction Child Rights and Urban Planning Principles
- Presentation case studies (Indonesia/Asia and global)
- Workshop with break out session, facilitated with a checklist
- Presentation capacity development package of three types of tools for child-responsive urban planning: spatial planning tools (area-based), children's participation stakeholder engagement (process-oriented) and geo-spatial data management for child-centred decision making (evidence based).

The aimed outcome of the training session is to provide the participant urban planners with the knowledge and the technical tools on the why, what and how to put children central in their daily practice. Participants should feel inspired and comforted after the workshop to lead on this topic in their professional environment, by training further their staff, by proposing innovative approaches to their clients and partners, by elaborating guidance and policies in a city or national level.

A synthesis of the handbook on child-responsive urban planning can be provided for publication as a paper in the congress Publication. In dialogue with ISOCARP, this training can also be the start of a certification mechanism for child-responsive urban planners.

Research Paper

A DREAM OF OPEN DEFECATION FREE INDIA?

Decolonize and innovate urban sanitation to reach those left behind

Mahak AGRAWAL, Urban Planner; India

Abstract

India, a country now known as one of the world's fastest-growing economy, continues to be inhabited by 40 per cent of the global population of open defecators. Nearly 536 million people in India defecate in the open every day. To rectify this multifaceted issue, Government of India launched the Clean India Mission, famously known as the Swachh Bharat Abhiyaan, in 2014. Sanitation became a national political priority for the first time in India. The Mission renewed a hope to address a myriad of issues associated with open defecation. But this hope has only been fulfilled partially in the past five years.

The paper highlights the issue of open defecation with a case of the National Capital Territory of Delhi (NCTD), finding answers to one question: what is the role of an urban planner in liberating Indian cities, especially Delhi, from sanitation deprivation and open defecation. National Capital Territory (NCT) of Delhi is identified as the case area for the project for two prime reasons: one, the extent of sanitation deprivation in the city; and second, the administrative capital of India often forms a precedent for the rest of the nation.

The paper is structured into three broad sections: first, the extent of sanitation deprivation in urban India and analysis of policies- planning and non-planning, formulated in response to the issue, is highlighted. Second, the extent of the issue is investigated for the case of Delhi in context of policy frameworks; third, urban narratives of sanitation deprivation captured across select six clusters of jhuggi jhompri[1] in the National Capital Territory are highlighted to exhibit differences in access and use of sanitation facilities, in context of the pan-India Clean India Mission. The paper concludes at a note of hope- envisioning a city and a country where no one is deprived of their basic human right to improved sanitation, or has to defecate in the open, and also details out implementable strategies and policies for Delhi and urban India.

Keywords

Water and Sanitation, Urban planning, Urban narratives, Open defecation, Justice

1 Introduction

India's Prime Minister Narendra Modi in his speech marking the birth anniversary of Mahatma Gandhi on October 2, 2014 launched the Swachh Bharat Abhiyaan (also known as Clean India Mission). The Mission was launched as a national movement, bringing urban sanitation to the stature of a political priority pan-India, envisaging a clean India, free of open defecation by October 2, 2019, a date marking 150th birth anniversary of the father of the nation- Mahatma Gandhi, who believed 'Cleanliness is next to Godliness'. The Mission brought with it, a herculean task of cent per cent eradication of open defecation across the

[1] settlements of urban poor identified by the Delhi Urban Shelter Improvement Board (DUSIB), Government of National Capital Territory of Delhi (GNCTD) as "an encroachment on public or private lands. They are therefore seen as illegal" (DUSIB, 2014)

country in a span of five years, overlooking the fact that open defecation is an ageless reality culminating from over hundred years of inequities- roots of which may be traced to ancient history and societal laws of India, as well as colonial legacy of British India.

Several studies, including the documented works of Burra et al (2003), Prashad (2001), Chaplin (1999, 2011), Mushtaq (2009), Doron and Raja (2015), deliberate on the issue and history of urban sanitation and open defecation in India, whilst a few investigate deprivation in urban India, and just a few explore sanitation deprivation for the National Capital Territory of Delhi. While Mushtaq and Prashad trace the evolution of urban sanitation practices in colonial India, Chaplin argues that sanitation in India is primarily guided by colonial legacy of unfair and inequitable distribution of sanitation facilities, and perpetuated by restrictive policies of Government of India post-independence. Deviating from colonial politics of sanitation, Burra et al (2003) focus on the inadequacies of public toilets in Mumbai, highlighting failure of public toilets in India to provide good quality sanitation services for a variety of reasons, cardinal being the incapability of service providers to account for regular supply of water to use, and maintenance of these facilities.

Therefore, the paper does not reiterate research, project findings that have been documented already. It builds on the existing literature and focuses on city planning policies, whilst simultaneously examining multifaceted relationship of sanitation deprivation and open defecation with urban development and planning, public health, economy, environment, education, safety and security.

The project investigates the scope of interventions and role of an urban planner in liberating Indian cities from sanitation deprivation and open defecation, particularly the national capital. In search of answers to this central question, the paper is structured into three sections: first, highlights the extent of sanitation deprivation in urban India and the findings from analysis of policies- planning and non-planning, formulated in response to the issue. It argues that inequitable distribution of sanitation facilities to the urban poor, favouring the middle classes and elite groups of the Indian society by the British, is systematically perpetuated by the establishment of urban planning and development institutions.

In the second section, the extent of sanitation deprivation and open defecation is investigated for NCT of Delhi in context of policy frameworks. It begins with a critical review of the three master plans of Delhi to date, and also underscores the issue of multiplicity of agencies and departments working on the subject of sanitation in the city, and therefore, a lack of coordination amongst these is identified as one of the biggest roadblocks to the vision of ‘open defecation free (ODF)’ Delhi.

In the third section, urban narratives of sanitation deprivation captured across select six jhuggi jhompri clusters in NCT of Delhi, exhibit the implications of the restrictive view of urban sanitation policies. The paper concludes on a note of hope, envisioning a city and a country where no one is deprived of their basic human right to improved sanitation, whilst elaborating implementable strategies and policies for Delhi and urban India.

2 Sanitation Deprivation in urban India

Nearly 200 years of direct rule by the British Government, over the people of India profoundly affected all aspects of life, culture and society, including city sanitation. While modern city planning emerged in India in the early 20th century, the period from late 18th

century to early 20th century was characterized by the British led Sanitary Revolution- a critical period in the evolution of urban planning and sanitation in India. Cities were physically segregated into distinct areas for European and indigenous population. Modern sewerage network was laid for areas inhabited by the Europeans and middle class, elite indigenous cohort, whilst several slums and squatters were cleared and relocated to city periphery- all in the name of sanitary revolution aimed at improving aesthetics and public health of the cities.

Roots of urban sanitation in India can be traced to the late 1800s, whereby to improve the sanitary conditions of urban centres, British India adopted its home-grown model of urban planning- implemented in 'home' cities including London, where planning emerged post-industrialization with a need to address problems of public health and unsanitary living conditions. While in India, sanitation became a matter of concern post mutiny of 1857 (Chaplin, 2011, 1999). It is thus imperative to investigate urban sanitation and planning thereof in India at three time frames- one, the pre-colonial period, wherein sanitation and much of the household norms were guided by the laws of Manu; second, the British India period which laid the foundation of city planning and urban sanitation of modern India; third, the post-independence period which continues to perpetuate the British India legacy of city planning and inequitable distribution of sanitation services.

2.1. Urban Sanitation in pre-colonial India

Much before the Britons came to India, the country and its people functioned upon the ideologies of Manu, a Hindu saint who wrote the Manu Shastra. Considered as a bible of the time by Hindu sect of the country, the Shastra conceived toilets and people associated with toilets, that is the manual scavengers, as 'dirty' (Hopkins & Burnell, 2009). Earliest form of social segregation, on the principles of sanitation, was not uncommon. People of higher caste were privileged to either have toilets or defecate in open, but not responsible to dispose it. The undignified burden of picking up the night soil was thus endowed upon the lower caste or Dalits. Hence, the societal practice of untouchability was born. Cities and villages had separate areas which could be inhabited by these untouchables. Often, they were located in the periphery of habitation area. In other words, the social-sanitation divide had a physical manifestation.

It is interesting to note, that India also boasts of having one of the earliest sanitation systems intertwined with town planning- as excavated from the Indus valley civilization in 2600 BC.

2.2. Urban Sanitation in British India

With the increasing power of British India and social unrest amongst the natives, several revolts and demonstrations were organized by the public. The mutiny of 1857 was one with the largest impact- on colonists as well as natives. Cities emerged as focal points of this nationwide mutiny. Once the wave of rebel subsided, what was left was destruction and depravity, sanitation deprivation being one of the leading outcomes.

To improve the state of sanitation deprivation in towns and cities, the British India set up a Royal Commission to look into the sanitary state of affairs of India, particularly for the areas inhabited by the Army (Mushtaq. 2009). The Commission soon published a statement called as the White Paper of the Royal Commission, which called for an immediate and necessary revolution in the state- the Sanitary Revolution.

This Revolution was based on three principles. The first principle accentuated the social sanitation divide initiated by Manu Shastra, and propagated by the physical segregation of towns by British India. Towns and cities were divided into separate areas for indigenous and European population. The latter settled in well planned residential areas of model towns, cantonments and civil lines (Mushtaq, 2009), while the indigenous were left to rot in their own waste. The second principle builds upon the first, augmenting the British India belief that natives are dirty. Even if you provide them with facilities, they will continue to remain dirty. Thus, the principle deprived natives from enjoying the benefits associated with a modern sewerage network while extending the same for areas inhabited by the Europeans and upcoming housing areas for the middle class and elite. The third principle conceived slums and squatters as hotspots for diseases and everything insanitary. Slums were cleared from the city's core and relocated to the periphery, similar to the principles of Manu Shastra.

Multitude of public health problems however, continued to persist. Sanitation deprivation and open defecation was a huge issue that the British was unable to handle from the recommendations of the Commission. It was realized that until the problem is solved at local level, a city's public health will situation continue to derogate. To address deplorable conditions and public health in India, urban planning was thus born.

British India believed that use of land and planning principles across a city would alleviate sanitation and public health status of cities. Following this, municipalities were established in select urban centres of the time, including Madras, Bombay, and Delhi, to provide civic basic urban infrastructure and amenities at the local level. Improvement trusts were established to re-organize and plan chaotic habitations. Numerous development authorities came up as a beacon of hope for the British India. These authorities were discharged with the functions of preparing a development plan that would guide the use of land for various purposes, including the storage, treatment, and disposal of human waste. System of calculation-based land budgeting was borne, which emphasized and continues to focus on extension of modern sewerage network and establishment of ancillary infrastructure for collection, storage, transportation, treatment, and final disposal of human waste into a water body.

Summing up, sanitation deprivation in colonial India was accentuated by planning and administrative policies, which were instrumental in propagating for unequal treatment of native and European population, and areas inhabited by them- through inequitable distribution of sanitation infrastructure. Sewerage networks were laid down for the middle class and elite (Chaplin, 1999, 2011) while urban poor drowned in their own waste or were relocated to fringes, in the name of sanitizing the city.

2.3. Urban Sanitation in post-independent India

Seven decades post-independence, yet the sanitary state of urban India has not changed much. Planning policies continue to emphasize on extension of sewerage network through its calculation-based augmentation plan, ignoring the fact that urbanization in Indian cities differs from that of the West. In India, around 60 to 70 per cent of urbanization is unplanned. Extension of planned sewerage network in such areas is a complex task. To fill this gap in urban sanitation chain, sectoral policies step in. These sectoral policies, formulated by technical wings of central ministries, do not solve the problem either. Often guided by political agendas of ruling parties, the policies restrict their focus on provision of basic 'minimum' facilities to the poor.

Post-Independence several sectoral policies and planning guidelines have been formulated and implemented for tackling the issue of sanitation deprivation and open defecation either with a head-on approach or sinuously. Examination of these policy frameworks leads to two key findings: first, the scope of sanitation expanded to include not just mere provision of facilities but also talks of gender-inclusivity and environmental sustainability on paper; second, the urban sanitation system continues to perpetuate colonial legacy of restrictive policy and planning, focussing on provision of toilets and augmentation of sewerage network, without linking the two.

For instance, in 1956, the Slum Areas (Improvement and Clearance) Act was notified with a need to clear cities of increasing number of slums whilst improving the sanitary state of cities (Government of India, 1956). Propagating the colonial principles, the Act perceived slums as 'public nuisance'. But amidst implementation of the Act, the Central government realized that cities were still knee deep in their own waste, and the problem of open defecation and sanitation deprivation could not be solved by mere relocation of slums. Thus, a new approach was formulated- focus shifted from clearance and relocation to provision of basic minimum infrastructure on-site to urban poor, as per the provisions of Environmental Improvement of Urban Slums (EIUS) scheme of 1974. Around same time, liberation movements were being organized by social workers to abolish the practice of manual scavenging and restore the dignity of manual scavengers (Government of India, 1993). Consequently, the Integrated Low-Cost Sanitation Scheme was enacted in 1980, and revised in 2008. Envisaging abolishment of the inhumane practice of scavenging, the scheme provided for conversion of dry latrines into low cost twin-pit latrine (Government of India, 2008).

Soon after, another scheme known as Urban Basic Services Program was implemented in 1985. The program focused on imparting education to urban poor, to enable and encourage them to use facilities provided under the Environmental Improvement Scheme. However, like several other sectoral policies implemented post-independence till the economic reforms of 1990s, sanitation continued to be a small component of a larger scheme on affordable housing or poverty alleviation. Also, India being a country that continues to reside in its villages, major portion of central and state funds for sanitation sector were diverted to rural India. To sum it up, urban sanitation was enervated via these policy frameworks.

Post 1991, however, the scenario transformed. With liberalized economy, increased flow of international aid for large infrastructure projects and growth of public-private partnerships, large urban renewal projects were initiated. In 2006, the Central government's flagship programme- Jawaharlal Nehru National Urban Renewal Mission (JNUURM), was launched. The programme made huge outlays particularly for urban infrastructure projects, including urban sanitation. Basic Services to Urban Poor (BSUP) programme was launched as a sub-mission of the JNNURM, with an aim to improve the quality of life and infrastructure for urban poor. However, even till this point, urban sanitation remained a component of a larger programme.

With the economic reforms of 1990s, another significant change to sanitation happened. Public health and sanitation, an item of the State List of the Constitution of India, became a responsibility of urban local bodies with the devolution of powers in 74th Constitutional Amendment Act. Yet, delivery of the human right remains a critical issue.

It was only in 2008, with the notification of National Urban Sanitation Policy, that an exclusive and comprehensive policy was penned for urban sanitation at the Centre. Novelty of this policy is that it identified open defecation as a challenge to urban development- a fact and reality of urban India no other document had earlier given due diligence to. The policy envisaged '100 per cent free from open defecation' as the goal (Government of India, 2008).

The biggest boost to urban sanitation and open defecation came to India six years later, whereby urban sanitation became a subject of multidisciplinary discussions and debates, and a political priority under the Swachh Bharat Abhiyaan or the Clean India Mission. Launched by Prime Minister Narendra Modi, as a national drive for making India clean and free of open defecation, the urban component of the Mission continues to follow the path of its predecessors while emphasising on the provision of toilets. Moreover, the scope of Mission's urban component is inclusive of statutory towns (less than 40 per cent of total urban centres of India) only. Despite this limited area of interest of the Mission, one noteworthy provision of the Mission is its inclusivity of distressed population, which is inclusive of not only the urban poor, but also manual scavengers, rag-pickers, construction labours, migrants, homeless and other vulnerable sections of urban society.

Yet, the Mission has become a lost opportunity (PTI, 2016). It continues to perpetuate the age-old mantra of constructing more and more toilets. For example, in his visit to Australia in 2014, Prime Minister Modi preached Indian diaspora to participate in the Mission by constructing one toilet in the village of their origin (Doron & Raja, 2015). With the approaching deadline of 2019 and no significant changes in the usability of toilets or the status of open defecation, the Centre directed state governments to levy fines ranging from Rs 200 to Rs 5,000 for littering, urinating or defecating in public spaces, an amount that could account anything from a day's wage to monthly wage of a person (HT Correspondent, 2016). What could not be achieved through provision of toilets is now being attempted by way of levies.

Up until now, the paper elaborated on the tunnel vision of sectoral policies of urban sanitation. But when it comes to planning policies and guidelines, the situation is not much different, just the focus differs. For example, the norms of Central Public Health and Environmental Engineering Organization (CPHEEO), suggest one public toilet at every one kilometre of road length in urban areas and equal number of toilets for men and women. But the norms are rarely adhered to.

Finding a toilet is difficult in a city, while finding a toilet for women is rarer. The latest Urban and Regional Development Plans Formulation and Implementation Guidelines, 2014 borrow the standards from CPHEEO manual and recommend public toilets' provision in all vending zones and markets; in areas of high volume of people (like railway stations, bus terminals, public open spaces, et cetera). Taking a step further, the guidelines specify the design of toilets shall have adequate water closets for women, children and differently abled (Government of India, 2014). In simple words, the planning norms are evolving around toilets, but becoming more inclusive in approach and design.

These manuals and guidelines act as bible for planners working in city and state level planning and development authorities, whilst the practitioners continue to follow colonial legacy of controlling the use of land through master plans. In these statutory plan documents, a planner forecasts population, water demand, and thereby estimated wastewater generation. Comparing the estimate with existing treatment capacity, a planner

prepares a land budget for augmentation of wastewater treatment capacity, and earmarks land for infrastructure expansion.

Summing up, planning policies focus on augmentation of sewerage treatment capacity while the sectoral policies focus on increasing number of toilets- both missing the critical components of usability, adequacy, and accessibility. The sanitation chain therefore, remains broken, with severe implications for socio-economically distressed.

Sanitation deprivation in urban India can also be identified as a form of colonialism, where interests of a few are attended to, at the expense of the majority. Introduced by Britons, urban planning and policy frameworks to address the issue of open defecation and sanitation deprivation still reek inequity and injustice.

2.4. Sanitation deprivation as a challenge to urban India

Perpetual dependence on restrictive policies of urban sanitation, both planning and sectoral, has aggravated sanitation deprivation to an extent that India ranks 1st across globe in terms of population of open defecators (World Bank, 2017). The report accounted for over 40 per cent of world's total open defecators as residents of India. This equates to more than 536 million persons across rural and urban India that can be found defecating in open spaces, along railway lines, roads, drains and other such public spaces, scarring their life and soil.

Sanitation deprivation rots the nation with severe long-term impacts as well, accounting for annual loss of 2.4 trillion or 6.4 per cent of national Gross Domestic Product (DASRA, 2014), equivalent to 60 per cent of environmental health burden of the country. The economic and environmental burden of sanitation deprivation is also related to inefficient treatment of wastewater in cities. The Central Pollution Control Board (CPCB) report of 2010 points out this inefficiency in class I and class II cities whereby 70 per cent and 92 per cent of untreated sewage, respectively, contaminate surface and groundwater resources on a daily basis (Central Pollution Control Board, 2010).

But the implications of sanitation deprivation are not limited to public health, environment and economy alone. It also affects education and safety, particularly of women- one in every four girls drop out of school because of lack of sanitation facilities in school (DASRA, 2012). In search of open spaces that are closed off to surroundings, women often travel long distances from home, making them vulnerable to sexual harassments. For example, in a 2012 study of Delhi slums, 70 per cent girls and women were found to be victims of verbal harassment on a daily basis, with 50 per cent of them falling prey to grave physical and sexual assaults (DASRA, 2012). For India therefore, sanitation deprivation is a pan-India issue with long term impacts on multiple dimensions of development, particularly the health of public, economy of nation, environmental quality, education status of girl child and safety and security of females.

Being associated with multitude impacts on multiple dimensions, sanitation deprivation is a perpetual challenge for urban development of urban India. The 597 million persons defecating in open account for 53 per cent of country's total population (Census of India, 2011), but only 4 per cent of it resides in urban India. Despite the small percentage, the issue of sanitation deprivation and open defecation is a challenge to urban development for three main reasons: first, 81 per cent of India's urban households have access to latrine facilities but only 33 per cent of them are connected to modern sewerage network; second, 19 per cent of urban households do not have a latrine facility within premises – a figure which can

be broken down into 6 per cent using shared toilets and 13 per cent defecating in open (Census of India, 2011); third, and the most important reason for the accentuation of sanitation deprivation in Independent India relates to rural-to-urban migration (Table 1). Every decade, urban areas are expanding in number and population, but so are the slums within them, primarily due to increasing migration and limited access to affordable housing. Simultaneously, percentage of households having access to latrine is improving by each decade but in absolute figures the number of households that do not have latrine facilities is still significantly large.

Census year	Number of towns	Households (in millions)		Annual migration to urban areas (in millions)	% of households availing latrine	
		Urban	Slum		Access to latrine (within and outside premise)	No latrine
1981	3949	29.3	5.6 **(19%)**	5.8	57.4	42.6
1991	4615	40.7	9.3 **(23%)**	6.6	63.8	36.2
2001	5161	53.6	10.2 **(19%)**	10.2	73.7	26.3
2011	7935	78.8	13.9 **(18%)**	15	81.4	18.6

Table 1: Access to Latrine facilities in urban India, 1981-2011
Data Source: Census of India (1981, 1991, 2001, 2011)

Limited capacity of civic authorities and urban local bodies to keep up with the demand for adequate sanitation, several organizations are coming up across states and cities to help address issues and challenges associated with sanitation deprivation particularly for urban poor. Mahila Milan is one such organization which works with and for pavement dwelling women in Mumbai. The organisation gave up waiting on government's promise to provide toilets and pooled resources from the community to construct community toilets in 1990s. In 2013, the 'Right to Pee campaign' was launched in the city (Patel, 2013) by sanitation deprived women with the demand to make existing male-biased public toilets sensitive and inclusive of the women as well (HT correspondent, 2016).

The same organization, in collaboration with the NGO- Society for the Promotion of Area Resource Centres (SPARC) and the National Slum Dwellers Federation forged a partnership called the Alliance in 1987, to address poverty and related challenges in the city, including the challenge of open defecation. Three major strategies adopted by the Alliance whilst working with local communities include- self-surveys and enumeration, housing exhibitions, and toilet festivals. The Alliance works at grassroots level to gather information on communities and design appropriate toilets for slum dwellers. These toilets differ from state provided infrastructure as they are sensitive to local demand and are better quality toilets (Sriram, 2016). Through works of the Alliance in tackling issues of open defecation it is clear that to resolve issues on ground, local knowledge and urban narratives are imperative and capable of guiding public policies and programs (Kumar, 2016).

3 Sanitation Deprivation in NCT of Delhi

Urban sanitation systems for the NCT of Delhi, and its planning, development, operation and maintenance involve multiple agencies at all scales of governance- Centre, state, city, district and local; for it is a union territory and the national capital. At the Centre, Delhi Development Authority outlines the vision and provisions within the statutory plan documents, also known as a Master Plan. Since 1957, the Authority has formulated three Master Plans for Delhi- the Master Plan of Delhi, 1962- 1982, succeeded by the Plan for

1982-2001, which is superseded by the current Plan of 2001-21. With each plan the scope of sanitation has expanded but the emphasis remains on augmentation of treatment capacity through population-based wastewater calculations, land budgeting, and extension of modern sewerage network (DDA, 1982, 1990, 2007).

At city level, the urban sanitation systems' administration is led by two main agencies- first, the Delhi Jal Board (DJB), and second, the Delhi Urban Shelter Improvement Board (DUSIB). The former agency is the sole provider of water for the city and is also discharged with the responsibility of laying down sewerage network and augmenting its capacity periodically. However, it is not mandated to provide the human right to all. It thus, conveniently limits its service delivery to planned developments with minor interventions for unplanned developments of slums and unauthorized colonies. Delhi Urban Shelter Improvement Board however, focuses on the provision of community toilets in identified unplanned settlements within the city, identified as jhuggi jhompri cluster[2] (JJ cluster).

At the local level, the city's urban sanitation system is governed by the five urban local bodies – North, South and East Delhi Municipal Corporation, the New Delhi Municipal Council and Cantonment Board. Each of these local bodies manage sanitary state within its jurisdiction area- by daily sweeping of streets, solid waste management, and constructing urinals in public spaces- often ignoring the needs of women in design, planning or management.

The urban sanitation is a complex responsibility of multiple agencies at three levels of administration for the National Capital Territory of Delhi. For reasons of restrictive policy emphasis and incoherence in coordination and functioning of these systems, the extent of sanitation deprivation and consequently open defecation is perpetually on the rise.

3.1. Extent of sanitation deprivation in NCT of Delhi

The National Capital Territory of Delhi, inaugurated in 1931 by the British has witnessed tremendous growth of population, spatial extent, as well as demands for basic amenities, including adequate sanitation. Even though the city's growth rate is declining, population of the capital in 2011 was enumerated at 16.75 million- an increase of 2.94 million from 2001 census. With this exponential growth, supply in response to the rising demands for adequate sanitation, by competent authorities has not been able to cope up. As a result, only 89.5 per cent of city's households have access to latrine facility within their premise, of which around 45 per cent are connected by sewerage, while remainder 10.5 per cent of households either have shared public toilets outside their premise or defecate in open. Presently, over one lakh households defecate in the open (Census of India, 2011) in Delhi.

Data however, often hides more than it tells- what this Census data on latrine facilities fails to reveal are the ground realities or the true extent of depravity and open defecation across the city. If we compare the district wise percentage of households having no access to latrine facilities in 2001 (Figure 1A) and 2011 (Figure 1B), it is clear that the situation has improved significantly for Delhi, particularly the peripheral districts of North West, West, South West, and South Delhi. But examining percentage of households defecating in the open (Figure 1C), it is evident that the peripheral districts alone account for over 87 per cent of households defecating in open in the city (Census of India, 2001, 2011).

[2] "an encroachment on public or private lands. They are therefore seen as illegal" (DUSIB, 2014)

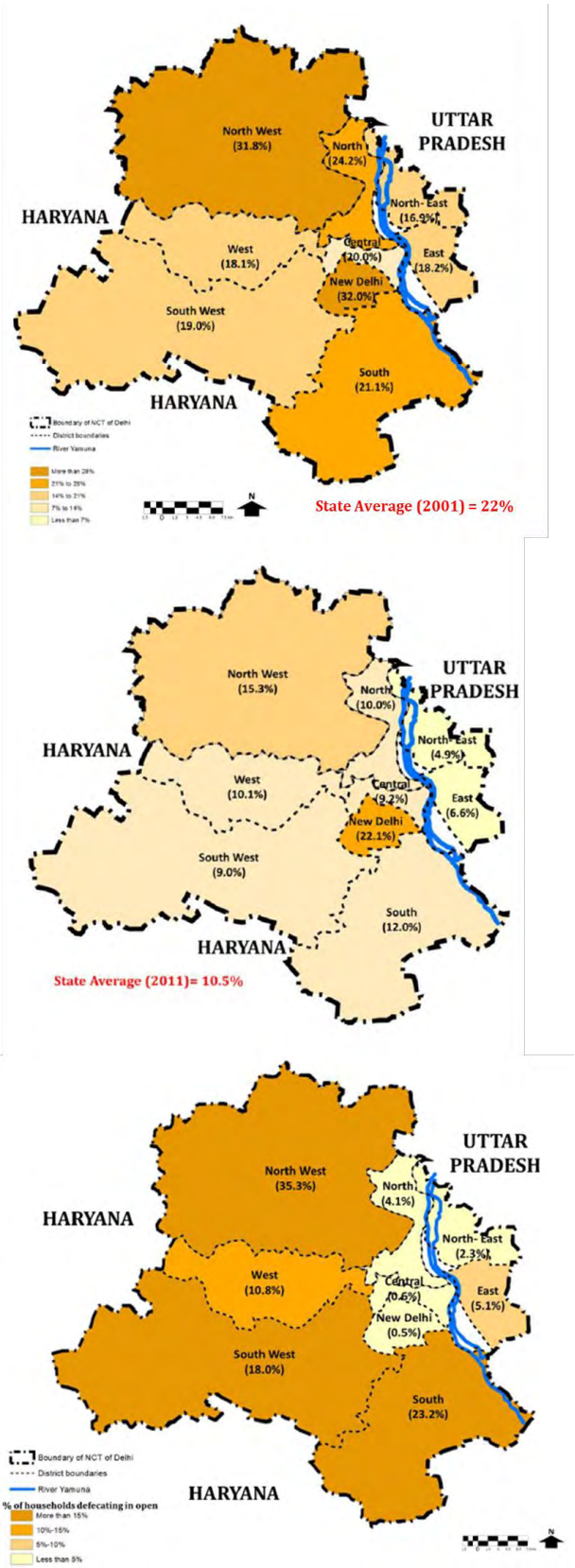


Figure 1: District wise distribution of percentage of households (from top to bottom) A. having no access to latrine facility within premise, 2001; B. having no access to latrine facility within premise, 2011; C. defecating in the open, 2011
Extracted from: ORGI 2001, 2011

This anomaly has a two-fold explanation- one finds its basis in planning practice, and second in sectoral strategies, administration and management. The second explanation refers to the 2003-05 partnership between the Sulabh International[i] and the Municipal Corporation of Delhi; formed for construction of community toilet complexes in slums of the city. Majority of these toilet complexes were constructed in the peripheral districts or New Delhi district, as land availability was higher in these districts than in densely populated districts of central Delhi or east Delhi. But, for users, these complexes did not solve their true purpose- of eradicating open defecation or urination. Open defecation was still a mundane routine for many.

Some of the key reasons for the failure of this partnership were: one, many clusters converted the complexes either to storage units; second, women could not avail it for its male biased design; third, preferred to defecate in open lands which offered much cleaner environment to relieve than these ill-maintained toilet complexes.

The period between last two census enumerations (2001-11) therefore, witnessed a numeric improvement in access to latrine facility, yet people preferred to defecate in open.

The second explanation for this data anomaly emerges from restrictive view of planning profession, in practice. Planners prepare land budgets for augmenting sewage treatment capacity for each revision of master plan, wherein capacity calculations are made by

forecasting population for horizon year, estimating water demand, and equating 80 per cent of this demand as total wastewater generation (DDA, 1982, 1990, 2010). But, these calculations for determining the use of land for urban sanitation ignores one simple fact- not all households with access to water supply (Figure 2A) are connected by piped sewers (Figure 2B). As a result, land and capital are being allocated for augmenting sewage treatment capacities which would never be utilized to the designed capacity.

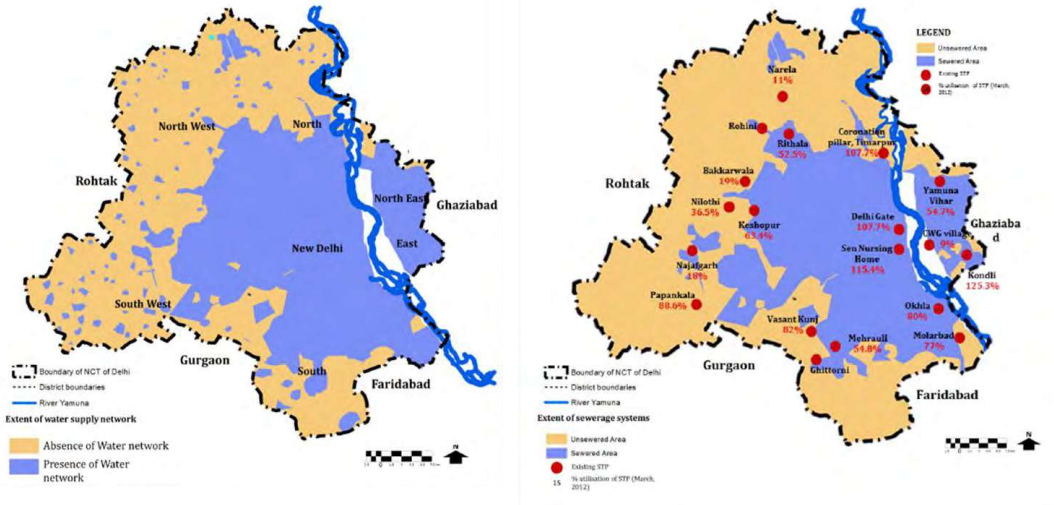


Figure 2 (from left to right): B. Extent of sewerage network in NCT of Delhi and
Extracted from: ORGI 2001, 2011

The cumulative effect of this misguided focus is that over one lakh households are defecating in open every day in the capital with 48 per cent of them being urban poor. Benefits of policies and programs at various levels of administration have been unable to trickle down- as envisaged, the basic human right to adequate sanitation for those at the lower rung of socio-economic ladder.

In the next section of the paper, a few of the hotspots of depravity- six jhuggi jhopri clusters, have been studied in detail and documented for their official and unofficial stories.

4 Narratives of Sanitation Deprivation in NCT of Delhi

With 48 per cent of households defecating in open being those of urban poor, sanitation deprivation and open defecation continues to be intermixed with poverty. Several initiatives have been undertaken by welfare state to provide basic minimum facilities of sanitation and water supply to these deprived pockets, but envisaged benefits are yet to trickle down. The section captures ground realities of six jhuggi jhompri clusters of Delhi. Official and unofficial stories are discussed in brief to highlight sanitation deprivation as an indicator of poverty which manifests spatially.

The six clusters have not been selected at random and do not come with any bias to the author or the project. A technical methodology supports selection of the clusters. Wards 68, 63 and 154 were first identified as the wards with highest, lowest and average slum households, respectively (Figure 3). After selection of wards, information system of the Delhi Urban Shelter Improvement Board was referred to identify specific jhuggi jhompri clusters in each of these three wards, which would have highest, lowest and average slum households. That is, stratification was done at two level- first, city level to identify a ward; and second,

ward level to identify specific cluster. Eventually, only one cluster could be identified in ward 63, three in ward 68 and two in ward 154.

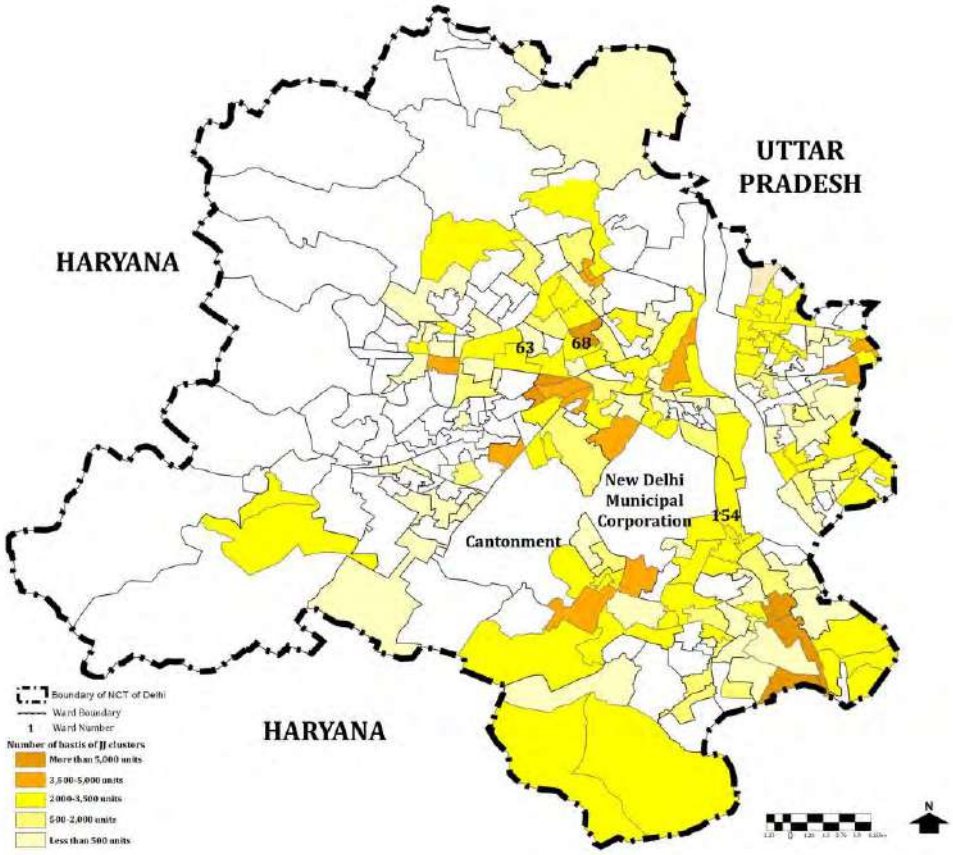


Figure 3: Ward wise distribution of JJ clusters across NCT of Delhi, 2018
Extracted from DUSIB data (2019)

4.1. JJ Cluster, near Kohat Enclave, Pitampura

Jhuggi jhompri cluster in Ward-63 near Kohat Enclave, Pitampura, is a 40-year-old settlement of 50 households squatting on 668 square meters of DDA-owned land which was originally planned as a green space for the elite of Kohat enclave. An island of informal housing, surrounded by luxurious bungalows (Figure 4A) and flats, it is inhabited by migrants from villages in and around Bandhikui town of Rajasthan state in northwest India, which came to the city in search of employment and soon became daily wage construction workers for the upcoming Rohini and Pitampura neighbourhoods in the 1970-80s. Less than 500 meters from the nearest metro station and outer ring road, the cluster enjoys benefits of public mode of transport for travelling beyond the neighbourhood, as construction work in the area has reached a plateau.

One look at the settlement and anyone would presume that it is one of those clean and sanitary clusters which has been blessed by its local political representative (councillor) with

all the basic amenities any human requires for a healthy living except affordable housing (Figure 4B). But a walk through the cluster and conversations with its dwellers reveals a different picture.

Figure 4 (from left to right): A. JJ cluster- an island of deprived surrounded by the elite; B. informal housing units on either sides of drain
Picture credits: Author

The cluster is devoid of any form of latrine facility, or drainage but has one stand post to supply water an hour or two every day. Accepting perpetual denial by civic authorities, the community has adapted itself, constructing a drain which bisects the cluster into two halves (Figure 4B). But for relieving themselves, there is not much the community has been able to do, despite political attempts in the past to construct pucca toilet for the cluster. The Pradhan/community leader of the community recounts promises of a ward councillor prior to 2009 to construct toilet which were quashed by the elite, and instead surface of cluster was covered with concrete and a stand post was erected to silence the demand for human right. A year or two later, the Public Works Department started with construction of a small toilet, but the effort was stalled and ultimately demolished by the kothiwalas[3]. As a result, people go behind their houses to defecate (Figure 5).

[3] A term given for people who live in bungalows (or 'kothi' in Hindi language)

Figure 5: Site for open defecation within the JJ cluster
Picture credits: Author

Dismantling common misconception amongst non-deprived, urban narrative of the cluster revealed that it is not true the community is unaware of the implications of open defecation. They do. They are well aware of the issue it brings to them during monsoons, particularly on their health and productivity. Yet, they have no option, but to pee and defecate in their backyard. In an interview with the executive engineer of the DUSIB for the north-west zone, the unofficial story of past efforts to provide toilet to the community was reiterated. He also highlighted the conflict between the rich and poor as the main reason for uncertainty of proposals by the authority, with the recent one being a bio-digester toilet.

Sanitation being a human right is denied to the community by power and influence of the rich. The latter fails to comprehend that open defecation may be a lived experience for the poor, but its implications are not confined to the cluster. Efforts are being made by respective public agencies, but uncertainty of their implementation hovers.

4.2. Madrasi Camp, Jal Vihar

Madrasi Camp is a jhuggi jhompri cluster located in Ward-154, on a piece of land owned by the Indian railways, for over 30 years now. Surrounded by Barapullah drain in the north and railway line in the east, the community of 411 households uses the two open spaces- drain and railway line, for defecation (Figure 6).

Figure 6: Women travelling back to the cluster, having traversed railway line to find an open yet hidden from the surroundings, a site to relieve
Picture credits: Author

The cluster derives its name from the Madras regional language spoken by its community which has migrated from different parts of Tamil Nadu to settle in the area in 1982, as per the Railways' records. With close-knit work-home relationships with the surrounding

neighbourhood, the cluster continues to expand, despite eviction notices issued in 2007 and 2010. Falling under the jurisdiction of South Delhi Municipal Corporation, it is provided hand pumps as well as open drainage channels on either side of the approach road to the settlement. But it is deprived of a toilet facility.

The camp being situated on central land requires DUSIB, an agency of state government, to negotiate and sign a memorandum of agreement with the Indian Railways before constructing any facility. The Centre however, continues to negate such efforts, in the name of discouraging further growth of the cluster. The unofficial story elaborated by Magesh, the community leader highlights similar efforts by the Municipal Corporation of Delhi in early 2000s, whereby a tender was passed for construction of community toilet and given to a private contractor, but the construction never took place. As a result, the entire community relieves itself in the open, either along railway tracks or along the drain. When it gets crowded during peak hours, men travel down to the drain to defecate while women and children relieve in closer proximities of home.

The dangers of defecating along the two available open spaces is well known amongst the community. Magesh and his wife mourn the loss of few children of the community on the tracks while several have lost a limb. The community unanimously demands for a safe and adequate site for relieving themselves. But it seems the demand will persist as a dream for the community amidst land conflicts.

4.3. JJ Cluster near DPS Mathura road

Another cluster located within ward-154, is a squatter of 212 households' on DDA owned land. This Muslim dominated settlement is built along the famous Sunder Nursery, and its inhabitants earning livelihood from scrap dealing.

Dialogue with the community reveals that the local name of the cluster is Amir Khusro Basti and it fell under the constituency of the former Vice President of India. They praise the dignitary for providing them with clean and separate toilets and bathing units for men and women, much before the Swachh Bharat Abhiyaan came into being. The installation work in 2013-14 provides the community with well-maintained and adequate number of toilets, as per the DUSIB norm of 1 water closet for every 10 households- which is an effort initiated by political influence and implemented by South Delhi Municipal Corporation in partnership with a private contractor.

This cluster and recent initiatives to provide quality infrastructure sets an example for others to follow. It demonstrates that political impetus and power when associated with a cause, be it as dirty as that of shit, it does get responded to.

4.4. JJ Cluster, Prem Bari Bridge along railway line, Wazirpur Industrial Area

Jhuggi Jhopri at Prem Bari Bridge is one of the largest clusters of Delhi. Located linearly along the railway line near Prem Bari Bridge, the cluster comprises of 3,799 households, and lies next to the proposed master plan green across the railway line, and Wazirpur Industrial area on the other side. Majority of community is working as wage labour in various industries within the area, while a few works as domestic workers, drivers, sanitation workers in the surrounding residential neighbourhood.

In 1990s the cluster was issued an eviction notice under the large-scale clearance drive of slums on public land, particularly the Indian Railways' land. The cluster became a focal point

for hunger strike by the then President of India, Mr. VP Singh, following which evictions were deferred and the slum was notified. With legal notification, it got included in the list of slums that were provided community toilet complexes, despite conflicts between land owning agency and providing agency.

At present, the 3,799 households are provided with one community toilet complex consisting of 30 water closets for both men and women, which equates to one water closet for every 126 households (~567 persons). Moreover, the facility is located at a tail end of the linear cluster and is ill-maintained. The doors to toilets are unstable, many do not have any door. As a result, 18 out of 20 persons using the facility are still defecating in the open- at least once a day, either along the railway track or in the proposed master plan green. For many, relieving within the facility is no different than defecating in open (Figure 7).

Figure 7: (Open) defecation in closed premise
Picture credits: Author

Due to its location at a tail end of the cluster, accessibility for women is a serious issue. One out of every five women does not feel safe to travel over 700 meters from their home to the facility. For select users, facility's design ensures a biased access to males and discouraged use for children and females. In a recent initiative by the DUSIB, a double storied toilet complex has been proposed near the existing facility, but the proposal is yet to receive a nod from the Indian Railways. Though the proposed facility promises reduced stress on existing facility, but issues of open defecation and biased access will continue for its location near already existing facility.

4.5. JJ Cluster on DDA Park, Chander Shekhar Azad Colony, Wazirpur Industrial Area

JJ cluster on DDA Park- Chander Shekhar Azad colony is situated amidst warehousing units of Wazirpur industrial area (Figure 8). This 35-year-old settlement of 775 households is situated on 0.8 hectares of DDA-owned land, but is devoid of a sanitation facility.

The cluster has come up on a proposed park locked on all sides by warehouses, leaving no space for construction of a toilet complex that could fulfill need of the community. But 300 meters away from the settlement, an ill-maintained (Figure 8) and overused community toilet complex was constructed as part of MCD-Sulabh collaboration in 2003-05.

Figure 8: Ill maintained facilities with sewage deposited outside the facility
Picture credits: Author

The complex consists of 30 closets for both men and women, which equates to 1 water closet for 26 households. During daytime, community uses the facility, while at night they prefer safety over hygiene and relieve themselves in proximity to home.

4.6. JJ Cluster at B-46, Wazirpur Industrial Area

The cluster at B-46 Wazirpur Industrial Area is a small pocket of 21 households squatting on 443 square meters of DDA-owned land. The community hails from a small village of Rajasthan, and is engaged as either sanitary workers or daily wage workers within the industrial area. The basti located amidst warehousing and storage units is devoid of space to construct a permanent structure and does not have access to any complex within 500 meters distance. Therefore, it has been provided with a mobile toilet unit consisting of 7 water closets for both men and women (Figure 9).

Figure 9: Ill maintained facility with sewage deposited flowing the facility in a space which is not distinct from recreational space for the children of the cluster
Picture credits: Author

The facility is not maintained and whatever waste is generated it is directly dumped into the open drain channel flowing behind the unit. This open space where toilet unit is located and drains flow carrying human waste, coincides with play area for children (Figure 9). The slum is practically living, working and playing in waste.

5 Conclusion and a way forward

The paper concludes with identification of the root cause of sanitation deprivation, which finds basis in the limited scope of urban sanitation policies. These policies- planning and sectoral, perpetuate sanitation deprivation which has a physical manifestation, and unjust

implications on urban poor. For the national capital too, open defecation is a mundane routine for the poor. The extent varies, but the deprivation is common.

It is also evident that Indian planners takes an elitist and modernist view of sanitation, excluding any discussion on open defecation in master plans – the primary policy instrument for tackling city sanitation. Addressing multitude of challenges that emerge or are linked to sanitation deprivation and open defecation in India, the task at hand is uphill, and a radical change in the current approach is thus required for realising the dream of open defecation free cities.

First and foremost, a **new framework** of examination, developing solutions and interventions, and monitoring, needs adoption. This framework is composed of eight parameters of adequacy, accessibility, affordability, finance, coverage, efficiency, quality of service and environmental sustainability (indicated in Figure 10). This framework of parameters has been based on the established fact that: one, sanitation deprivation is more than just provision of toilets; or calculation-based augmentation of sewerage; and third, data often hides more than it tells. Thus, to capture the real extent of sanitation deprivation, the framework comprises of 8 parameters based on service level benchmarks conceptualized by the Ministry of Urban Development and the Performance Measurement Framework for Urban Water and Sanitation (CEPT University, 2010) as well as the shortcomings identified from examination of policies for the project.

Parameter	Sub-Parameter	Indicator/ Benchmark	Explanation
ADEQUACY	Coverage of toilets	100%	• Sanitation is associated with universal service obligation (USO). It is a human right which needs to be provided to all socio-economic groups of society
	Water supply to facility	30-45 lpcd	• Adequate amount of water is needed for flushing out night soil, to ensure its use
	Adequacy of sewage treatment capacity	100%	• Treatment capacity available shall match with the amount of wastewater generated
ACCESSIBILITY	Location of facility	Walking distance to suit all users	• In case toilets are not available within premises, they shall be located within suitable walking distance from household. Locating toilets in secluded and distant sites, increases people's preference to defecate in nearby open area
	Bias in access	• Gender sensitive • Differently abled sensitive • Child friendly	• All members of community, irrespective of their gender, age or disability shall be able to access the provided facility
	Legality	• Notified slums • Non-notified slums	• Being associated with USO, (il)legality cannot be a criterion for depriving people of their right. DUSIB is mandated to submit an undertaking, in which it is to be highlighted that the structure will exist only till the date of existence of JJ cluster
AFFORDABILITY	Percentage of income spent on sanitation facility	• Free, else not imposing financial burden on household	• Being a human rights, one should not be charged to be able to access it • If facilities cannot be free of cost, then household expenditure to avail the facility should not impose an economic burden
FINANCE	Cost of Construction	100% borne by public agency	• The amount of money spent on construction and maintenance of city level sanitation infrastructure is to be borne by concerned public agency as provision of sanitation infrastructure is their mandate • The amount of money spent on construction and maintenance of toilets and wastewater collection network will be borne by state government
	Cost of Maintenance		
COVERAGE	Coverage of sewerage network services	100%	Denotes the extent to which the underground sewage (or sewerage collection) network has reached out to individual properties across the service area
EFFICIENCY	Efficiency of sewage collection	100%	Amount of wastewater collected shall be equal to amount of generation
	Efficiency of sewage treatment	100%	Amount of wastewater collected shall be equal to amount of wastewater treated
	Efficiency in redressal of complaints from users	100%	Percentage of sewage-related complaints redressed within 24 hours of receipt of complaints in the given time period
QUALITY OF SERVICE	Maintenance of existing facility	Periodical Repairs and maintenance	Once a facility is provided, it requires timely repairs and maintenance works to ensure continuing usage of facility
ENVIRONMENTAL SUSTAINABILITY	Extent of reuse and recycling of sewage water	20%	The percentage of wastewater received at the treatment plant that is recycled or reused after appropriate treatment for various purposes

Applicability of sub-parameters
- At city level
- At community level
- At city and community level

Figure 10: Framework for assessment of sanitation deprivation
Developed by Author (2016)

Within this framework the parameter of adequacy looks beyond the provision of toilets, and includes adequacy in terms of water supply to flush out the waste and adequacy of treatment capacity, to dispose-off the waste safely. Second, accessibility of sanitation facilities examines not only the physical accessibility but also social and legal accessibility. Affordability and financial parameters insinuate sanitation as a human right to be provided

to all by the state. The parameter of coverage looks into the spatial extent of sewerage network while efficiency is assessed in terms of collection of sewage, its treatment and disposal as well as efficiency of redressal system towards user complaints. To ensure that the structure provided by public, private or a partnership of the two is actually put to use, maintaining the quality of service is crucial. This maintenance has to be conducted at periodic intervals with accountability to its users. Lastly, environmental sustainability examines extent and emphasis on reuse and recycling of sewage water.

Testing the framework for the identified clusters, it is evident that one theme that binds all these episodes- sanitation deprivation is a routine for Delhi's poor, with variable extent. Four of the six clusters have access to some form of sanitation facilities, but still inadequate numbers and inadequate supply of water to flush out the waste renders the infrastructure useless after a period of time. Moreover, open defecation is a common practice even amongst those who are using the facilities, either due to inadequate number of closets or ill-maintained units. Also, the access to these facilities is biased. Due to space constraint or conflicts between land owning agency and Delhi Urban Shelter Improvement Board, facilities get located at such sites that not all segments of communities are able to access it. Mostly, women travel in groups to use them. Also, affordability, along with quality of service and efficiency of collection and treatment, is often not addressed in these clusters.

Sanitation deprivation is a public health concern as well as violation of human right that has long term implications on productivity of nation. In light of political impetus being given to sanitation deprivation and open defecation under the Swachh Bharat Mission, the way forward requires **realignment of existing urban sanitation policies**, **revision of planning norms** to make them more inclusive and responsive to issues of spatial inequities, supported by strong **implementation and regulatory mechanisms**.

As planners we need to rework our modus operandi and deviate from mere augmentation of sewerage network. Despite implementation of the three master plans, issues of inequitable spatial distribution of sanitation infrastructure, biased access and inadequate maintenance, still plague the general public. As a step forward, we need to **identify open defecation as a challenge to urban development** in our statutory plans and highlight the extent of depravity. Third, we need to **discard the blueprint approach** emphasizing on modern sewerage. That is, planning like the administration needs to get decentralized. Low cost area-based solutions need to be adopted for sanitation deprived pockets of the city. These efforts can either be taken by the authority itself or in collaboration with land owning agencies or NGOs or other such parties motivated by societal good.

Lastly, as planners we need to **re-look at our calculation-based augmentation plans** and work towards a judicious use of land. The current calculations need to be modified. Instead of augmenting the treatment capacity based on existing demand supply gap, a planner needs to look into the fraction of households having access to water supply and those having access to piped sewers. After all, only the wastewater collected through sewers will be treated, so why waste money and land on creation and maintenance of infrastructure that would never be utilized to its built capacity. Ultimately, planning is practiced for the people. The idea is to account for official as well as unofficial stories through urban narratives and cater to one and all.

In the end, to eradicate open defecation from a society whose foundation is still influenced by Manu Smriti, and decades of social, physical segregation and accompanied psychological

differentiation brought upon with the Sanitary Revolution in mid-19th century, sanitary foundations need to be dug deep and a radical change in the current approach is required- ensuring no one and no place is left behind, through more equitable and environmentally sustainable interventions and innovations.

6 References

Baviskar, A., 2003. Between violence and desire: space,power, and identity in the making of metropolitan Delhi. *International Social Science Journal,* pp. 89-98.

Castro, J. E. & Heller, L., 2012. *Water and Sanitation Services: Public Policy and Management.* London: Routledge.

Central Pollution Control Board, 2010. *Status of water supply, wastewater generation and treatment in Class-I and Class-II towns of India.* New Delhi: Central Pollution Control Board.

CEPT University, 2010. *Performance Measurement Framework for Urban Water and Sanitation- Volume 1: Approach and Framework,* Ahemadabad: CEPT University.

Chaplin, S. E., 1999. Cities, sewers and poverty: India's politics of sanitation. *Environment and Urbanisation,* 11(1), pp. 145-158.

Chaplin, S. E., 2011. Indian cities, sanitation and the state: Te politics of the failure to provide. *Environment and Urbanisation,* 23(1), pp. 57-70.

Chaplin, S. E., 2011. *The politics of Sanitation in India: Cities, services and the state.* New Delhi: Orient BlackSwan.

Cosgrove, J. J., 2010. *History of Sanitation.* Charleston: Nabu Press.

Dasra, 2014. *Squatting Rights- Access to Toilets in Urban India ,* Mumbai: Forbes Marshall.

Davis, M., 2006. *Planet of Slums.* New York: Verso.

Deb, K., 2004. *Reforms in Drinking water and Sanitation.* New Delhi: TERI Press.

De, J., 2007. Development, Environment and Urban health in India. *Geography,* 92(2), pp. 158-160.

Delhi Development Authority, 1982. *Master Plan of Delhi-1962,* New Delhi: Akalank Publications.

Delhi Development Authority, 1990. *Master Plan of Delhi-2001,* New Delhi: Delhi Development Authority.

Delhi Development Authority, 2010. *Master Plan of Delhi-2021,* New Delhi: Delhi Development Authority.

Doniger, W., 1992. *The laws of Manu.* London: Penguin books.

Dupont, V. et al., 2014. *Megacity Slums- Social exclusion, space and urban policies in Brazil and India.* London: Imperial College Press.

George, B., 2009. Sanitation Programme: A glass half-full. *Economic and Political Weekly,* 44(8), pp. 65-67.

Government of India , 1991. *Census of India - 1991,* New Delhi: The Office of the Registrar General & Census Commissioner.

Government of India , 2008. *National Urban Sanitation Policy,* New Delhi: Government of India .

Government of India , 2014. *Swacch Bharat Abhiyaan,* New Delhi: Ministry of Urban Development.

Government of India, 1951. *First Five Year Plan, 1951-56,* New Delhi: Planning Commission, Government of India.

Government of India, 1956. *Slums Areas (Improvement and Clearance) Act, 1956,* New Delhi : Ministry of Law and Justice.

Government of India, 1984. *Seventh Five Year Plan,* New Delhi: Planning Commission.

Government of India, 2008. *Integrated Low Cost Sanitation Scheme- Revised guidelines, 2008,* New Delhi : Ministry of Housing and Urban Poverty Alleviation.

Government of India, 2008. *Service Level Benchmarking Databook: Improving Service outcomes,* New Delhi: Ministry of Urban Development.

Government of India, 2010. *National Rating and Award scheme for Sanitation for Indian cities,* New Delhi: Ministy of Urban Development.

Government of India, 2010. *Rating of Cities- towards city wide sanitation,* New Delhi: Ministy of Urban Development.

Government of India, 2011. *Census of India 2011- NCT of Delhi: Houses and Household Amenities and Assets (Latrine Facility),* New Delhi: Office of the Registrar General and Census Commissioner.

Government of India, 2011. *Instruction manual for houselisting and housing census,* New Delhi: Office of the Registrar General and Census Commissioner.

Government of India, 2011. *Primary Census Abstract for Slum,* New Delhi: The Office of the Registrar General & Census Commissioner.

Government of India, 2011. *Twelvth FIve year Plan (2012-17),* New Delhi: Oxford University Press.

Government of India, 2013. *Rajiv Awas Yojana: Guidelines for Slum free city Planning,* New Delhi : Ministry of Housing and Urban Poverty Alleviation.

Government of India, 2013. *The Prohibition of employment as manual scavengers and their rehabiitation Act, 2013,* New Delhi: Ministry of Law and Justice.

Government of India, 2014. *Urban and Regional Development Plan Formulation and Implementation (URDPFI) guidelines,* New Delhi: Ministry of Urban Development.

Government of NCT of Delhi, 1957. *Delhi Municipal Corporation Act,* New Delhi: Delhi Gazette.

Government of NCT of Delhi, 2010. *Delhi Urban Shelter Improvement Board Act, 2010,* New Delhi: Delhi Gazette, Department of Urban Development.

Hawkins, P., Blackett, I. & Heymans, C., 2013. *Poor Inclusive Urban Sanitation: An Overview ,* Washington D.C: The World Bank Institute.

Hopkins, E. W. & Burnell, A. C., 2009. *The Ordinances of Manu (1884).* Montana: Kessinger Publishing.

Joshi, D., 2010. *Sanitation for the urban poor: Whose choice, theirs or ours?.* [Online] Available at: http://r4d.dfid.gov.uk/PDF/outputs/Water/R8028-FTR.pdf [Accessed 24 December 2014].

Kundu, A., 1993. Urbanisation and Alternate Policy Perspectives. *Economic and Political Weekly,* Vol. 28(No. 26), pp. pp. 1351-1352.

Kundu, A., 2009. Exclusionary Urbanisation in Asia: A Macro Overview. *Economic and Political Weekly,* Vol. 44(No. 48), pp. pp. 48-58.

Mawdsley, E., Mehra, D. & Beazley, K., 2009. Nature Lovers, Picnickers and Bourgeois Environmentalism. *Economic and Political Weekly,* Volume Vol. 44, No. 11, pp. 49-59.

Mushtaq, M. U., 2009. Public Health in British India: A brief account of the history of medical services and disease prevention in colonial India. *Indian Journal of Community Medicine,* pp. 6-14.

Ramachandran, S. K., 2012. Sanitation, hygiene services almost nil in India. *The Hindu*, 28 July.

Saini, S., 2012. Necessity of community participation in the process of Resettlement to improve WATSAN facilities : A study of Indian urban poor women of Madanpur Khadar. *International Journal of Research in Social Sciences,* Vol. 2(No. 2), pp. 292-302.

Sandel, M. J., 2009. *Justice- What's the right thing to do?.* London: Penguin Books.

Satterthwaite, D., 2003. *Water and Sanitation: Environment and Urbanisation.* London: International Institute for Environment and Development.

Sengupta, S., 2014. New plan, Old problem. *Down to Earth*, 30 November.

Sen, J., 2013. *Sustainable Urban Planning.* New Delhi: The Energy and Research Institute (TERI).

Shah, G., 1997. Bureaucracy and Urban Improvement: Can it be made to last? Post Planning Scenario in Surat. *Economic and Political Weekly,* 32(12), pp. 607-613.

Singh, B. P. & Varma, P. K., 2001. *The Millenium book on New Delhi.* First ed. New Delhi: Oxford University Press.

Singh, S., 2013. *Education and Sanitation : Social problems plaguing emerging India- A sociological analysis.* Germany: LAP Lambert Academic Publishing.

UNICEF, WHO, 2014. *Progress on drinking water and sanitation,* Geneva : World Health Organisation.

United Nations , 2003. *Water and Sanitation in the world's cities: Local action for global goals,* London: Earthscan Publications Ltd. .

Wadhwa, S., 1997. Delhi needs a royal broom. *The Outlook India*, 27 October.

WAPCOS & AECOM, 2014. *Sewerage Master Plan for Delhi-2031,* New Delhi: Delhi Jal Board, Government of NCT of Delhi.

WaterAid, 2008. *Tackling the Silent Killer: Case for sanitation,* London: WaterAid.

World Bank, 2006. *World Development Report: Equity and Development,* Washington D.C. : Oxford University Press.

World Health Organisation , n.d. *Health Topics.* [Online]
Available at: http://www.who.int/topics/sanitation/en/
[Accessed 02 January 2019].

Zimmer, A., 2012. Enumerating the semi-visible : The politics of regularising Delhi's unauthorised colonies. *Economic and Political Weekly,* XLVII(30), pp. 89-97.

[i] Sulabh International is an India-based social service organization that works to promote human rights, environmental sanitation, non-conventional sources of energy, waste management and social reforms through education.

Research Paper

Place-making in Indonesian Kampung: A Case Study of Bustaman, Semarang

Creating Urban Spaces that Enhance Local Empowerment

Poeti Nazura Gulfira AKBAR, Erasmus University Rotterdam; The Netherlands
Jurian EDELENBOS, Erasmus University Rotterdam; The Netherlands

Abstract

For almost a decade, there has been a grassroots movement in the country that adopts place-making in kampungs (Indonesian urban informal settlements) through cultural and contemporary art festivals. The common issues that have been faced by almost every kampung are to maintain their existence in the city where they tend to be excluded, marginalized, and demolished. Place-making has been held with the hopes of improving the aesthetic appeal of the kampungs, creating new opportunities for the residents to develop creative output relevant to their neighborhood and communities' specialties, and strengthening the local identity to protect kampungs from the demolishment threat (Kustiawan et al. 2015; Lieshout 2014; Prasetyo and Iverson 2013). Although many pieces of research from a different part of the world have shown that "temporal" place-making through cultural and art festivals provides many social benefits to the individual and their communities, it seems to be unclear from the global South context. Consequently, uncertainties exist whether place-making brings positive impacts on social aspects of residents in the context of developing countries, particularly those who live in problematic areas such as urban informal settlement dwellers. It is indeed an area that has been little explored in the place-making literature (Lew 2017). Therefore, this study will contribute to understanding the implications of place-making towards the public life of informal settlers, particularly in Indonesia. The main purpose of this study was to examine the impacts of place-making on the local capacity in Indonesian kampung. The research was carried out using a sequential mixed-methods in Bustaman, Semarang. Results from multiple regression analysis showed that place-making through regular "everyday life" and temporal "festivals" have significantly influenced local empowerment. While the qualitative findings further explained that place-making can promote local empowerment by encouraging youth's participation, increasing the organizational and mobilizational capacity of the local community, providing knowledge exchange, and broadening local community's perspectives about their place and community. This study also demonstrated that different types of place-making bring a different kind of impact towards particular socio-economic groups. Therefore, to achieve a better quality of place-making, the enhancement of relational resources between different age group is necessary. Finally, these findings raise important questions and suggestions for incorporating place-making into neighborhood planning efforts.

Keywords

Place-making, kampung, urban informal settlements, empowerment, mixed-methods

1. Introduction

The rationale for developed countries to introduce various arrangements of place-making from a neighborhood to a city level is multifold. It was said by previous researchers who investigated place-making in developed countries that place-making can promote local empowerment by increasing capacity of local community (Douglas 2016; Goldstein 2016; Main and Sandoval 2014), providing knowledge exchange between stakeholders (Rios and Watkins 2015; Dukanovic and Zivkovic 2015), broadening local community's perspectives about their city and communities (Houghton et al. 2015). Several authors observed that place-making also helps fostering social connection in communities, which is found explicitly in the form of strengthening network between different social groups (Ho and Douglas 2008; Peng 2013; Rota and Salone 2014), break down cultural barriers (Sandoval and Maldonado 2012), and create new friendship between local communities (Piribeck and Pottenger 2014). In addition, place-making can contribute to the improvement of quality of life, such as building positive image to place (Andres 2013; Chan 2011b; Knight 2010; Lombard 2014), increasing safety (Lazarevic 2006; Teernstra and Pinkster 2016a), liveability (Cilliers et al. 2015; Semenza 2003), and well-being (Foo, Martin, et al. 2015) while other researchers found that place-making is an essential factor to reinforce the identity of both place and its inhabitants. For instance, enhancement of individual and communal confidence towards their cultural identity (Rota and Salone 2014), higher sensitivity to place histories (Ho and Douglass 2008; Lazarevic et al. 2015), and cultural regeneration (Andres 2012; Chan 2011).

Similar to other cities in the developed world, the use of place-making as a tool to redevelop and reimage areas, particularly that are perceived as problematic, has become increasingly popular in Indonesia. For almost a decade, there has been a grassroots movement in the country that adopts place-making for kampungs. The terms 'kampung' is equivalent to an urban village, which refers to an informal settlement area that exists in a city and mostly associated with the slum. Kampung is the smallest administrative unit in the urban area that can be classified as a neighborhood unit. The common issues that have been faced by almost every kampung are to maintain their existence in the city where they tend to be excluded, marginalized, and demolished. Therefore, place-making through art and creative festivals has been held with the hopes of improving the aesthetic appeal of the kampungs, creating new opportunities for the residents to develop creative output relevant to their neighborhood and communities' existing assets, and strengthening the local identity to protect kampungs from the demolishment threat (Kustiawan et al. 2015; Lieshout 2014; Prasetyo and Iverson 2013).

It is still unclear, however, whether temporal place-making through art and cultural festivals have made any real contribution to these aspects. While there is a growing concern about the use of art and cultural festivals in Indonesian kampung, many of them paid much more attention to explain the festivals using perspective of cultural tourism (e.g. Podlaszewska 2017; Puspitosari 2015; Silver et al. 2017; Susetyo 2015), physical and spatial outcomes (e.g. Hutama 2016; Nasution 2015; Roychansyah 2014; Safira 2012; Surya, 2008), and stakeholder interrelations (e.g. Ekomadyo et al. 2013; Rahmany and Djajadiningrat 2014). The investigations of art and cultural festivals in kampung within the place-making context using residents perspective is indeed understudied. Meanwhile, regardless of a wide arrange of research from a different part of the world have shown that place-making provides many social benefits to the individual and their communities, the benefits of place-making have been less evident within the global South context. Most of the researches on place-making conceptualizations and applications have been done in the western cultures and developed countries, mainly from North America, Europe, and Australia. An example is given from a current literature study about methodologies for quantifying the value of place-

making in which Cohen et al. (2018) explicitly stated that the study was limited to the developed countries. Given that socioeconomic, physical, and institutional contexts in those groups are distinctly different from the former ones, their outcomes might also differ. This argument is supported by Lew (2017, p.461): "The world-making context (cultural dynamics, political economy, and social values) of Asia, Africa, and South America, especially at the regional and local scales, can be quite different from those of the West, resulting in different community challenges, needs, and solutions".

Consequently, uncertainties exist whether place-making brings positive impacts on social aspects of residents in the context of developing countries, particularly those who live in problematic areas such as urban informal settlement dwellers. Therefore, an investigation on social outcomes of place-making towards residents in Indonesian kampung will contribute to understanding the implications of place-making. The main purpose of the study is to understand the effects of place-making through regular and temporal practices on local empowerment of residents in Indonesia urban informal settlements. The following research question is addressed to guide the study: *To what extent place-making influences social aspect of kampung residents?*

With three sub questions:

a. *How is the relationship between regular and temporal place-making towards local empowerment?*
b. *How do the relationships come about in the two kampung cases?*
c. *To what extent the socio-economic aspect of kampung residents influence the relationship between place-making and local empowerment?*

2. Literature Review

This section will present literature review on place-making as a social process, classification of regular and temporal place-making, and its impact on local empowerment.

2.1. Place-making as a Social Process

A large and growing body of literature has investigated the concept of 'place-making', and yet, the notion and definition of place-making within discourses reviewed appear nebulous and contested. It ranges from a stable definition of place, as is the case of a 'locale' or physical settings of social activity, to one that encompasses the dynamic human and non-human agents influencing site character (insert references). To frame this study on a clear definition, the latter perspective on place-making is taken into consideration.

The concept views that urban places are embedded in the built environment and come into being through 'reiterative social practices' (Cresswell 2004). Many earlier authors has described place-making as an on-going process of enhancing the quality of places through creation and transformation, which are in these cases, refer to build environment and physical area in various scales from public places, urban open space, neighbourhood, town, city, to region (Benson and Jackson 2013; Brunnberg and Frigo 2012; Buser et al. 2013; Douglas 2016; Elwood, Lawson, and Nowak 2015; Lombard 2014; Quayle and Driessen Van Der Lieck 1997). Franz et al. (2008, 316) defined place-making as "collective appropriation of the own environment by the residents that has the potential to create new 'places' of identification for the local residents". Therefore, remaking a public place is a social activity of involved people (Arefi 2014; Lombard 2014). Many claims that the right to make space is not designated to expert and professionals, but also a right to residents and other stakeholders (Lepofsky and Fraser 2003). Friedmann (2010, 159) for example claims that "making places is everyone's job." Individuals make spaces, and these are socially negotiated, constantly

changing and contingent (Pierce et al. 2010). Lepofsky and Fraser (2003, 132-133) argue with their concept of 'flexible citizenship' that place-making is not only for professionals and neighborhood residents, but must be open for 'external' stakeholder groups that have a decision-making role even though they are not residents of the particular target neighborhood. In this case, place-making is viewed as a social process in which local activities construct place (Pierce et al. 2010; Silberberg 2013). While some authors called this approach as 'place-making as a process', it has also been known as 'bottom-up place-making' (Arefi 2014; Bendt et al. 2013), 'organic place-making' (Lew, 2017; Sofield et al. 2017), and 'community-led place-making' (Pierce et al. 2016; Silberberg, Lorah, et al. 2013). These authors, although using different terms, confirmed the capability to attain positive results from place-making that does not rely on targeted and advanced skills, but mainly on the full effectiveness of influential mutual relationship of places and their communities in generating those desirable results. To summarise, place-making is defined as an activity of integrating various actors, functions, means, and dimensions in order to transform urban places.

2.2. Classification of Regular and Temporal Place-making

In this study, regular place-making refers to some characteristics of place-making that is the collective 'mundane' activities of ordinary residents in their neighborhoods. In the literature where the characteristic was found, some scholars, either partly or wholly, drew upon 'everyday life' to explain place-making (Douglas 2016; Elwood et al. 2015; Friedmann 2010; Lombard 2014). Everyday life was defined as a process where places are claimed and shaped through everyday social practices. This concept of everyday life was acknowledged as the essence of 'lived space' by Lefebvre (1991, p. 362), identified as a representational space inhabited or used by people imposing their "private worlds upon the public realm." Drawing from his idea, more recent scholars of place-making have put forth the ideas of the 'lived place-making' which is defined as "those bottom-up processes by which people appropriate space for daily living through small, individual gestures, and social relationships that attach meaning to space" (Balassiano and Maldonado 2014, p. 647). While Lew (2017, p. 49) called it as 'place making', or "how a culture group imprints its values, perceptions, memories, and traditions on a landscape and gives meaning to geographic space." Together, these scholars emphasis on the ability of ordinary citizens or users to become involved in the formation of space.

In the literature, place-making is also characterized as 'temporary' to refer its uses of urban space (Andres 2012; Marshall and Bishop 2015; Silberberg et al. 2013). Besides 'temporary,' this characteristic of place-making is applied in different terms by other scholars. While Till and McArdle (2015) chose 'interim space' to consider short-term projects such as a pop up event in Dublin's park by an artistic collective, 'temporality' was adopted by Rota and Salone (2014) and Kern (2015) to categorize several formally organized activities by local neighborhood-level organizations, such as annual music festivals. These terms, albeit called differently, are principally the same in explaining the 'temporary' characteristic of place-making as place activations through occasional events at the neighborhood or block level. A number of authors also used 'temporary' to describe a specific approach of place-making which called 'tactical' (Douglas 2016; Lew 2017; Lydon et al. 2012; Wyckoff et al. 2015). This approach is described as "a bottom-up approach led by community groups looking to test, change, improve aspects of their locale and often using temporary, low-technology interventions" (Cohen et al. 2018, p. 13).

Some early authors also include the distinguishing characteristic between the place-making daily by residents and the place-making that is enabled by people or organizations who are not necessarily the residents but have the power to control a place. For instance, in their study about place-making in rural communities, Balassiano and Maldonado (2014) used

the dichotomy of 'lived' and 'facilitated' place-making to differentiate between everyday life activities by residents and place-making intervention by government. Another example was from Kern (2015) who differentiate the everyday life and temporality based on the time occurrence and involved actors. While everyday life place-making refers to daily activity by ordinary residents such as talking, smoking, playing cards, or drinking coffee while sitting in the corner of a parking lot in neighborhood; weekly farmers markets and music performances, occasional flea markets, one-off events, and annual summer festivals were grouped under 'temporal events'. By this, the temporal place-making, refers to place activations through occasional events, both small and large scale, in public spaces. His intention to divide the two was because he found that the latter one, which was more formally organized by local neighborhood-level organizations, had influenced the 'everyday life' of a particular group of residents.

Table 1. Regular and Temporal Place-making Characteristics

Characteristics	Regular	Temporal
Frequency	Daily, weekly, monthly, occasionally	Annual, biannual
Scale	Individual, group, community, block, neighborhood level	Neighborhood or block level
Facilitation	Mundane, everyday life	Facilitated
Involved actors	Local residents, including neighborhood organizations	Individual or local organizations other than residents
Nature of Activity	Promoting well-being, establishing infrastructure, caring for public spaces, promoting social cohesion, and empowering women	Promoting art and culture, social cohesion, recreational activities, and supporting young people

2.3. Place-making as a Tool to Enhance Local Empowerment

Local empowerment is defined as a process of change in which individuals or groups of local community, who initially has little or no control, have gained more power and capacity to intervene in particular things that affect their lives. This capacity can be in forms of solving problems, motivating and persuading other residents to involve, participate and work collectively for making and remaking their places. The indicators of local empowerment were mainly based on a study by Stewart (2010) about measuring community empowerment for place-making in forestry and Peng (2013) who used the same indicators to measure the effect of institutional capacity in place-making practices towards local sustainability.

As mentioned in the previous chapter, one of the basis of empowerment is local knowledge. Regarding this, De Carteret (2008) found that place-making through everyday life activities support residents in gaining informal knowledge as a result of their involvement in the activities and also from ordinary conversations they have with their neighbors. He also found that the character and purpose of the activity itself were the two main factors from the everyday activities that can be a bridge to facilitate an exchange of information and opportunity to learn by one another. The relationship between everyday life activities and empowerment were also investigated by Balassiano and Maldonado (2014). They argued that empowerment could be reached when people perceive themselves to have a high level of control towards their spaces. By this, they further stated that the degree to which people perceive they have 'control over spaces' can be determined by their contributions to the maintenance or improvement of these space and their participation in community activities or events.

Several studies discussed the value of place-making as a process, mainly the temporary, event-based, and tactical initiatives by grassroots and community-driven, that

brings positive benefits to community empowerment and engagement through deliberative discussion and collaboration (Cilliers et al. 2015; Silberberg et al. 2013). This argument was supported by Flanagan and Mitchell (2016), stating that the social networks formed through project participation also facilitated knowledge-sharing and peer-to-peer learning. One specific example by Dukanovic and Zivkovic (2015) underlined the importance of two temporal and experimental projects in central riverfront of Belgrade as vehicles for community participation. They found that the project not only brought positive changes in the physical aspect of the place but also offered a learning experience to the participants through active involvement during the project, from preparation to implementation. In this case, the participants were also given the opportunity to become tutors and project managers of the next event. As a result of the arrangement of temporal activities, the participants were able to gain knowledge and skills in interdisciplinary and collaborative work. This study concluded that enthusiasm for improvement of city spaces through temporal place-making was rooted in a synergy of the citizen, expert, and public sector.

3. Methodology

3.1. Area of Study

Data collection was done in an urban kampung in Indonesia, Bustaman, which is a high-density urban settlement located in Purwodinatan sub-district, Semarang City. It consisted 0.6 ha with a population density equal to 590 people per ha. The kampung consists of 2 RT, namely RT 04 and RT 05, where approximately 400 inhabitants live. Despite its limitation as city's slum area, it has high productivity level based on its goat-trading and culinary activity. It is popular with its Gulai Kambing or goat curry making, which has been a local tradition since the Dutch colonial period. Most residents rely on goat trading with various jobs, from butchers, goat merchant to catering that specializes in the goat curry. Besides the goat, Bustaman is well-known with its historical value. This kampung got its name from Kyai Bustam, a religious leader and a communicator between the Dutch government and the locals in the 18th century. He was also the great-grandfather of the most internationally known Indonesian painter, Raden Saleh Bustaman. The rich history and tradition makes this kampung become an important part of the history of Semarang, especially with the fact that the kampung was built at the time of Semarang formation.

3.2. Place-making Practices in Two Kampung Cases

Temporal place-making in Bustaman was started by Hysteria, a local organization who has involved in Bustaman since 2013. The organisation was officially formed in 2011 and focused on youth empowerment, art, and urban issues. Since then, Hysteria has coordinated with various grassroots communities, artists, and students in Semarang and surround. Their activities included discussions, exhibitions, workshops, festivals, and other type of community facilitation based activities. As a commitment to their main aim to contribute in solving city's issues, along with other communities including Rujak Centre for Urban Studies, Hysteria formed Peka Kota which means, literally translated, "sensitive city". The core program of the platform was to raise kampung issues at the city scale, including how to use everyday life knowledge of the dwellers to be considered by the government for making city's master plan. By then, they started the program in several Semarang kampungs, which one of the first was Bustaman.

3.3. Sampling, Data Collection, and Analysis

To answer the study research questions, mixed methods approach is used, specifically based on the sequential explanatory mixed method. This study begins with a quantitative strand

and then conduct a second qualitative strand to explain the results obtained from the quantitative data and analysis. It is also important to mention that the two approaches were connected when selecting the interview participants and developing the interview protocol based on the results from the questionnaire results from the first phase. In the last stage of the research, the results of the quantitative and qualitative phases were integrated during the discussion of the outcomes of the entire study.

Quantitative Phase

Since the type and number of place-making practices were implemented differently in a particular block (RT) of the kampung, there is a high possibility that the perception of residents would be different in each block, and therefore, the population of kampung does not comprise a homogenous group. Regarding this, a proportionate stratified random sampling was chosen since it involved a process of dividing the population into homogenous subgroups, which in this study, the participants were divided per RTs before doing the sampling. After the number of households in each block (RT) was selected, the next stage of the sampling process involved identifying the eligible households and household members to be surveyed. To randomly select households, the researcher acquired documents by the local RT leaders which contained a list of addresses in every RT in Bustaman. The document was then enumerated and organized in sequence. By using a computational method from www.randomizer.org, some random numbers were generated and used as a sample. It is also important to note that the survey respondent is limited only to residents who ever participated in at least one of the regular activities in the kampung and/or the art festival. That is to say, the survey respondents were either active, inactive, and former participants of regular and temporal place-making activity in Kampung Bustaman. Residents who never participate or attend regular and/or temporal place-making in kampung are not included in the sampling and were substituted instead. Regarding the sample size based on Yamane's formula, the 67 respondents were residing in Bustaman.

Qualitative Phase

To further understand and elaborate survey results, 15 in-depth interviews with purposefully selected residents of the selected kampungs were conducted using semi-structured interviews. The face-to-face interviews were done between August – September 2017 and were digitally recorded. For this phase, the interviewees were selected from those who responded and completed the survey in the quantitative phase. The participants, who consisted of residents with different level of participation in a different type of place-making practices, were asked to participate in having an interview on the given study subject. All semi-structured interview were transcribed, coded and analysed using the software of Atlas.ti. After all the important statements and words had been coded, the codes were grouped by similarity, and a theme was identified and documented based on each grouping.

4. Results

In this study, quantitative data and results provided a general picture of the research problem through unpacking the various constructs that link to two types of place-making and investigate them separately, measure the relationship between influential factors and social outcomes of place-making, and gather socioeconomic data of local residents. While the qualitative data and its analysis refined and explained those statistical results by exploring the participants' views in more depth and further explaining why certain relationships tested in the first phase were significant and why some were not significant.

Table below displays the results from the MLR analysis and indicating that among respondents from involved households that both of regular and temporal place-making had

positive relationships with local empowerment. They significantly influenced the empowerment, which were found significantly at F (5, 221) = 25.172, p = .000, with an R^2 of .363 (See Table 4.6). The score of partial correlation coefficient (β) implied that the temporal place-making (β = .530) affected empowerment more than regular place-making (β = .261). Meanwhile, the predictive equation suggesting that the respondents' empowerment increased by 0.363 and 0.179 for each point of the arrangement and participation in temporal place-making and regular place-making consecutively.

Table 2. Results of Multiple Regression Analysis

Independent variables	B	β	t-value	P	Tol.	VIF
Constant	*3.820*		*23.428*	*.000***		
Age	-.080	-.162	-2.922	.004**	.938	1.066
Temporal Place-making	.363	.530	6.712	.000***	.463	2.161
Regular Place-making	.179	.261	4.570	.000***	.882	1.134
Regression equation: Empowerment = 3.820 + .363 (Temporal Place-making) + .179 (Regular Place-making)						
R^2 = .363 F (5, 221) = 25.172 (P=.000) ***						

Taking into consideration the complex nature of Indonesian kampungs, particularly on the process of making and using public space, statistical relationships as outlined above seemed to not adequately capture this complexity, and thus, the following paragraphs go further to look at how these relationships between two types of place-making and local empowerment are shaped.

4.1 Impacts of Temporal Place-making on Local Empowerment

According to the quantitative findings, temporal place-making positively and significantly influenced local empowerment of residents in the kampung. In response to this, there were two positive views on temporal place-making recurred throughout the qualitative analysis, namely youth capacity and opportunities to transfer knowledge.

Many respondents commented that youth organizations in Bustaman have been more active ever since temporal place-making took place in the kampung. One respondent who is a leader of Ikatan Remaja Bustaman (IRB), or Bustaman Youth Organization, explained that the organization had been deactivated for eight years long until finally Hysteria came and persuaded the youth to revive IRB. Since then, not only IRB has been active, but also youth have played an active and vital role in Bustaman. Furthermore, the majority of participants demonstrated that temporal place-making provided participation opportunities in mainly three aspects: concept development, public relations, and operation. Most of the interviewees confirmed this positive impact of temporal place-making by saying that throughout the concept development and framing stage, it offers a knowledge exchange process between the residents and Hysteria. While the residents gained a clearer understanding of their kampung's issues, the local organization also obtained new knowledge about the kampung and the community. Some other interviewees made more point that now they can make things that they could not before participating. In the current event, some youth claimed that they made a booklet, flyer, some DIY decoration equipment, sponsorship proposals and invitations, all mainly by themselves. A few other youths also explained that the concept of the current event was developed mainly by the residents, while the local organizations only helped them for advisory. Lastly, the evaluation that was held by the local organization and residents after the festival was also a way of empowering. In this case, through sharing feedback and lessons learned from the festival, the residents learn how to make the better ones in the following year. All those interviewees stated that

the dominant role of youth in temporal place-making only happened currently. While in the previous events, Hysteria was the one who executes most of the festival preparation to the end of its implementation. From all the statement above, it indicates that there is an increased capacity among residents, particularly youth, to volunteer and participate in their communities.

The other opportunity to transfer knowledge is offered through open discussions with experts, academia, and city officials which were held as part of the festival and targeted for broader groups of residents. For instance, during the first festival in Bustaman, a former rector of the local university and a representative of local art institution were invited to talk about the importance of the kampung in historical context. In return, residents were offered chances to share their stories, opinions, and aspirations during the discussions. The other evident came from the Forum of 12 Art Activists Semarang Kampung which was started in 2017. On this meeting, there were twelve representatives from different kampungs including Bustaman, where the representative of each kampung explained their kampung's condition, both issues and potentials. Sometimes they also invited experts such as architect and urban planner. This kind of discussion can be an excellent opportunity for knowledge exchange between expert and locals. For the residents, not only it can lead to gaining more understanding towards their kampung's issues, but also benefitting knowledge of self-professed experts in a broader context such as demolishment issue in cities. As one interviewee of women neighbourhood organization put it, *"This discussion reminded me that Bustaman is just like other urban kampungs, like those demolished kampungs in Jakarta… if we do not have a strong foundation, we will get demolished too."* Another interviewee also stated that this kind of discussion was needed because it did not only make the residents more aware of their kampungs but also an excellent start to building strong communal identity and organizational foundation in the kampung. *"I hope this discussion will be continuous, and we can support each other and be the strong basis for the kampung which is not less powerful than private sectors"*.

Despite the formal preparation meetings, the core concept development process, which called as 'framing,' was started long way before and done through informal discussions. During the framing process, Hysteria helped the residents to elaborate their needs and unidentified issues in the kampung into coherent themes. For instance, there were some negative comments about the motorcycle parking spaces which scattered around in almost every narrow streets in the kampung; the unhealthy multi-functioned spaces that was used as slaughterhouse and gathering; and the most populous alley in the kampung, *Gedong Sepuloh*, which has about then houses with a combined population of 140 inhabitants. For people who obtain higher education or work in community services might easily see that the recurrent problems in the comments mentioned above from the residents were related to public spaces. However, that was not the case for kampung dwellers who have limited educational background and career field. In the beginning, before Hysteria gives them guidance and coherent framework, most of the residents were clueless in developing a comprehensive understanding of the issue they faced. As a member of Hysteria explained, *"Residents are aware of their problem because they have been facing it for a long time, but they don't know how to refine it*."

According to the quantitative findings, it was found that age is one of the controlled variables that has significantly and negatively influenced local empowerment of residents in the kampung. The interview findings, could only partly supported this relationship. Based on the analysis, temporal place-making was found to have a more positive impact on young people and young adult than any other age groups. One of the possible reasons is related to task divisions during temporal place-making, in which a more significant part of the tasks is given to youth. Many interviewees from both kampungs confirmed the dominant role of

youth, while there is minimum participation amongst kids, housewives, and elderly. Most of the youth, with some help of a male adult group, is mainly in charge of all the preparation stages including internal funding resource. For housewives group, however, was only responsible for catering services. Several respondents explained that these tasks divisions were not randomly appointed. Indeed, it was done through the willingness of each group to participate during the place-making. For instance, one respondent argued that she must take care of her little daughter because no one would watch the kid if she joined too. Commenting on this issue, another respondent said:

> *"The problem is that my husband doesn't work here, he works outside of the city, so I also need to work to support my family. But my son is active in the youth organization, so he almost always updates some news to me."*

This view was supported by youth participants explaining that it was a practical way of thinking for participant who already has a family to not participate in temporal place-making, given that the nature of the activity itself is energy and time consumption and not to mention dominated with contemporary art.

4.2 Impacts of Regular Place-making on Local Empowerment

Similar to the poor neighborhoods where their dwellers are struggling to make ends meet, making and remaking their place through spatial and physical interventions is essential for kampung residents. The corollary of this is that there are always improvements that can be made, especially on the basis of the necessity that refers to the residents' needs upon the presence of those spaces in their kampung. In Bustaman, regular place-making through physical activity is clearly seen through the development of various facilities and infrastructure, particularly in recent years. For instance, constructing adequate public sanitation, paving streets that during the rainy season creates big puddle everywhere, and creating community spaces that are more comfortable for regular meetings and daily gatherings.

Empowerment is also evident by the record that within eleven years (2006 – 2017), residents were able to mobilize themselves in handling ten important physical improvements around public spaces in the kampung with limited environmental and economic resources. Not to mention, from 2009 until 2017, the improvement was arranged every year by the community who was in charge of initiation to maintenance. It is not surprising therefore that the development process has cultivated the practice of mutual self-help based on cooperation through sharing responsibilities. This is not suggesting that place-making is always unequivocal or even peaceful. Indeed, conflict occurred several times during the process, mainly because of different opinions among residents, from discussion on design and planning, task divisions during construction, to the management of contribution. Nonetheless, the diversity of opinions in deciding the community needs reflects the empowerment and collaboration process. In this matter, decision-making is made as to the interplay amongst residents in determining their future, while collaboration can be seen through the fact that the community has been able to embrace diverse perspectives without compelling conflicts into various collective actions.

As the development of public space cannot be carried out by the community itself, mainly in the financial sense, some alliances and partnerships with external agencies also took place to ensure the permanence and quality of the public spaces. In this way, not only residents extend and strengthen their external networks through collaboration that

occurred during the development process, but it also provides opportunities to transfer knowledge among the stakeholders. Among the various subjects taught by non-profit organization and government, a good example as a result of the high learning process can be seen related to financial management assistance. Until the year when the fieldwork was conducted, residents have independently managed the sanitation contribution so they can pay all the maintenance costs, and some public spaces were even financed partly through the contribution.

Another form of empowerment is palpable during the process of daily social activities. In this case, Bustaman shows its potential to be a self-supporting kampung since all the process along with necessary skill and materials for the goat trading are available in this kampung every day. In addition to empowerment, the fact that residents have done the business until today means that they help in preserving Bustaman's identity as kampung of goat where it holds cultural heritage in the form of all essential knowledge for running the business. Interestingly, another identity has emerged through everyday life, which includes two other activities, in this case, are culinary business and *guyub* tradition. The diverse movement and nature of those activities, that run every day for almost 24-hours, have enlivened the kampung while also given a distinctive character and meaning to it. Altogether, they created a place identity for those who dwell in. At the same time, the presences of those daily enterprises also contribute in sustaining the self-help practices within the community, in the sense that the local's struggle to support their livelihood does not stop them to help each other. For that reason, these activities undoubtedly cannot be overlooked if one talks about the self-help practice of Bustaman residents.

Taken all these practices of regular place-making in Bustaman, their wider impacts can be seen through how they simultaneously bring positive impacts on the quality of life in kampung through the creation of socially favorable public spaces. Several qualities such as accessibility, security, and liveability were attributed. In this case, regular place-making has not only able to improve the local environment which resulting in better health and safer environment, but also bring social benefits that were perceived to improve the well-being of the kampung residents such as the vibrant environment.

5. Conclusions and Implications

This paper underscores the relationship between regular and temporal place-making on local empowerment. Overall, the qualitative analysis revealed two positive impacts of regular place-making, which are the improvement of organizational and collective capacity. The importance of temporal place-making was seen through the opportunities to transfer knowledge with external stakeholders and general improvement among residents, particularly youth, to actively participate in the kampung festivals and to revive the youth organization in both kampungs. Interestingly, the analysis showed that while temporal place-making had a more positive impact on young people and young adult than any other age groups, most participants who involved in regular place-making are the older generation.

However, regarding the impacts mentioned above, the overall results demonstrated that the organizational capacity and the opportunities to transfer expert knowledge are mainly obtained by a few of active groups of residents who play fundamental roles in running and organizing place-making practices in the kampung. These active groups were known as cadres of social organizations in the kampung, members of youth organization, and individual activists without any assigned responsibility. The analysis of

interviews with key informants also demonstrated that place-making process creates an opportunity for these core group of residents to empower and develop themselves.

This study also revealed some challenges that could affect the impact of place-making on the empowerment, mainly the lack of financial and human resources in the kampungs. The relatively low socioeconomic conditions of kampungs not only hinders many residents from participating in place-making but also create dependency on external stakeholders. Another barrier to the implementation of place-making in kampung is to generate interest in their kampung improvement programs amongst other residents, in order to implement and sustain regular and temporal place-making. More considerable efforts are needed to ensure a higher level of enthusiasm and participation in place-making.

6. References

Andres, L (2013) Differential spaces, power hierarchy and collaborative planning: A critique of the role of temporary uses in shaping and making places. *Urban Studies, 50*(4), 759-775.

Arefi, Mahyar (2014) *Deconstructing Placemaking: Needs, Opportunities, and Assets* Routledge.

Balassiano, Katia and Marta Maria Maldonado (2015) "Placemaking in Rural New Gateway Communities." *Community Development Journal* 50 (4): 644-660.

Bendt, P., S. Barthel, and J. Colding (2013) "Civic Greening and Environmental Learning in Public-Access Community Gardens in Berlin." *Landscape and Urban Planning* 109 (1): 18-30.

Benson, M., & Jackson, E (2013) Place-making and place maintenance: Performativity, place and belonging among the middle classes. *Sociology, 47*(4), 793-809. doi:10.1177/0038038512454350

Brunnberg, L., & Frigo, A (2012) Placemaking in the 21st-century city: Introducing the funfair metaphor for mobile media in the future urban space. *Digital Creativity, 23*(2), 113-125

Buser, M., Bonura, C., Fannin, M., & Boyer, K (2013) Cultural activism and the politics of place-making. *City, 17*(5), 606-627. doi:10.1080/13604813.2013.827840

Chan, S. C (2011) Cultural governance and place-making in taiwan and china. *The China Quarterly, 206*, 372-390.

Cilliers, EJ, W. Timmermans, F. Van den Goorbergh, and JSA Slijkhuis (2015) "The Story Behind the Place: Creating Urban Spaces that Enhance Quality of Life." *Applied Research in Quality of Life* 4 (10): 589-598.

Cohen, M., Gajendran, T., Lloyd, J., Maund, K., Smith, C., Bhim, S. and Vaughan, J. (2018). Valuing creative placemaking: development of a toolkit for public and private stakeholders. NSW Government, Landcom: Sydney, Australia.

De Carteret, P (2008) "Diverse Pleasures: Informal Learning in Community." *Australian Journal of Adult Learning* 48 (3): 502-521.

Douglas, Gordon CC (2016) "The Formalities of Informal Improvement: Technical and Scholarly Knowledge at Work in do-it-Yourself Urban Design." *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 9 (2): 117-134.

Dukanovic, Zoran and Jelena Zivkovic (2015) "Public Art & Public Space Programme: Learning, but Doing!" *Annales-Anali Za Istrske in Mediteranske Studije-Series Historia Et Sociologia* 25 (1): 49-64.

Ekomadyo, A., Prasetyo, F., & Yuliar, S (2013) Place construction and urban social transformation: an actor network theory analysis for creative-kampung phenomena in Bandung. Paper presented at the "Habitechno International Seminar", Institut Teknologi Bandung, Indonesia.

Elwood, S., Lawson, V., & Nowak, S.(2015). Middle-class poverty politics: Making place, making people. *Annals of the Association of American Geographers, 105*(1), 123-143.

Flanagan, M., & Mitchell, W. (2016). *An Economic Evaluation of the Renew Newcastle Project*. Newcastle: Centre of Full Employment and Equity, University of Newcastle.

Foo, K., D. Martin, C. Polsky, C. Wool, and M. Ziemer (2015) "Social Well-being and Environmental Governance in Urban Neighbourhoods in Boston, MA." *Geographical Journal* 181 (2): 138-146.

Franz, M., Güles, O., & Prey, G.(2008).Place-making and 'green' reuses of brownfields in the ruhr. *Tijdschrift Voor Economische En Sociale Geografie, 99*(3), 316-328. doi:10.1111/j.1467-9663.2008.00464.x

Friedmann, John (2010) "Place and Place-Making in Cities: A Global Perspective." *Planning Theory & Practice* 11 (2): 149-165.

Goldstein, S. R.(2016)."Planning the Millennium City: The Politics of Place-Making in Gurgaon, India." *International Area Studies Review* 19 (1): 12-27.

Kirralie Houghton, Marcus Foth & Evonne Miller (2015) Urban Acupuncture: Hybrid Social and Technological Practices for Hyperlocal Placemaking, Journal of Urban Technology, 22:3, 3-19.

Ho, K., & Douglass, M.(2008). Globalisation and liveable cities: Experiences in place-making in Pacific Asia. *International Development Planning Review, 30*(3), 199-213.

Hutama, I. (2016). *Exploring the sense of place of an urban kampung. Through the daily activities, configuration of Space and Dweller's perception: Case study of kampung code, yogyakarta* (Master).

Kern, L. (2016). Rhythms of gentrification: Eventfulness and slow violence in a happening neighbourhood. *Cultural Geographies, 23*(3), 441-457. doi:10.1177/1474474015591489

Knight, D. (2010). Culture, the Arts and New Foundland Place-Making." *Plan Canada* 50 (2): 38-41.

Kustiawan, Iwan., Ukrin, Ibrahim., Aulia, Astri (2015) Identification of the Creative Capacity of Kampong's Community towards Sustainable Kampong (Case Studies: Cicadas and Pasundan Kampong, Bandung): A Preliminary Study. *Procedia Social and Behavioral Sciences*, 184, 144 – 151.

Lazarević, E. V., Koružnjak, A. B., & Devetaković, M (2016) Culture design-led regeneration as a tool used to regenerate deprived areas. Belgrade—The savamala quarter; reflections on an unplanned cultural zone. *Energy and Buildings, 115*, 3-10.

Lepofsky, J. and J. C. Fraser (2003) "Building Community Citizens: Claiming the Right to Place-Making in the City." *Urban Studies* 40 (1): 127-142.

Lew, Alan (2017) Tourism planning and place making: place-making or placemaking?, Tourism Geographies, 19:3, 448-466.

Lieshout, Valerie (2014) The creative kampung: bridging the gap. A creative placemaking approach to empower poor Bandung communities. University of Amsterdam.

Lombard, M (2014) Constructing ordinary places: Place-making in urban informal settlements in mexico. *Progress in Planning, 94*, 1-53.

Main, K., & Sandoval, G. F (2014) Placemaking in a translocal receiving community: The relevance of place to identity and agency. *Urban Studies,* , 0042098014522720.

Marshall, N. and K. Bishop (2015) "Is there any Correlation between Placemaking and Place Attachment? A Challenge for Interdisciplinary Research." 9 (3-4): 1-10.

Peng, Li-Pei (2013) "Effects of Anti-Dam Campaigns on Institutional Capacity: A Case Study of Meinung from Taiwan." *Paddy and Water Environment* 11 (1-4): 353-367.

Pierce, J., D. G. Martin, and J. T. Murphy (2011) "Relational Place-Making: The Networked Politics of Place." *Transactions of the Institute of British Geographers* 36 (1): 54-70.

Piribeck, J., & Pottenger, M (2014) Good fences for good neighbors: A "Meeting place" intervention. *Journal of Poverty, 18*(1), 73-81.

Prasetyo, F., & Martin-Iverson, S (2013) Planning in the era of uncertainty. Art, activism and the 'Creative kampong': A case study fromDago pojok, bandung, indonesia. Paper presented at the *Planink International Conference,*

Quayle, M., & van der Lieck, Tilo C Driessen (1997) Growing community: A case for hybrid landscapes. *Landscape and Urban Planning, 39*(2), 99-107.

Rios, Michael and Joshua Watkins (2015) "Beyond "Place" Translocal Placemaking of the Hmong Diaspora." *Journal of Planning Education and Research* 35 (2): 209-219.

Rota, F. S., & Salone, C (2014) Place-making processes in unconventional cultural practices. the case of Turin's contemporary art festival paratissima. *Cities, 40*, 90-98.

Roychansyah, M. S (2010) *Kampung as core model of urban compaction development: Yogyakarta initiative* Unpublished manuscript.

Safira. (2012) KAMPUNG KREATIF sebuah solusi spasial pemenuhan kebutuhan dasar manusia (Bachelor).

Sandoval, Gerardo Francisco and Marta Maria Maldonado (2012) "Latino Urbanism Revisited: Placemaking in New Gateways and the Urban-Rural Interface." *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 5 (2-3): 193-218.

Semenza, J. C (2003) "The Intersection of Urban Planning, Art, and Public Health: The Sunnyside Piazza." *American Journal of Public Health* 93 (9): 1439-1441.

Silberberg, S., K. Lorah, and R: Muessig Disbrow A (2013) *Places in the Making: How Placemaking Builds Places and Communities.* Massachusetts Institute of Technology.

Teernstra, AB and FM Pinkste (2016a) "Participation in Neighbourhood Regeneration: Achievements of Residents in a Dutch Disadvantaged Neighbourhood." *Urban Research & Practice* 9 (1): 56-79.

Till, K. E., & McArdle, R. (2015). The improvisional city: Valuing urbanity beyond the chimera of permanence. *Irish Geography*, 48(1), 37-68. doi:10.2014/igj.v48i1.525.

Research Paper

The Implementation of Children Friendly City in DKI Jakarta through Assesesment of Children Friendly Integrated Public Space

Dhea Andriani, Urban and Regional Planing, Faculty of Engineering; Pakuan University
Indarti Komala Dewi, Urban and Regional Planing, Faculty of Engineering; Pakuan University
Janthy T Hidayat, Urban and Regional Planing, Faculty of Engineering; Pakuan University

Abstract

The government of DKI Jakarta province is attempting to build public space to change the city face by means of constructing Children Friendly Public Space (thereafter called RPTRA) as the attempt of supporting Jakarta to be Child-Friendly City. In realizing a Child-Friendly City in DKI Jakarta it is supported by several governor regulations governing RPTRA standardization, RPTRA Management Guidelines, and the DKI Jakarta government also makes Jakarta grand design towards a Child-Friendly City. According to the Governor Regulation Number 196 of 2015, Child Friendly Integrated Public Space is an open place or space that combines community activities and activities by implementing 10 (ten) family empowerment and welfare programs to integrate with child-friendly city program. This RPTRA is part of a child-worthy infrastructure to achieve the fulfillment of one of the 24 child-worthy city indicators set by the Republic of Indonesia Minister of Women Empowerment and Child Protection Regulation Number 12 of 2011 concerning District/City eligible for children Indicators. The government of DKI Jakarta province built 6 (six) RPTRA in Kemayoran, Central Jakarta with each RPTRA having different characteristics. RPTRA Mutiara Sumur Batu has the highest score of 1.66 and RPTRA Harapan Mulya, which is 1.62. The purpose of this research was to assess the suitability and characteristics of RPTRA in Kemayoran District. This research method used GAP analysis, observation, and questionnaire. The results of this research showed that the RPTRA in Kemayoran Subdistrict is still not optimal because only 2 RPTRA have good values, while the other (4 RPTRA) still have constraints in developing RPTRA as fulfilling children's infrastructure.

Keywords

Child-Friendly City, Infrastructur Child Friendly, Public Space

1. Introduction

Infrastructure is a matter that is closely related to the conditions of development in the city today, while there are still many infrastructure conditions in the city that have not shown child worthiness. There are many types of talking about infrastructure, ranging from decent homes, transportation, educational facilities, drainage channels, green open space, sports fields, to children's playrooms. Of these, the problem of availability of Green Open Space is a problem that is currently not resolved.

The development of the Central Business District in DKI Jakarta, especially Central Jakarta from the construction of office buildings, companies, to dense housing on the outskirts of the city, continues to use existing urban spaces. This causes a change in the surrounding environment, especially urban public spaces, and contributes to changing the pattern of community activities in it, so that many settlements are densely populated and the population is quite high in age but lacks public space for children to play.

The importance of fulfilling child-friendly public spaces in realizing Child-Friendly Cities in Kemayoran District, Central Jakarta City can be seen from the large number of children, which is 397,896 people. Reaches 35% of the population in Central Jakarta City *(BPS Jakarta Pusat 2018)*. So the government needs to make various efforts to improve the quality of children and fulfill facilities and infrastructure facilities that are pro-children in the planning and implementation of government development documents. Child worthy infrastructure is one indicator that must be met by the government in an effort to realize a child-friendly city.

The Government's efforts in realizing the achievement of the Child Friendly City concept are also supported in the Republic of Indonesia Minister of Women Empowerment and Child Protection Regulation Number 12 of 2011 concerning Eligible District / City Indicators. Where in the regulation to develop a Child Friendly City in each district / city, it must refer to 24 indicators of the fulfillment of rights and protection of children which are broadly reflected in the 5 clusters of children's rights, namely (1) Cluster of Civil and Freedom Rights; (2) Family Environment Cluster and Alternative Care; (3) Basic Health and Welfare Clusters; (4) Educational Clusters, Use of Leisure Time and Cultural Activities; and (5) Special protection cluster.

Public open space is a shared space, where the community carries out its functional and ritual activities in a community bond, both daily life and in periodic celebrations that have been determined as something open, where the community conducts personal and group activities. Whereas the Child Friendly Integrated Public Space is an open place and / or space that integrates activities and activities of citizens by implementing 10 (ten) main programs of family empowerment and welfare to integrate with the Child Friendly City program.

Child Friendly Integrated Public Space is also a manifestation of the commitment of the DKI Jakarta Provincial Government to ensure the fulfillment of children's rights so that children can live, grow, develop and participate optimally in accordance with human dignity and receive protection from violence and discrimination. RPTRA can also be described as one of the child-friendly infrastructure in the form of a park designed with a modern concept that is child-friendly, equipped with various supporting infrastructure facilities such as Gazebo / pavilion for children's learning venues, sports facilities, children's forum secretariat, Community Reading Park, internet / wifi network, toilets, etc.

Thus it is expected that Child Friendly Integrated Public Spaces can become the center of public interaction as well as a medium of learning and development of children's interests and talents. With the availability of Child Friendly Integrated Public Space, it is expected to be able to fulfill a playground that is friendly to children and can help in realizing a Child Friendly City, which is a city that is humane, comfortable and friendly to the community, especially children.

2. Research Methods

The study was carried out in 6 Child Friendly Integrated Public Space spread across Kemayoran District, namely RPTRA Harapan Mulya, Krida, Serdang Baru, Bandar Kemayoran, Mutiara Sumur Batu, and Kampung Budaya. The method used in this study is GAP analysis, questionnaire, and qualitative descriptive method. This analysis / Gander Analysis Pathway (GAP) analysis is to find out the gap or conformity between the realization of existing conditions of Child Friendly Integrated Public Space with a model (standards, policies etc.). This can be linked to policies in the RPTRA standardization policy. The calculation formula for the average value of realization of Child Friendly Integrated Public Space is as follows:

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n}$$

Information :

$\bar{x}$ = average value of realization

x = Criteria measured

n = Total RPTRA criteria for overall observation

Whereas to find the calculation of conformity value (G) the following formula is used:

$$G = R - K$$

Information :

G = Average value of conformity

R = Average score for realization

K = Value of average policy score

Qualitative methods are research procedures that produce descriptive data in the form of written or oral words from people and behaviors observed (Moleong 2007). As for selecting respondents, the questionnaire was submitted to the RPTRA visitors. Indicator criteria can be seen in the following table.

Table 1 Indicator

No.	Variable	Indicator
1.	Accessibility	• Entrance • Sidewalks • Crossing Place

No.	Variable	Indicator
2.	Facilities	• Multipurpose room • Library room • Lactation room and KB space • Management room • Family Welfare Development Room • Toilet • Sports fields (futsal / basketball / badminton) static sports facilities • Children's playground • Running / jogging track • Path of reflection • An amphitheater • Garden • Parking lot • Park bench
3.	Activity	• Communicate • Exercise • Service activities • RPTRA environment • Place of community association
4.	Convenience	• Vegetation • Distribution of Garden Lights • Distribution of Trash Can • Security officer

3. Results and Conclusions

3.1. Result

Based on the results of the research, the ideal value for each RPTRA is 2. Where the value of 2 is the result of distributing questionnaires to the community and comparison with the results of expert interviews. Then according to the results of the assessment of accessibility aspects and facilities having higher values because RPTRA is provided to the community, so accessibility is one of the needs that can facilitate the community in reaching RPTRA from its place and facilities are facilities that can support community needs in carrying out their activities or activities while in RPTRA. The results of the conformity assessment on the RPTRA in Kemayoran Subdistrict show that there are only 2 RPTRAs which have good values, while the other 4 RPTRAs still have some obstacles in the development of RPTRA as fulfillment of children's infrastructure. Mutiara Sumur Batu RPTRA achieved the highest rating with a value of 1.66 and RPTRA Krida and Bandar Kemayoran had the lowest rating of 1.42. For more details, can be seen in the following table.

Table 2. Suitability of Child Friendly Integrated Public Spaces in Kemayoran District, Central Jakarta

No.	RPTRA	Standar RPTRA		Facility Availability	GAP
		Variable	Indicator		
1.	Harapan Mulya Kel. Harapan Mulya 3.446 m^2	Accessibility Facilities Activity Convenience	-Entrance -Sidewalks -Crossing place -Multipurpose room -Library room -Lactation room and KB space -Management room -Family Welfare Development room -Toilet -Sports fields -Children's playground -Running/jogging track -Path of reflection -An amphitheater -Garden -Parkiring lot -Park bench -Communicate -Exercise -Service activities -RPTRA environment -Place of community association -Vegetation -Distribution of Garden Lights -Distribution of Trash	-Multipurpose room - Library room - Lactation room and KB space - Toilet - Sports fields - jogging track - Path of Reflection - Children's playground - An amphitheater - Garden - Park bench	1,62
2.	Krida Kel. Serdang 639 m^2			- Multipurpose room - Library room - Lactation room and KB space - Toilet - Sports fields - Path of Reflection - An amphitheater - Park bench	1,42
3.	Serdang Baru Kel. Serdang 1.202 m^2			- Multipurpose room - Library room - Lactation room and KB space - Toilet - Sports fields - Children's playground - Path of Reflection	1,47

No.	RPTRA	Standar RPTRA		Facility Availability	GAP
		Variable	Indicator		
			can -Security officer	- An amphitheater	
4.	Bandar Kemayoran Kel. Kebon Kosong 586 m^2			- Multipurpose room - Library room - Lactation room and KB space - Toilet - Sports fields - Children's Playground - Path of Reflection - An amphitheater - Garden	1,42
5.	Mutiara Sumur Batu Kel. Sumur Batu 1.202 m^2			- Multipurpose room - Library room - Lactation room and KB space - Toilet - Sports fields - Children's Playground - Path of Reflection - An amphitheater - Garden - Parkiring lot - Park bench	1,66
6.	Kampung Budaya Kel. Utan Panjang 515 m^2			- Multipurpose room - Library room - Lactation room - Toilet - Sports fields - Children's Playground - Path of Reflection	1,44

No.	RPTRA	Standar RPTRA		Facility Availability	GAP
		Variable	Indicator		
				- An amphiteater - Garden	

The characteristics of RPTRA indicate that each RPTRA has its advantages and disadvantages depending on the location and availability of facilities and services provided. The more complete the available facilities and the many RPTRA activities the higher the visitors. RPTRA Harapan Mulya is an RPTRA with the highest activity value because it has the most extensive land and has a lot of service activities compared to other RPTRAs while RPTRA Krida has the lowest value because of limited facilities and limited service activities available.

4. References

Manurung, Parmonangan (2018) Kota untuk Semua, Yogyakarta, Andi.

Paratima, Mahditia (2014) Dari Surakarta Mendesain Kota Layak Anak Indonesia, Yogyakarta, HRC Yogyakarta.

Hernowo E; Navastara A.M (2017) "Karakteristik Ruang Publik Terpadu Ramah Anak (RPTRA) Bahari di Kecamatan Cilandak Jakarta Selatan", Jurnal Teknik ITS, Vol.6 (2) Hal: C567-C570 (August).

Saidah, Eneng Dayu (2017) "Kebutuhan Taman Kota Ramah Lansia di Kota Bogor", Jurnal Program Studi PWK Universitas Pakuan, Vol 1. No 1 Hal: 1-8 (August).

Sari R.P; Kusumastuti, Putri R.A (2017) "Kesesuaian Taman Cerdas Sebagai Ruang Publik Skala Pelayanan Kelurahan Terhadap Konsep Kota Layak Anak", Jurnal Kesesuaian Taman Cerdas sebagai Ruang Publik, Vol.12 (1) Hal: 72-82 (August).

Widyawati K; Ernawati A, Dewi F.P (2011) "Perananan Ruang Terbuka Publik Terhadap Tingkat Solidaritas dan Kepedulian Penghuni Kawasan Perumahan di Jakarta", Jurnal Ilmiah Faktor Exacta, Vol. 4 (3) Hal: 246-260 (March).

Case Study / Project

Hunger in revered spaces

Exploring the impact of planning on the university campus food system in South Africa

Rouve BINGLE

Abstract

This exploratory study examines how campus planning and its spaces affect the food security of students. The study is conducted on the campus of the University of the Free State in South Africa and uses a mixed methods approach which includes an online survey, qualitative interviews and a site inspections. The data is used to determine the state of the campus food system as well as gauge respondents opinions on the subject of food access, availability and management. Traditionally a university campus is considered an axiom of sophistication and enlightenment. These principles also translate to the physical layout and appearance of the campus and services. For many societies universities have become a symbols of reverence and privilege and as such they are absolved from certain criticisms that might be found elsewhere in the built environment. A disconnect can occur between the needs of students and the campus offerings. Although the traditional blueprint has been extremely successful it should be adapted to adres the changing needs of new generation students in the South Africa.

The University of the Free State (UFS) is such an example of changing needs and is located in one of the poorer regions of South Africa. As a result, the institution registers many students who come from vulnerable and marginalised communities. Poverty and food insecurity are directly linked and as a result, many students experience degrees of hunger while attempting to complete their studies. It is also assumed that this problem is not unique to the UFS and more widespread throughout the country. The problem is set to grow due to the increase in the cost of living which includes transport, accommodation, tuition fees and food. The circumstances first generation students find themselves is complex. For many a degree is seen as a means for the entire families to uplift themselves. This puts tremendous pressure and stress on students who are often just able to pay registration fees. The true cost of living is not always taken into consideration and students are forced to survive on a meagre daily budget. Many are unsure how they will find funds to continue from the one semester to the next one. Hunger becomes a reality and many experience it to certain degrees. Also, cheap, fast and unhealthy food at the student canteen is the only choice due to time, convenience and financial constraints. It should be realised that campus planning can help solve this problem.

Planning should take into consideration all possible options for strengthening and accessing the local food system and introduce spatial alternatives and services not conventional to a campuses. Food planning as a sub-category of urban planning is especially relevant for citizens of the Global South and universities, as micro communities, can provide valuable lessons for planners as these institutions often function as incubators for new ideas.

Research Paper

OUTLINES FOR ACCESSIBLE ROUTES ON SIDEWALKS:

a new challenge for small Brazilian cities

Fernando Domingues CAETANO, Autonomous Social Service PARANACIDADE and Pontifical Catholic University of Parana; Brazil

Jeronimo Paulo da Cunha Pimentel de MEIRA, Autonomous Social Service PARANACIDADE; Brazil

Suzi Cristini RODRIGUES, Autonomous Social Service PARANACIDADE; Brazil

Abstract

Sidewalks in Brazilian cities still have physical conditions that hamper pedestrians to move, especially those citizens with mobility impairments. Despite improvements on legal provisions, aiming to build more accessible cities, its fulfillment is still far from what is desired. The purpose of this paper is to present a method (virtual audit) to support local administrations, in particular of small cities, to define accessible routes on sidewalks where their precariousness tends to be more significant. In order to illustrate the method application, it is shown a exploratory study in the Central Business District of Quitandinha municipality, located in Curitiba Metropolitan Area. The method allows a comprehensive knowledge of site problematic and it is expected to stimulate: i) local administrations to evaluate their sidewalks situation in order to include their suitability in their investment agendas; and ii) regional and federal administrations to develop public policies towards urban environment qualification.

Key words

Sidewalk, Accessibility, Mobility Impairment, Small City, Brazil

1 Introduction

Sidewalks of Brazilian cities have inadequate physical conditions that hamper or even prevent pedestrians from moving, especially those with mobility impairments. The 2010 Brazil Population Census indicated that 69.0% of urban households benefited from paved sidewalks in their surroundings, lower than the percentage of paved streets (81.7%). The worse situation was observed concerning curb ramps, available to only 4.7% of total urban households.

Brazilian legislation has advanced on setting up planning mechanisms aiming to build more accessible cities. In 2015, the federal law to protect the rights of people with mobility impairments modified the Statute of the City (urban planning federal law), inserting the request of accessible route plan to those municipalities that are required to enact Comprehensive Plans - CPs.

Therefore, the accessible route plan is mandatory for cities: i) with more than 20,000 inhabitants; ii) members of metropolitan areas or urban conglomerations; iii) where the municipal government will intend to use the instrument established in paragraph 4º of art. 182 of Federal Constitution; iv) members of particular tourist interest areas; v) inserted in the area of influence of developments or activities with significant environmental impact in the regional or national domain; vi) included in the national cadaster of municipalities located in areas susceptible to natural disasters.

The Statute of the City now establishes that the accessible route plan has to follow the CP and that sidewalks must be executed to assure accessibility to pedestrians' attractors, either public or private, such as public offices, health care, educational, social assistance, sports or cultural facilities, post offices, commercial banks or bus stops. Although improvements on legal provisions concerning accessibility, its fulfillment is still far from what is desired.

Among the states of the Brazilian federation, Parana has the highest number of municipalities with CPs approved by city councils: 383 out of 399 (IBGE 2015). Even though most part of Parana municipalities have CPs, they do not have accessible route plan. In fact, most cities of the State of Parana are too small, and their municipal population are less than 20 thousand inhabitants. Besides that, local governments lack experience or technical capacity which restrict the elaboration or implementation of public policies towards urban development.

Within such an ongoing scenario, since 1989 the State of Parana Constitution established that cities with less than 20 thousand inhabitants (306) would receive technical assistance from a state urban development agency to define general rules relating to urban land use. Currently, the state agency with this mission is the Autonomous Social Service PARANACIDADE, linked to the State Department of Urban Development and Public Works - SEDU under a management contract.

Most recently in 2018, the State Public Prosecution has settled that local governments are responsible for sidewalk works and maintenance which conflicts with a common understanding that it is adjacent properties owners' responsibility: sidewalks, as part of public space, are public property. Those municipalities required to have CPs ought to provide their adaptation following accessibility standards; otherwise it can result in local authority's liability (MINISTÉRIO PÚBLICO DO PARANÁ 2018).

Therefore, the purpose of this paper is to present a technical method, developed by PARANACIDADE staff, to support, most of Parana municipalities, in accessible routes' definition in downtown sidewalks. The whole method consists of two stages. The first one, explored in this paper, employs a virtual street audit, using secondary information available from official sources and Google Street View - GSV. The second stage involves field visits to survey and analyze the data that complement the site diagnosis, accomplished in the first stage, to develop an accessible route project.

Initially, it is described the 5 steps that take place during the first stage: i) delineation of the Central Business District - CBD; ii) location of both public or existing private facilities as pedestrian attractors within CBD area; iii) development of a pedestrian network draft that assures access to attractors; iv) remote survey of sidewalks physical conditions; and, v) preliminary physical works proposal to guarantee universal accessibility, with estimate costs.

Previously, however, a brief quantitative evaluation of sidewalks situation in Parana municipalities is presented, considering available data.

2 Sidewalks in Parana Municipalities: A General Quantitative Overview

Parana, located in the Southern region of Brazil, is the sixth most populated state. It entered 2016 with an estimated population of 11.2 million inhabitants (IPARDES 2018). The state has a high degree of urbanization, since its cities offer greater job opportunities and better essential infrastructure services, putting pressure on local administrations to increase supply. Between 1990 and 2000, the annual urban population growth rate has reached 2.3% due to rural-urban migration. This urbanization process has increased the proportion of people in urban areas - from 73.4% to the current 85.3%. In addition to institutional weakness and insufficient financial resources availability, designed to attend the needs of the expanding urban population, urban infrastructure and primary services deficits became significant.

Aiming to support urban planning and management, in 2010, the institution in charge of the statistics in Brazil (IBGE) produced information about the occurrence (or not) of 10 distinctive urban characteristics of household surroundings. The selected urban characteristics are: i) street name sign; ii) street lightning; iii) street pavement; iv) street tree; v) storm drain; vi) waste accumulation; vii) open sewer; viii) curb and gutter; ix) sidewalk; and x) curb ramp (IBGE 2010a).

Table 1 shows that, in 2010, the percentage of Parana urban households with sidewalks in their surroundings was 58.6%, lower than the national level (69.0%). Besides that, only 9.7% of households in Parana had, in their surroundings, curb ramps. Although its level compared to that of Brazilian municipalities (4.7%) was higher, it was still deficient.

Table 1: Percentage of households with two urban characteristics in the State of Parana

RANGE	POPULATION (n. of inhabitants)	MUNICIPATILITIES	URBAN CHARACTERISTIC	
			Sidewalks (%)	Curb ramps (%)
1	Less than 5,000	98	56	11.1
2	5,001 - 10,000	105	48	8.3
3	10,001 - 20,000	109	48	8.1
4	20,001 - 50,000	55	51	9
5	50,001 - 100,000	14	57	8.5
6	More than 100,000	18	64	11
	PARANA	**399**	**59**	**9.7**
	BRAZIL	**5,570**	**69**	**4.7**

Source: IBGE 2010a.

Municipalities with a population between 5,001 and 20,000 inhabitants presented the lowest proportion of urban households with sidewalks in their surroundings: no more than 48%. Moreover, only those municipalities with a population above 100,000 inhabitants, and therefore, with the largest numbers of urban households, had the most significant percentage of households with sidewalks (64%), exceeding state average (59%), but still lower than national mean level (69%).

The data collected by IBGE concerning sidewalks were only related to quantitative aspects restricted only to the existence (or not) of the sidewalk, that is, "…paved path, designed for pedestrians, usually in a higher level than travel lanes" (IBGE 2010a), and the results in Parana are bad. If qualitative aspects were also considered, probably the state situation would be even more dramatic, especially because of restrictions imposed on people with mobility impairments.

Table 1 also shows that the percentage of Parana's urban households with curb ramps in their surroundings was higher than Brazilian average level, although both were very low (9.7% and 4.7%, respectively). In Parana, the municipalities with a population less than 5,000 inhabitants and more than 100,000 inhabitants presented the highest percentage (11.1% and 10.6%, respectively).

Although the data here considered were as of 2010, it can be assumed that current deficits of sidewalks and curb ramps are still very significant in Parana. Therefore, public policies, that ought to contribute to their considerable decrease, are becoming not only necessary but urgent.

3 A Method to define Accessible Routes on Sidewalks

In Brazil, it is remarkable the lack of urban planning concerning sidewalks in order to guarantee the existence of accessible routes as defined in the Brazilian technical standard NBR9050. It can still be said that, even nowadays in Brazil, among sidewalk's functions, adequate pedestrian's movement is one of the less considered. It is common the presence of obstacles on clear paths, such as inadequate vehicles access to properties, street lighting poles, street furniture and trees.

Theoretical references highlight walkability in urban design debate, aiming to make our cities more walkable (Lo 2009; Speck 2012; Forsyth 2015). To implement accessible routes in Brazil, sidewalk design has to consider NBR9050 width standards for each of the three sidewalk zones: street furniture zone, clear path and frontage zone.

The street furniture zone is defined as the sidewalk section between the curb and the clear path, where street furniture and sidewalk amenities should be implemented, such as lighting, benches, traffic signs and green infrastructure elements. The minimum width recommended to accommodate all these elements is 0.70m. Nevertheless, this specification is not, in practice, taken into account, and besides that, those elements use to be located in the clear path.

A clear path, where accessible routes should be implemented, is the pedestrian through zone that ensures a safe and adequate place to walk. It must be free of any obstacle, with gentle cross slope (less than 3%), minimum width of 1.20m and free from a 2.10m height.

According to NBR9050, the minimum clear path width of 1.20m is required to comfortably absorb a flow of 25 pedestrians per minute, in both directions. The clear path width must be increased due to sidewalk impedance factors, such as i) shop windows or façade stores at the building line (+0.45m); ii) urban furniture (+0.25m); and iii) building entrance at the building line (+0.25m). It can be said that, in Brazil, compliance with these normative provisions is not the rule, but the exception.

The frontage zone defines the section of the sidewalk that functions as an extension of the building. According to NBR9050, the existence of this space is only possible on sidewalks width larger than 2.00m, allowing room for vehicle access to properties, without interference in clear path specifications. As in the case of the street furniture zone, it is common in Brazilian sidewalks, due to their small widths, that the function of the clear path is affected by the coexistence of the function designed to the frontage zone.

Besides the minimum standards specified to accessible sidewalks, it is essential to point out additional relevant aspects that can contribute to improve walkability, such as continuity of pedestrian routes; accessibility of facilities to people with different impairments; connections to street network and transit services; safety of crossings; visual interest; and perceived security (Lo 2009).

The virtual street audit to define accessible routes was selected considering the inadequate urban planning capacity of local government staffs, particularly in small municipalities, where it may be even nonexistent. Virtual street audits, using secondary data, including GSV, were considered viable to understand the diversity of built environment aspects (Kelly et al. 2013; Lee and Talen 2014; Hara et al. 2015; Hara and Froehlich 2015; Saha 2019).

Most of the aspects related to the physical conditions of a preliminary proposal are shown in Table 2. The secondary information sources used in this method were: i) urban digital cartography; ii) urban digital orthophotos; and iii) GSV.

Table 2: Aspects considered to evaluate walkability conditions

ASPECT	ZONE	ATRIBUTTE	VIRTUAL AUDIT	INFORMATION SOURCE
Topography	Clear Path	• Longitudinal Slope	Yes	1
		• Transverse Slope	No	--
Size	Clear Path	• Width	Yes	1 / 2/ 3
		• Length (block)	Yes	1 / 2 /3
Obstacle	Clear Path	• Street Tree	Yes	3
		• Urban Furniture (traffic light, light pole, public telephone, fountain, trash can, awning, bench)	Yes	3
		• Pavement (material, irregularity)	Yes	3
		• Light Pole	Yes	3
		• Vehicle Access Ramp	Yes	3
Equipment	Travel Lane / Street Furniture	• Crosswalk	Yes	2 / 3
		• Curb Ramp	Yes	2 / 3
		• Traffic Light	Yes	3
		• Elevated Crosswalk	Yes	2 / 3
Thermal Comfort	Street Furniture	• Street Tree and Shading	Yes	1 / 2 / 3
Convenience	Street Furniture	• Bench	Yes	2 / 3
Safety	Street Furniture	• Street Lighting	No	--

As a case study, it is presented a preliminary proposal of a sidewalk accessible route within CBD of Quitandinha, located in Curitiba Metropolitan Area, to illustrate the application of the suggested method.

4 Definition of an Accessible Route in the Central Business District of Quitandinha: a Case Study

The municipality of Quitandinha, with around 5,000 urban inhabitants, belongs to the third-class interval of Table 1, with the worst percentages of sidewalks and curb ramps supply in the surroundings of households.

Around 24% of Quitandinha municipality inhabitants declared themselves as disabled people (IPARDES 2018). This large contingent of people, added with those with reduced mobility, makes the lack of accessibility a priority issue in urban local agenda.

The first step of the proposed method consists in CBD delineation. According to Sepck (2016), starting to improve the CBD physical conditions can help to improve all other parts of the city. If the CBD doesn't look good, the same also happens with the rest of the city. In Parana, only 10% of its municipalities have neighborhoods officially defined, mostly the large ones (IBGE 2010b).

PARANACIDADE, based on Quintandinha Comprehensive Plan (historical evolution of urban land use and zoning law) and on urban cadaster, has conducted a study that outlined 10 neighborhoods, including CBD. The latter's limits took as reference the spatial concentration of, public or private, service and commercial activities, comprising an area of 55.35 hectares (9.5% of urban growth boundary), and a set of 17 streets with a total extension of 5,638.80m (12.4% of the urban street network).

Figure 1: Location of CBD area within Quitandinha Urban Growth Boundary
Source: SEDU/PARANACIDADE INTERATIVO 2019.

In the second step, 121 pedestrians' attractors were identified within CBD: 99 from private sector and 22 consist of public agencies (Figure 02). Public facilities are grouped in 2 blocks, whereas commercial activities are more equally distributed among the main street (Eleuterio Fernandes de Andrade Avenue) and two other streets (Expedicionario Street and Padre Francisco Street).

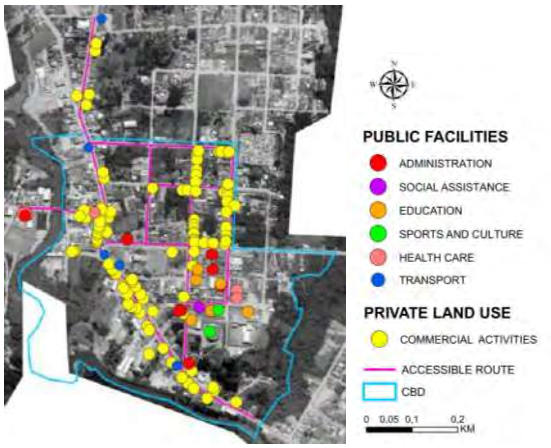


Figure 2: CBD Quitandinha Accessible Route Final Proposal

The first accessible route proposal was defined considering the connection of all the 121 pedestrians' attractors identified within CBD (third step). Nevertheless, the high longitudinal slope of the initial section (2 block frontages) of Estalisnau Socek Street and of the total extension of Abilio Alves Street compel to their exclusion. In both cases, the longitudinal slope was higher than the allowable standard for wheelchair users, as specified in NBR9050. So, the total length of accessible route first proposal was 7,828.54m (comprising 11 out of 17 Quitandinha CBD streets and 50 out of 67 central block frontages), which allowed the connection of 97% of all identified pedestrians' attractors (Table 3).

Table 3: Extension and number of block frontages of the CBD accessible route proposal

STREET	BLOCK FRONTAGE					
	CBD		CBD ACCESIBLE ROUTE			
			FIRST PROPOSAL		FINAL PROPOSAL	
	LENGTH (m)	Nº	LENGTH (m)	Nº	LENGTH (m)	Nº
Eleutério Fernandes de Andrade	1,919.90	08	2,658.73*	13*	2,658.73*	13*
Abílio Alves	356.66	02	356.66	02	------	-----
Acelino Ribas Pinto	781.85	06	210.89	02	781.85	06
Independência	209.40	02	209.40	02	209.40	02
Dias de Moraes	118.76	02	-----	-----	-----	-----
Expedicionário	1,251.18	08	1,251.18	08	1,251.18	08
Estanislau Socek	713.83	06	713.83	06	452.29	04
José de Sá Ribas	687.93	05	687.93	05	687.93	05
Marciano de Carvalho	544.20	04	333.22	02	544.20	04
Monsenhor Miguel Mickos	295.88	02	-----	-----	-----	-----
Padre Francisco Starzybski	1,208.89	08	983.56	06	983.56	06
Paraná	401.64	03	-----	-----	-----	-----
Pedro Zolner	196.79	02	196.79	02	196.79	02
José Eugênio Soczek	120.86	02	-----	-----	------	-----
01	104.09	01	-----	-----	-----	-----
02	181.83	03	-----	-----	-----	-----
03	87.40	02	-----	-----	-----	-----
Marinho de Almeida Prado	226.35	02	226.35	02	226.35	02
TOTAL	**9,407.44**	**67**	**7,828.54**	**50**	**7,992.28**	**52**

*Accessible route extended to other points of interest located outside the CBD limits.

Additionally, to make connections with other two near relevant public facilities, outside CBD, (bus station and public health unit), it was necessary to expand the first proposal of an accessible route, including 4 block frontages of Acelino Ribas Pinto Street 2 of Marciano de

Carvalho Street, achieving the total length of 7,992.28m (comprising 10 streets and 52 block frontages). Figure 2 illustrates the street set of the accessible route final proposal.

In the fourth step, physical conditions of the accessible route sidewalks have to be virtually audited. However, fully audit was only possible in the CBD main street (Eleuterio Fernandes de Andrade Avenue) where information from GSV was available. Nevertheless, the analysis concerning the other streets was taken forward restricted to those aspects that could be evaluated considering the two other secondary information sources.

Sidewalks widths analysis pointed out the need to their enlargement: Jose de Sa Ribas Street, where City Hall is located, has the largest sidewalk width (1.90m); three other streets have sidewalk widths near the minimum required by NBR9050 in relation to clear path (1.20m); and the rest (6) has their sidewalks' width with less than 1.00m. To ensure full accessibility, total sidewalks widths should be increased - considering commercial land use - which directly implies travel's lanes width narrowing.

Only 4 out of the 52 central block frontages has length less than 100m; half of them, between 100m and 120m; and the rest, over 150m, reaching the largest block frontage length of 765m. The latter group corresponds to 60% of the accessible route total extension (7,922.28m), which possibly requires the implementation of midblock curb cuts, together with crosswalks, to assist people with mobility impairments.

Along Eleuterio Fernandes de Andrade Avenue, different types of obstacles in the clear path were recognized, such as i) 6 trees out of 11; ii) 10 urban furniture elements out of 19 – 5 vertical signs, 3 awning's support, 1 bus shelter and 1 public trash; iii) improper materials for sidewalks pavement (73%), added to the irregularity of those deemed appropriate (27%), compromising accessibility in almost all sidewalks of the route; iv) 6 light poles out of 38 (the improper location makes them an obstacle to pedestrian flows); and, v) 21 vehicle access ramps out of 35 (affecting the clear path transversal slope).

The existing crosswalks (20) are only 25% of the overall estimated need (82), and, in 3 streets (out of 10) they do not even exist. The survey results revealed a worse situation for curb ramps: there are only 6% of the total number required (150). In addition, there is only one elevated crosswalk along Eleuterio Fernandes de Andrade Avenue. This kind of element should also be available in other accessible route streets, as is the case for Expeditionary Street where several public facilities and educational establishments are concentrated.

Regarding the thermal comfort aspect, the existence of shading elements along the accessible route was evaluated. Of the 48 trees identified, only half of them provide shade over sidewalks. Based on the estimated need of 191 trees, the deficit is approximately 87%. Even in the Expeditionary Street, which has the greater contingent of afforestation (12), thermal comfort is far from desired (22), since distances between existing trees oblige pedestrians to walk extensive stretches under sun exposure.

Virtual audit, using GSV, allowed to identify 7 commercial awnings, of which 4 are continuous and contribute for 40 meters of shading along Eleuterio Fernandes de Andrade Avenue. The 3 other remainder awnings provide 15 additional meters of shade, although not continuously. No other convenience elements, such as benches that could provide rest along the footpath, were identified in the furniture zone.

Once the accessible route within Quitandinha CBD was audited, the fifth and last step consisted in quantifying the required physical interventions as well as in estimating their costs, so that the municipality can anticipate the required financial resources for their works.

Pavement materials that provide uniform and regular surfaces, such as asphalt and concrete were favored. Although it does not meet this criterion, it was also considered the paver block, due to its recent and wide dissemination in Parana cities' sidewalks.

Due to scarce information, the present analysis was grounded on the sidewalks' adaptation requirements of Eleuterio Fernandes de Andrade Avenue central segments, to which GSV was available. So, the estimated total costs for the other streets were based on its average costs.

Initially, lot-by-lot land use, urban furniture in sidewalks, and zones' widths were audited to identify width sidewalk readjustment requirements (Figure 3). As a result, sidewalks widths needed to be increased, as follows, to: i) 2.60m in central blocks where commercial activities concentrate; ii) 2.40m in residential areas where frontage zones are needed; and iii) 2.15m where urban furniture is available.

Figure 3: Sidewalk impedance factors – Eleuterio Fernandes de Andrade Ave.

Figure 4 illustrates the shifts on sidewalks widths. It should be noted that the required narrowing of travel lane width does not compromise the street service capacity.

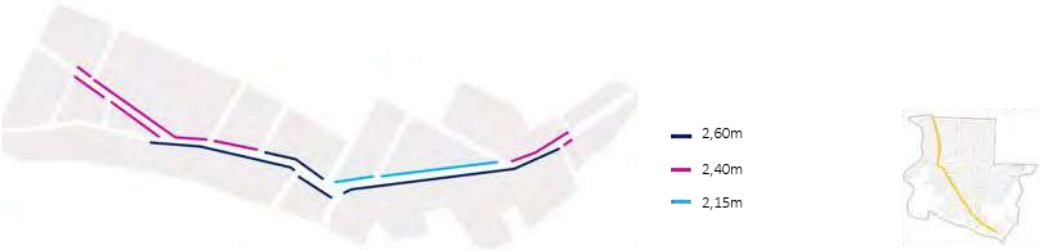


Figure 4: Sidewalks widths proposal - Eleuterio Fernandes de Andrade Ave.

Moreover, it was identified the needs to replace sidewalks pavement and execute additional physical interventions, such as tactile paving, car ramps in access zones, curb ramps at intersections, public lighting poles, and pedestrian crosswalks. Since in CBD pedestrian flows are most intense, no infiltration strips were proposed on the accessible route.

The estimate project cost for each of the 3 sidewalk pavement alternatives is presented in Table 4. The scope of the intervention area is 4,586.45m^2 (corresponding to 70% of total area), due to pavement material inadequacy or poor conditions of maintenance.

Table 4: Total and average costs estimates of sidewalks in Eleuterio Fernandes de Andrade Ave. according to pavement alternative

SIDEWALK PAVEMENT ALTERNATIVE	TOTAL COST (R$ 1.00)	AVERAGE COST (R$ 1.00)
Asphalt	399,525.93	87.11
Concrete (in-situ)	452,092.59	98.57
Paver block (precast)	531,870.30	115.97

The total project cost of supplying and adapting urban elements that guarantee universal accessibility and adequate comfort conditions for Eleuterio Fernandes de Andrade Ave. was estimated in R$ 388,682.25 corresponding to the average cost of R$ 84.75. The item that most impacted final budget was light poles installment (85%).

Based on estimate average costs and on accessible route final proposal total area (19,927.97 m^2), the budgets for the 3 sidewalks pavement alternatives were appraised as follows: R$ 2,515,868.64 for asphalt; R$ 2,683,639.47, for concrete (in situ); and R$ 2,938,334.51, for paver block.

These amounts accounted from 36 to 42% of the potential indebtedness capacity of Quitandinha municipality to borrow money to finance investments in 2019 (16% of its net current revenue) or from 52 to 61% of the average value of its investment expenditure for the two-year period 2017-2018 (Tesouro Nacional 2019).

5 Conclusions

The requirement, in the federal sphere, for cities already obliged to elaborate CP, to plan accessible routes, demands, in the state and municipal spheres, a wide building capacity effort concerning the content and methods related to this plan. Even though this legal requirement has already been in existence since 2015, there is no city in the State of Parana with an accessible route plan.

To develop an accessible route plan for Quitandinha, a small city obliged to elaborate an accessible route plan, proved to be a challenge from its very beginning due to scarce and limited available data concerning physical aspects of its streets. Nevertheless, the efforts made so far are much smaller than those required to redesign and rebuild a lot of Brazilian urban streets, such as Eleuterio Fernandes de Andrade Ave. of Quitandinha, aiming to guarantee sidewalks universal accessibility.

Virtual audit contributed, despite limits of GSV coverages, to get a preliminary broad site comprehension by compiling several types of spatializable data (pedestrian attractors, topography, street features, obstacles, equipment, thermal comfort, convenience and safety physical elements) from different information sources of public access. Besides that, this method enables to propose a set of physical interventions and gives support to estimate its investment costs.

It is expected that this feasible method encourages: i) local administrations to audit sidewalks situation to include in their investment agendas aiming urban walkability improvement; and, ii) regional or national governments to define public policies towards urban environment qualification.

6 References

Forsyth, A. 2015, 'What is a walkable place? The walkability debate in urban design', *Urban Design International,* vol. 20, no. 4, pp. 274-292. Available from: https://dash.harvard.edu/handle/1/29663388 [May 2019].

Hara, K.; Azenkot, S.; Campbell, M.; Bennett, C. L.; Le, V.; Pannella, S.; Moore, R.; Minckler, K.; Ng, R. H.; Froehlich, J. E. 2015, 'Improving public transit accessibility for blind riders by crowdsourcing bus stop landmark locations with Google Street View: An extended analysis', *ACM Transactions on Accessible Computing*, vol. 6, no. 2, pp. 1-8. Available from: https://dl.acm.org/citation.cfm?id=2717513 [May 2019].

Hara, K.; Froehlich, J. E. 2015, 'Characterizing and visualizing physical world accessibility at scale using crowdsourcing, computer vision, and machine learning', *ACM SIGACCESS Accessibility and Computing*, vol. 113, no. 15, pp. 13-21. Available from: https://dl.acm.org/citation.cfm?id=2850442 [May 2019].

IBGE 2010a, *Características urbanísticas*, IBGE, Brasil. Available from: https://biblioteca.ibge.gov.br/visualizacao/periodicos/96/cd_2010_entorno_domicilios.pdf [March 2019].

_____ 2010b, *Censo Demográfico***,** IBGE, Brasil. Available from: https://ww2.ibge.gov.br/home/estatistica/populacao/censo2010. [March 2019]

_____ 2015, *Perfil dos municípios brasileiros*, IBGE, Brasil. Available from: https://biblioteca.ibge.gov.br/visualizacao/periodicos/96/cd_2010_entorno_domicilios.pdf [8 March 2019].

IPARDES 2018, *Paraná em números*, IPARDES, Brasil. Available from: http://www.ipardes.pr.gov.br/pr_numeros/index_pr_numeros_pt.htm [25 July 2018].

Lee, S.; Talen, E. 2014, 'Measuring Walkability: A Note on Auditing Methods', *Journal of Urban Design*, vol. 19, no. 3, pp. 368-388. Available from: https://www.tandfonline.com/doi/abs/10.1080/13574809.2014.890040 [16 May 2019].

Lo, R. H. 2009, Walkability: what is it?, *Journal of Urbanism*, 2(2), pp. 145-166. Available from: https://doi.org/10.1080/17549170903092867 [16 May 2019].

Ministério Público do Paraná 2018, Nota Técnica Conjunta (No 1). Available from: http://www.urbanismo.mppr.mp.br/arquivos/File/NTC01_2018CALCADAS.pdf [March2019].

Kelly, C. M.; Wilson, J. S.; Baker, E. A.; Miller, D. K.; Schootman, M. 2012, 'Using Google Street View to audit the built environment: inter-rater reliability results', *Annals of Behavioral Medicine*, vol. 45, no. 1, pp. 108-112. Available from: https://link.springer.com/content/pdf/10.1007%2Fs12160-012-9419-9.pdf [15 May 2019].

Saha, M.; Saugstad, M.; Maddali, H. T.; Zeng, A.; Holland, R.; Bower, S.; Dash, A.; Chen, S.; Li, A.; Hara, K.; Froehlich, J. 2019, 'Project Sidewalk: A Web-based crowdsourcing tool for collecting sidewalk accessibility data at scale', *Conference on Human Factors in Computing Systems*, vol. 62. Available from: https://dl.acm.org/citation.cfm?doid=3290605.3300292 [15 May 2019].

Speck, J. 2016, *Cidade Caminhável*, São Paulo: Perspectiva.

Tesouro Nacional 2019, *Relatório Resumido de Execução Orçamentária Simplificado – 6° Bimestre,* Siconfi, Brasil. Available from:

https://siconfi.tesouro.gov.br/siconfi/pages/public/declaracao/declaracao_list.jsf [07 february 2018]

Research Paper

The Importance of Participation and Inclusion in African Urbanization

A focused look at Transport and Housing Projects

Constant CAP, Naipolitans; Kenya

Abstract

According to the World Bank (2015) Africa's urbanization rate has surpassed other parts of the world. It is believed that by 2030, over 50% of Africans will reside in Urban Centres. Kenya is among the African counties that has experienced a tremendous increase in her urban population. This is most visible in the capital, the primate city of Nairobi. The growth has led to increased pressure on basic needs like housing, transport, water, education and security. Coupled with unequal economic development and social benefits, the result has been the tremendous expansion of informal sectors across fields.

To respond to some of this pressure, the central government has vowed initiate large projects in housing, transport, water and others (Republic of Kenya, 2018). Newly enacted legislation also provides for the establishment of multi-sectoral urban boards to oversee the delivery of some services. Among the major projects coming up include Affordable Housing schemes and Mass Rapid Transport investments such as Bus Rapid Transit and expanded commuter rail systems.

However, experience from the past both in Nairobi and other Cities has taught us the importance of inclusion, empathy and participation in such projects. Recent times have shown that public projects tend to ignore these and other key elements leading to massive failure of investment.

The paper investigates case studies from similar projects in other parts of Africa, Bus Rapid Transit Projects in Lagos, Dar es Salaam and South African Cities; past Slum Upgrading and Housing Projects in Nairobi and other parts of the continent. The research methods also involve data collection on inclusion and participation from those who are affected directly by these proposed projects as well as the impacts that previous projects have had.

The results from the study show that without proper communication and participation there are several misunderstandings on liveable spaces in cities. These include misinterpretations of the challenge's citizens face, on the intentions of proposed solutions as well as the socio-economic decision-making process of citizens. The implication of this leaves an unhealthy competition between existing informal 'structures' in various sectors against the new government driven proposals. The results are that those meant to benefit end up not being the primary beneficiaries.

In conclusion, the role of putting people primarily as the centre objective of planning remains critical and key. For African planners, diverting from this will increase the existing inequalities and lead to further social divisions.

Keywords

Africa, Participation, Informal, Transport,

1. Introduction

Urban areas have grown and developed at an astronomically high rate over the last century. The United Nations estimates that at present 55% of the world's population lives in urban centres. This is expected to get to 64% by 2050.

Though Africa has the lowest level of urbanization, Sub-Saharan Africa's urbanization rate is the highest in the world (Mckinsey, 2016). Africa experienced an increase in her urban population growth rate from 3.52 (2005) to 3.61 (2005-2010) to 3.70 (2010-2015). This currently lies at 3.58 (2015-2020). The growth rate of African Cities and towns is currently unmatched with Asia's at 2.80 (2005) to 2.43 (2005-2010) to 2.61 (2010-2015) and 2.56 (2015-2020). Europe, which is highly urbanized has experienced a growth rate of 0.33 (2005) to 0.46 (2005-2010) to 0.35 (2010-2015) and is currently at 0.35 (2015-2020). United Nations Population data 2019).

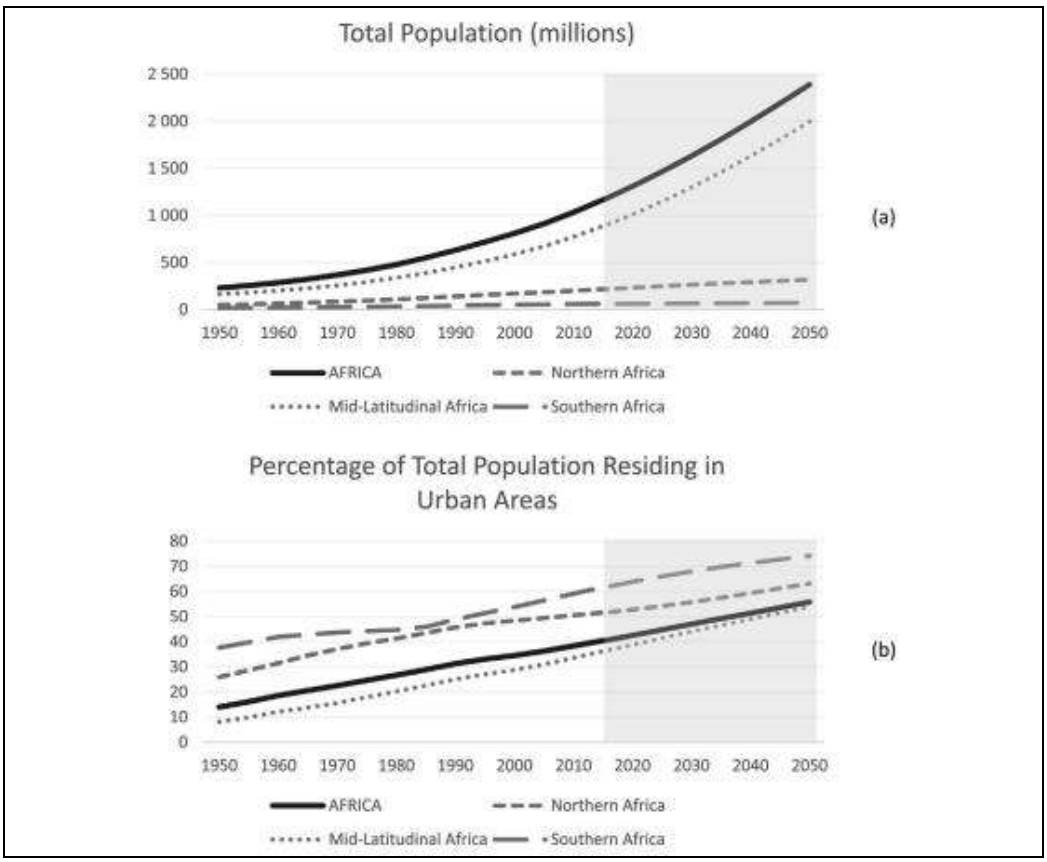


Figure 1: African population trends 1950-2050, Source: Guneralp

Rapid urbanization is seemed to be increasing the continent's productivity. Africa's urban population growth, however, has brought unique challenges and observers are questioning whether urban infrastructure, especially housing and transportation, can meet the needs of the ever-growing population (Anderson and Galatsidas, 2014). These challenges are coupled with high levels of unemployment, the growth of informality and various environmental risks and hazards. Traffic congestion, shortage of affordable housing, poor service delivery like

solid waste management and water supply environmental degradation through pollution are also evident.

The popular approach taken towards solving many of these challenges has been through engaging in bi-lateral agreements and more recently private-public partnerships. These are directed towards the development of mega-projects in affected fields. The transportation sector has seen a lot of focus on the development of highways and link roads. In housing, slum upgrading and multi storey affordable housing projects have been attempted. Bus Rapid Transit is currently being championed as a means of tackling transportation and congestion challenges. Multi-storey markets are being driven as possible solutions to the informal trading problems.

Inclusion, empathy and participation are important factors to be considered in urban development projects. Public participation is an action or a series of actions a person takes to involve themselves in affairs of government or community (Uraia, 2016). The role of participation has increased though legislation in the Kenya Constitution 2010. Kenyan policymakers have put strong emphasis on transparency, participation and accountability in the new Constitution and legal framework (World Bank ,2013). Global experience, however, shows that it takes time for systems to be put in place and for legal requirements to be fully functional. Many times, participation is only applied as a formality to 'rubber-stamp' pre-determined projects. Views of citizens are rarely looked at substantially and projects are determined in board rooms, seminars and studios. The results have been catastrophic, with very little understanding of the social infrastructure and ecosystem of citizens lives.

2. Public Participation in Urban Planning and Development

2.1. The Ladder of Public Participation

Participation can take different approaches as per the ladder of participation developed by Sherry Arnstein in 1969. The lowest levels those of 'Manipulation' and 'Therapy' which fall under the sub context of 'Non-Participation.' The highest levels are those of 'Citizen Control, Delegation and Partnership' which fall under the sub contexts of 'Citizen Control.' The middle sub context is that of tokenism which covers placation, consultation and informing.

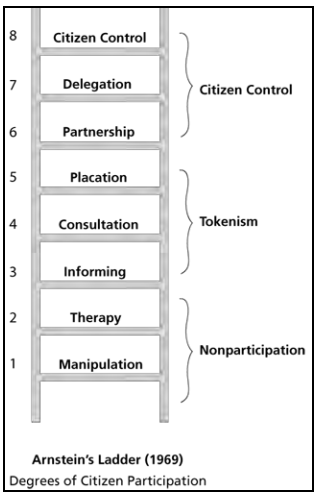


Figure 2: Arnstein's Ladder of Citizen Participation

The importance and necessity Citizen Control levels of participation other than the more dominant non-participation and tokenism methods cannot be undervalued. This importance has been visible in the successes and failures of many development projects in cities. Repetition of the same brings about similar if not worse results.

Some key necessities for good public participation include timely access to information; Reasonable access to the process of formulating and implementing policies, laws, and regulations; Protection and promotion of the interest and rights of minorities; Providing multiple opportunities for public participation; Legal standing of those interested or affected and Reasonable balance in the roles and obligations of county governance and non-state actors (Uraia, 2016).

2.2. Legal Framework for Participation

Under the 2010 Constitution, Kenya opted towards decentralization of powers, changing the relationship between government and citizens. The 2010 Constitution and new legal framework place a strong emphasis on strengthening public participation. (World Bank 2015).

Under Article 1(1-4), The Constitution states that, all sovereign power belongs to the people of Kenya. It adds that that the people may exercise their sovereign power either directly or through their democratically elected representatives both at national and county level. Article 33 points out that public participation should respect the freedom of expression of all participants while Article 35 guarantees citizens the right to access information.

Participation is important in governance and development because it enables 1. Increased trust between public officials and the community. 2. Citizens have a sense of belonging and trust in their community leaders. 3. There are diverse views from a greater citizenry, 4. Citizens are better informed on various developmental projects and government initiatives. 5. Community concerns are more focused and prioritized for public officials to address comprehensively. 6. Citizens' diverse and unique skills are revealed to government officials and to the community. 7. It contributes in setting the priorities of the community and better decision making. 8. The citizens is more aware of community concerns and can effectively judge government responses on issues affecting the community. 9. Public officials get a better understanding of community needs and are able respond effectively (Uraia, 2016)

2.3. Participation in Urban Development

Beazley (1994) states that for public participation in urban planning to be effective it ought to be equitable and efficient. Public participation is a critical aspect of the success of public infrastructure megaprojects (PIMs), in which ineffectiveness is a constant problem (Wu, 2019). Urban Mega projects have significant impacts on cities, on the way we practice planning and the way we involve the community in decision making processes (Beazley, 1994). Community members are constantly asking themselves how much influence they can have on the nature and shape of such projects.

Public participation is also important for the proper achievement and execution of the Sustainable Development Goals. Sustainable Development Goal Number 11 that SDG11 talks of inclusive, safe, resilient, just and democratic cities (UN Habitat, 2016). The New Urban Agenda, which was signed by several in 2016 represents a shared vision for a better and more sustainable future (UNHabitat, 2016). It describes how when well-planned and well-managed, urbanization can be a powerful tool for sustainable development. It covers key

thematic areas which include: Social Cohesion and Equity (Liveable Cities), Spatial Development, Urban Ecology and Environment, Urban Economy, Urban Frameworks, Urban Housing and Basic Services. This is not possible to achieve without proper participation, which according to Maceratini (2018), gives the greatest opportunity is to create trust between government and communities.

In urban development and planning projects there are several key factors that should be handled when attempting good and effective public participation. Maceratini identifies five as key and these include: 1. Every step in the decision-making process is taken involving the community, 2. Having a multi-dimensional perspective, listening to all voices 3. Involving all people, no matter what the rank or position in society (Engagement) 4. Space for dialogue between stakeholders 3. Social inclusion

Likewise, there are five challenges that emerge when one wants to have good public participation. These are: 1. Identifying key stakeholders, 2. Involving them throughout the process and keeping their trust 3. Making stakeholders communicate and sharing what they know 4. Understanding territory and enduring that the project transforms projects into opportunities and 5. Ensuring that the result is adopted by everyone.

3. Metropolitan Transportation Projects

3.1. Bus Rapid Transit in Lagos, Nigeria

The Lagos Bus Rapid Transit (BRT) was launched in 2008. It is a 22 Km segregated lane with 3 terminals and 26 stops. The private sector provides rolling-stock, recruits and trains crew and manages operations. The route was selected based on Gateway corridor High traffic demand Less Resettlement Action Plan. This BRT system is the first of its kind in sub-Saharan Africa and is the only example of a comprehensive and integrated approach to improving public transport. (Mobereola, 2009)

Mobereola (2009) states that there was an intentional attempt to involve stakeholders from the start and this was done through Study tours with union executives, a Series of high-level meetings with Union members, the involvement of senior politicians and the inauguration of BRT implementation committee. BRT officials were constantly engaged the public and promoted the new system. Negative comments primarily revolved around the need for more routes and buses.

The BRT development process included the formation of a Cooperative comprising Union members on the BRT corridor. A steering committee comprising Lagos Metropolitan Transport Authority (LAMATA) and the funding bank which provide professional advice on the management of the cooperative and BRT operations was also established.

In order to protect union members interests, a transparent cash slow process was designed. An interesting development was the Bi -lateral operation where Danfoes (Mini and Midi buses) and Molues (big yellow buses) operate on the service lane while BRT buses operate on the BRT lane.

This new form of the BRT scheme aimed at delivering a transport system that would meet the needs of local users, while improving citizens' quality of life, economic efficiency, and safety. Its success stems not solely from its infrastructure but from a holistic approach that has included reorganizing the bus industry, financing new buses, creating a new institutional

structure and regulatory framework to support it. It also involved training the personnel needed to drive, maintain, enforce, and manage it (Mobereola, 2009). An evaluation in 2009 pointed that over 200,000 commuters used the bus system daily. Passengers enjoyed a reduction of 30 percent in average fares and a saving of 40 percent in journey time. Public transport waiting time was also reduced by 35 percent (brtdata, 2019). The project is deemed to have met and exceeded its development objectives, proof that there is no substitute for a well-conceived project managed by a competent implementing agency (Gorgam et al, 2017).

3.2. Reya Vaya Bus Rapid Transit, Johannesburg, South Africa

Johannesburg has a Bus Rapid Transport system called Reya Vaya. Studies indicate that it has lower passenger demand, poorer financial performance and higher subsidy requirements than initially hoped (Venter, 2016). In 2016, it catered for only 1100 daily boarding's per kilometre as compared to the minimum of 8000 in other cities.

The South African government recently admitted that it had been a mammoth flop. Commuters have shunning the system in favour of taxis and ordinary buses. One major setback has been its low area coverage which makes informal taxis more favourable (Mabena, 2017). This has forced the government to highly subsidize the service as the fare revenue is not enough to sustain it (Venter G, Hays C, 2017).

Findings from a study done with a local community revealed that little community participation was conducted prior to the implementation of the transportation project. The interviewed participants stated that they were not involved in the determination of the routes that Rea Vaya would take (Venter, 2016). This left many wondering who the development is for: the government's or the community's? The project was also rushed in order to be ready in time for the FIFA World Cup in 2010.

The lack of or poor participation is seen as one of the reasons why those implementing the project failed to realize what Venter (2016) pointed out from his research: that distinct market segments had different needs e.g. Choice passengers have a very limited willingness to pay for the travel time savings procured with dedicated trunk lanes, but place much higher value on good access, higher frequencies, and, above all, the overall service quality.

3.3. Dar es Salaam Bus Rapid Transit (DART)

For more than fifty years, residents of Dar-es-Salaam city faced public transport problems which were seen through traffic congestion and several fatal vehicle accidents. A Bus Rapid Transport system was proposed as a possible solution to these challenges.

A study done in Dar es Salaam prior to the development of the BRT system stated that though many were of the perception that it would be helpful in reducing travel time, it was perceived to benefit specific groups of people, particularly professional workers or a 'higher class' (Joseph, 2018). Based on the physical location of the DART line, the number of transfers for individuals commuting from peri-urban area to the CBD changed from one (direct route) to two transfers. However, since the BRT system started its operation in 2016, it has been found to be an effective solution for urban transport problems in the city. The benefits of the system have been recognized though improved mobility and satisfaction with public transport (Chengula and Kombe, 2017).

Matteo R (2015), discredited "win-win" narratives by showing what some Tanzanian actors stood to lose from the implementation of the Dar es Salaam Rapid Transit scheme. He points out that there was slow implementation of the transport system due to the tepid commitment to the project by the Tanzanian government. This was due to domestic politics, and the government's attempt to respond to the priorities of the World Bank without alienating local actors. Some of these actors wield considerable electoral power.

The urban poor and vulnerable also face access constraints. It has also been noted several the stations are not aligned with stops, stands, and stations of other modes. Consequently, most passengers spent up to 20 minutes to walk to the DBRT stations/terminals (Chengula and Kombe, 2017). There are also concerns about fares, which are 55% more than *daladala's (informal transport minibuses).* This is despite an initial pledge from DART officials that they would be comparable (Matteo, 2019). These high fares have forced many of the poor to use informal transport systems which run parallel to the BRT but in normal traffic. The higher fares given benefit to those who can afford to travel without any worry of traffic congestion. For the service to be more inclusive, some form of government subsidy will be necessary (The Citizen, 2016).

From a technical perspective, Chengula and Kombe, (2017) state that for the DBRT system to be viable life cycle cost and sustainable project there should be connections between DBRT truck roads and arterial roads and coverage of remote areas. In this regard, informal public transport is still key to taking people to work, school, shopping and social matters. Time efficiency, flexibility, mode availability, and access to high- and low-density unplanned areas are some of its key features that BRT system is unable to fully replicate. (Joseph L, et al, 2018).

4. Metropolitan Housing Development Projects

Housing remains a visible symptom of the vast poverty affecting the poor in Africa's cities. The development of informal settlements in sub Saharan Africa has been one of the highlights of its urbanization process over the last 50 years. Governments are also unable to keep up with and provide social housing for the urban poor. A more recent trend has been to 'formalize the informal' through slum upgrading projects. These have been done in several cities with varying levels of success. Affordability, however, remains a challenge in the formal housing market for low income households. *In Situ* upgrades through community participation have become more common recently and are being considered as global best practice (Williams, 2006).

4.1. Lagos Metropolitan Development and Governance Project (LMDGP)

Lagos is one of the largest cities on the continent and experiences a massive housing shortage. 60-80 percent of urban Nigerians are estimated to live in slums and informal/squatter settlements. The World Bank financed the Lagos Metropolitan Development and Governance Project (LMDGP) as an attempt to improve living conditions of slum dwellers by enhancing their access to infrastructure and services. The project started with a demolition with only a 24-hour notice (without written notification). This completely undermined essence of consultation and participation. In what could be an attempt to cover face by some, extensive consultation was conducted throughout the preparation and implementation of the Relocation Action Plan (RAP) for the 2,296 displaced households in

Badia East. This included at least nine consultative meetings. The RAP uploaded on the website of the Lagos State Government, advertised through three national newspapers, and four hard copies were made available for 21 days in the Apapa-Iganmu Local Council Development Area (LCDA) (World Bank, 2015). The bank stated that the full extent of the risks associated with involuntary resettlement as a result of the LMDGP's slum upgrading and other activities was not have been fully apparent at the beginning of the project, especially considering the complex political economic dynamics. A report on the project added that the promoting if comprehensive and integrated urban planning approaches was necessary (World Bank, 2015).

World Bank policies require the engagement of communities in any project that might involve displacement. In Badia East, these requirements were ignored (Pereras, 2016). Sinani, (2014), in his article *'The World Bank Just Made Lagos Poorest Poorer'* states that Badia communities are demanding justice. He points out that 'The least the World Bank can do is implement its own policies.'

4.2. Kenya Slum Upgrading Project (KENSUP), Nairobi

The Kenya Slum Upgrading Project was established by the Government of Kenya and UNHabitat to construct and resettle residents of Kibera's Soweto East Village in more decent and sustainable housing. Approximately 6299 residents who lived in 976 structures were affected. The residents were moved to reside at a 'decanting' site as the new high-rise structures were constructed. According to (Komollo, 2017), very little participation was done, and stakeholders did not have access to maps and drawings of the proposed project. On the ground, most dwellers also claimed that they were not consulted (Good Fortune, 2009).

There was also little information on the financing structure for the residents. This was worrying as many predicted that they would be requested to pay more that the rents that they had been paying at the slums.

Eventually, when the time to relocate came there were several hitches as some houses had already been allocated to outsiders. Some tenants who were awarded houses ended up losing them due to inability to pay up. Others rented the houses out and moved back to the informal settlement. They cited various reasons for doing this. Amongst them was the inability to support themselves in the new neighbourhood and inability to access infrastructural services because of distance and high rent rates (Mureithi 2016).

To date the decanting site remains occupied while the houses are fully occupied. But about half of those who officially received houses in the new apartments in Soweto East no longer reside there. These units have either been given away, sold or rented out (Higgins, 2013).

The project was deemed to be an extension of earlier top-down interventions in the settlement. This was the typical case where state actors shift the boundaries of the formal and the informal and at the same time acting inside and outside these shifting boundaries (Flink, 2016). The discontent caused among the dwellers led to more problems. Adegun (2018) suggests that this is an indication on how Kenya's government is ignoring social and economic factors when relocating people from slums.

4.3. Zwelisha Slum Upgrading Project, Durban

In South Africa, the proliferation of informal settlements has deepened poverty and unemployment levels, prevented empowerment and increasing inequality. (Mbutu, 2014)

Patel, (2013) points out Zwelisha, an upgraded settlement north of Durban, South Africa, as an example of a successful slum upgrade. He uses data from an ethnographic study to show that successful outcomes are intrinsically tied to the way the upgrade process is implemented. He explains the importance of the continued and consolidated power and influence of the local community development committee (CDC) following upgrade. The residents agree that the upgrading was a success citing the improved quality of life they now have.

The CDC led the residents through the entire process of applying for the housing subsidy, depending on whether they were eligible (Mureithi, 2016). However, there ought to be caution of how the state's approach to community participation in slum upgrades may consolidate and legitimise informal power relations that may not be necessarily benevolent (Patel 2013).

In this case, formal changes in the settlement that led to improved security of tenure and improved quality of life (defined by residents lived realities) depended upon informal continuities.

5. Results, Insights and Findings from this Study

Lind (2011) states that Urban planning with public participation has not always been deemed necessary. As recent as 50 years ago, planners were considered 'demigods' who had transformed cities to be beautiful, healthier, cleaner, and more stable places. Planners had come to be trusted by the people. However, recent experience has led to Gorham et al, (2017) to point out that urban transport projects can only be successful if they are cooperative, involving all stakeholders. Flick (2016) defines stakeholders as the individuals, groups, or organisation, who may affect, or be affected, by a decision, activity, or outcome of a project. He explained that it is important for every stakeholder to be considered and considered in order to provide successful projects. This requires a solid communications plan and proper stakeholder analysis. General stakeholder management process consists of stakeholder identification and gathering relevant information, analyse stakeholders and their potential impact, and at last, developing adequate management strategies. (Flick, 2016).

Although studies have focused on public participation, a method that can measure and improve its effectiveness is lacking. (Wu, 2019). Up to date, the urban development process of Nairobi is still dominated by public interventions permeated by non-participatory technocratic instruments of urban space production (Omenya and Huchzermeyer 2006; Oyugi and Owiti 2007). There is new hope however to improve urban governance through citizen participation in planning given the recently enacted urban policies. (Mwaniki et al, 2015). A Study done in Nairobi Central Ward by University of Nairobi revealed that there was a very weak relationship between public awareness and participation in urban planning projects but there was no relationship between degree of accessibility and public participation in urban planning projects. It was also established that there exists a weak

positive correlation between a person's financial situation (income, expenditure and savings) and their participation in urban planning projects.

The success and failures of the projects above depict the importance of some of the key necessities of good public participation as listed earlier. A simple analysis can showcase how the success can be measured against the parameters given.

Principle	**Lagos BRT**	**Reya Vaya**	**Dar BRT**	**Lagos Slum Upgrade**	**Durban Slum Upgrade**	***KENSUP***
Access to information	Good	Poor	Average	Poor	Good	Poor
Access to policy formulation process;	Good	Poor	Good	Poor	Good	Poor
Protection minority rights	Good	Poor	Average	Very Poor	Good	Very Poor
Opportunities for public participation;	Good	Poor	Good	Poor	Good	Poor
Legal standing of those interested or affected;	Good	Good	Good	Poor	Good	Poor
Balance in the roles of various actors	Good	Good	Good	Poor	Good	Poor

Figure 3: Estimated Levels of success of participation per project Source: Study

From the information collected and looking at the table above can give a general overview of what levels of public participation were experienced at the different projects. The levels of participation are also an indication on how empathetic those behind the projects were as well as how well the projects were communicated to stakeholders.

Lagos BRT	Reya Vaya	Dar BRT	Lagos Slum Upgrade	Durban Slum Upgrade	*KENSUP*
Citizen Control	Tokenism	Tokenism	Non-Participation	Citizen Control	*Non-Participation*

Figure 4: Participation Levels taken at each project Source: Study

It is quite noticeable that there is a relation between the success levels of urban development projects and the levels of participation. Rucker (2011), stated that If the people who live around a proposed development oppose a development, chances are those people know something that is important to the health of their neighbourhood and the larger community. He views them as the source of its collective intelligence. At lower levels of participation, at times seen as 'conventional' participation or 'rubber-stamping' as is known in Kenya, it makes the mistake of privileging a few. Different project will affect different actors where their specific interests will vary depending on project type but also throughout the project's execution. (Flick, 2016). Participatory planning cannot be a paper commitment that is confined to policy documents, theoretical debates and municipal business plans.

There is therefore a need to identify ways to make this concept a reality, particularly in addressing developmental needs (Mbutu,2014).

Klopp et al (2019), point out that a key problem is that the focus on BRT as a "project" to displace and modernize the existing transport system. Additionally, in areas of transport governance in Africa there are low levels of transparency, information sharing and public participation in decision-making. Consultants are also well known to invite the public for participation meetings with little intention of making any changes to their proposed projects.

Planning professionals' failure to engage with communities in an integrated and inclusionary manner has made things even worse when it comes to community empowerment initiatives (Mbutu, 2014).Even though locals can share their socio-economic and cultural perspectives to make projects successful, professionals continue to assume their own perspective of the different fields to be correct. Residents have a level of detail and a critical perspective that can make the difference between whether a proposed project supports the health of the community or creates a new burden (Rucker,2011).

6. Conclusion

The necessity to put people at the centre of all planning and development activities cannot be ignored. This starts with proper identification of stakeholders and understanding how project will impact and influence their lives. Their participation in the planning process can help prevent 'white elephant' projects and ensure that social justice takes place accordingly. A lot of wastage in both time, money and other resources can be avoided when and extra effort is put into this.

Citizens are also more aware of their right to be consulted and the failures of 'top-bottom' projects have raised many concerns. Unfortunately, we still see many public agencies and private consultants approaching participation merely to approve projects without looking the potential long-term challenges that this brings.

These are lessons for the Kenyan government as they approach the Affordable Housing projects under the Big 4 Agenda as well as Nairobi Regeneration Strategy. This will enable them to ensure that further socio-economic divisions are not created from projects that aim at serving the urban poor.

Understanding the real reasons why people oppose a project requires the willingness to do so, the humility to listen, and the internal fortitude and self-assurance to admit that possibly, we don't know everything that there is to know. That is the real mark of wisdom. (Rucker, 2011)

7. References

Adegun, (2018), African cities must address social and economic issues when upgrading slums, in The Conversation, available at: http://bit.ly/2xXUOUG , accessed on 11th June 2019

Allen H, (2011), Africa's First Full Rapid Bus System: the Rea Vaya Bus System in Johannesburg, Republic of South Africa, Nairobi

Arnstein's Ladder of Citizen Participation, viewed at: http://www.citizenshandbook.org/arnsteinsladder.html on 9th July 2019

Beazley, M. (1994). Public participation in urban mega-project planning: a case study of Pacific Place Vancouver, B.C. (T). Retrieved from http://bit.ly/30LwO3p

Burak Güneralp et al 2017 Environ. Res. Lett. 13 015002

Chengula, D.H., Kombe, K., 2017. Assessment of the Effectiveness of Dar Es Salaam Bus Rapid Transit (DBRT) System in Tanzania. International Journal of Sciences: Basics and Applied Research

Elisa Maceratini E., (2018), Participatory urban planning, available at: https://youtu.be/MQHJCD-cQ4Y (viewed on 10th July 2019)

Global BRT Data, viewed on https://brtdata.org/location/africa/nigeria accessed on 10th July 2019

Gorham R, Eijbergen B and Kumar A, (2017), Urban transport: Lagos shows Africa the way forward (again), in World Bank Blogs, available at: http://bit.ly/2JORGjE (Accessed on 12th July)

Government of Kenya, (2016), County Public Participation Guidelines, Ministry of Devolution and Planning and Council of Governors,

Government of Kenya, (2017), County Governments Act

Hussein M, Socio-Economic Factors Influencing Community Participation in the Redevelopment Planning of Nairobi: A Case of Muthurwa and Kaloleni Estates in African Research Journal of Education and Social Sciences, 4(3), 2017

Joseph, L. et al, (2018), Activity participation and perceptions on informal public transport and bus rapid transit in Dar es Salaam city, 37th Annual Southern African Transport Conference (SATC 2018), South Africa, 9-12 July, pp594-607

Kenya Devolution Working Paper 2, (2015), Basic Requirements for Public Participation in Kenya's Legal Framework, Kenya School of Government

Lind, D, (2011), Control the Masses: Andres Duany in Architect, The Journal of the American Institute of Architects available on: http://bit.ly/2Yf4Wr4 (viewed on 14 July 2019)

Lufeng Wu; Guangshe Jia; and Nikhaphone Mackhaphonh, Case Study on Improving the Effectiveness of Public Participation in Public Infrastructure Megaprojects in Journal of Construction Engineering and Management, Volume 145 Issue 4 - April 2019

Lwakatare R et al, Evaluating the Impacts of the Dar es Salaam BRT System, March 20, 2018

Mabena S, (2017), Gauteng BRT a White Elephant: Minister, Times Live, 11th July 2017 available at: http://bit.ly/2Z09sH9 (viewed on 10th July 2019)

Matteo R (2019), Dar es Salaam's new rapid bus system won international acclaim – but it excludes the poor, in The Conversation 22nd January 2019, available at https://theconversation.com/dar-es-salaams-new-rapid-bus-system-won-international-acclaim-but-it-excludes-the-poor-109987 accessed on 10th July 2019

Mbuthu S.N, (2014), The role of participatory planning during the upgrading of informal settlements. A case study of Briardale, Newlands West in eThekwini Municipality, University of Kwa Zulu Natal,

Mobereola, B, (2009), Lagos Bus Rapid Transit, Africa's first BRT scheme, Sub-Saharan Africa Transport Policy Program

Mureithi C, (2016), The Evolution of Slum Upgrading: Mainstream Approaches Used, Lund University

Mwaniki D, Wamuchiri E, Mwau B, Opiyo R, (2015), Urbanisation, Informality and Housing Challenge in Nairobi: A Case of Urban Governance Failure? In RC 21, International Conference on 'The Ideal City: between myth and reality (pp 27-29). Urbino

Namano, B, (2015), Factors Influencing Public Participation in Urban Planning: A case of Nairobi Central Ward, University of Nairobi.

Matteo R, (2015), The Political Economy of an Urban Megaproject: The bus Rapid Transit Project in Tanzania, in African Affairs, Vol. 114, No. 455, April 2015, pp. 249-270,

Narae, C, (2015), Nigeria slum upgrading, involuntary resettlement, land and housing: lessons learned from the experience in Lagos and other mega-cities (English), World Bank Report.

Patel K, (2013), A successful slum upgrade in Durban: A case of formal change and informal continuity in Habitat International, volume 40, October 2013, Pages 211-217

Perreras A, (2016), In Badia East, Lagos, a Story of Devastating 'Development', Medium, available at http://bit.ly/2Yix4cC (accessed on 10th July 2019)

Ross, D. and Townshend, M. (2018) 'An economics-based road classification system for South Africa', 37th Annual Southern African Transport Conference (SATC 2018), Pretoria, South Africa, 9-12 July, pp. 11-21. isbn:978-1-920017-89-7

Schramm S, (2017), People's room for manoeuvre in a fragmented city: State housing in Kibera, Nairobi, in Transformation Critical Perspectives on Southern Africa 93(1):116-141 · January 2017

Sinani, N, (2014), The World Bank Just Made Lagos' Poorest Poorer, HuffPost available at: http://bit.ly/2y6Qdjn (Accessed on 10th July 2019)

The Citizen, (2016), Dart feared to crash without govt subsidy, 6th January 2016, available at: https://www.thecitizen.co.tz/News/Dart-feared-to-crash-without-govt-subsidy/1840340-3023050-wudbeiz/index.html accessed on 15th July 2019

Townsend M and Ross D, (2018), An Economics- Based Road Classification System for South Africa, University College Cork, Ireland.

Ubisi S, (2016), The social impacts of the Rea Vaya bus system on the residents of localities affected by the development: The Case of Rea Vaya in Moroka, Soweto, Submitted to the University of the Witwatersrand, Johannesburg, in the school of Architecture and Planning

United Nations (2019), World Urbanization Prospects 2018, viewed on https://population.un.org/wup/DataQuery/ accessed on 24th June 2019

United Nations (2017), New Urban Agenda, Quito

UNHabitat (2013), Participatory Slum Upgrading Programme (PSUP) seen on: http://bit.ly/2JRs1GX accessed on July 5th, 2019

Uraia, what is Public Participation, Kenya National Civic Education Programme

Venter C, Hays G (2017), South Africa needs to revamp its new public transport system, 12th October 2017, http://bit.ly/2JVtD2z accessed on 14th July 2019

Williams J, (2016), Community Participation: Lessons from South Africa. in Policy Studies, January 2006

Case Study / Project

IMPROVING THE QUALITY OF PUBLIC SPACE

IN BOGOR CITY THROUGH CSR FUNDING SCHEME

Adriadi DIMASTANTO, Rachmatika Fitri INSANI TANJUNG, Tri SAPTIWI

Abstract

Bogor is a city located 40 km to the south of Jakarta, which is a satellite city in the Greater Jakarta Metropolitan Area and has unique characteristics among other cities in the Metropolitan. The city has a characteristic as a garden city, which in its history, was called by the Dutch colonial as a "buitenzorg" or a "pleasant city". The Dutch colonial government as well as Britain in the era of their governance designed this city as a city of rest. One of them is indicated by the existence of the Bogor Botanical Gardens and the vast presidential palace in the heart of the city. Unfortunately, today Bogor continues to experience degradation in terms of the quality of space. Congestion, chaos, slums, and a myriad of other problems that are commonly faced by cities over 1 million inhabitants. In the last 5 years, Bogor has improved. One of the most important things that had been done by the local government was the improving quality of public spaces such as city parks, plazas, pedestrian ways, etc, and the attempt to restore the character of the city as a garden city. Over time, the city government began to face several obstacles, especially funding. Inadequate fiscal capacity of the local government makes the mission of improving the quality of urban public space stagnant. In one year, on average the government budget was only 2.5 trillion, and on average only 10 billion per year was allocated to build city parks, where the amount of this budget was seen as very minimal. Facing this obstacle, the city government innovated by inviting the private sector to contribute to the provision of city parks, one of which was through the CSR scheme. This was something that was not normal in Indonesia, and it was seen as one of the innovations in building city parks. This paper aims to explain one of the city park development projects in Bogor using the CSR fund scheme, which took place in April 2016-February 2017. The preparatory activities took place in April-August 2016, while the construction took place in September 2016-February 2017. The Project was the construction of outdoor children playground in the city center by utilizing CSR funds from one of the convenience store companies, which were channeled through children's foundations, and later appointed a third party to design and build the park. Activities were carried out with a "design and build" scheme, where the third parties (consultants and contractors) carried out the design and the construction as well. The development process was carried out through various stages such as discussions with local residents, with the mayor and his staffs, and discussions with funders as well, with the city government as a facilitator. It can be learned from this project that financing innovations through CSR scheme can be arranged to improve the quality of urban space towards a more livable city. This model can be one of the best practices and should be replicated in various cities in Indonesia.

Case Study / Project

Developing a Spatial Transformation Scoring Tool

to Monitor South African Catalytic Housing Projects

Raeesa GHOOR, Keneilwe PHOLO, Karishma BUSGEETH

Abstract

Spatial transformation is an important concept in the South African housing sector and has a specific meaning in the South African context (HDA, 2017a). Spatial transformation in South Africa is not only about restructuring or change but additionally deals with redressing the spatial legacies of apartheid (ibid). The Spatial Transformation Scoring Tool (STST), developed by the Monitoring and Evaluation, Knowledge Management and Research Planning unit in the Housing Development Agency is currently being used to assess housing projects classified as catalytic projects. Catalytic projects are intended to be high impact, sustainable and integrated mega human settlement projects (HDA, 2017b). The STST was initially developed through a study the HDA published in 2017 analysing one of government's housing programmes, the integrated residential development programme (IRDP), in four case studies (HDA, 2017a). The STST has since evolved to encompass approximately 160 indicators within ten pillars. The spatial transformation indicators aim to monitor change in the urban environment via the ten pillars of land value-add, integration, socio-economic development, functional and equitable residential property markets, public safety, return on investment, urban management, quality, a human settlements transformation scorecard and transversal alignment (HDA, 2017a). It is a tool that is constantly evolving and adapting with the unit's interaction with project managers, town planners and other professionals in the sector. The monitoring of catalytic projects with the STST have highlighted several challenges as well as opportunities both for catalytic housing projects and the STST. The STST is proving to be an effective planning tool.

This paper intends to explore the challenges, opportunities and lessons learnt of the STST in monitoring housing projects in South Africa. References: HDA. (2017a). Assessment of the Integrated Residential Development Programme (IRDP) and its Impact on Spatial Transformation. HDA: Johannesburg. HDA. (2017b). Marketing Plan for Catalytic Projects. Presentation. HDA. About The HDA: äóìThe Housing Development Agency (HDA) is a national public sector development agency that acquires and prepares land as well as develop the land and project manage the development of housing and human settlements. We carry out our activities in partnership with a range of stakeholders including national, provincial and local government and municipalities, as well as with communities, developers, financiers and other affected parties. Established in 2009, the Agency is established by an Act of Parliament in 2008 and is accountable through its board to the Minister of Human Settlements.äó Source: HDA. (2017c). Who We Are. Available at: www.hda.zo.za

Case Study Paper

Planning Transit Oriented Development (TOD) in an African City Facing Rapid and Informal Urban Growth

The Case of the Urban Mobility Plan of Conakry, Guinea

Sebastien Goethals, Citilinks; Belgium
Alioune Thiam, AfriAccess; Senegal

Abstract

Originally planned at the extremity of a peninsula, the capital of Guinea has faced a continuous demographic and spatial growth during the last decades, marked by insufficient actions in terms of planning regulations.

Surrounded by the Atlantic Ocean and vast areas of mangroves, Conakry forms a linear and narrow agglomeration of 40 kilometres long spreading on its peninsula. Its current population of 2.5 million inhabitants is projected to reach more than 5 million people by 2040, while its spatial growth has already reached its natural limits. Many of the informal settlements that characterize the urban structure of Conakry suffer from poor accessibility and from one of the lowest urban densities of street networks observed in Africa. Started in 2017, the Urban Mobility Plan of Conakry (EU funded program to national transport sector), has targeted the strategic and operational planning of a multimodal public transport network combined with a healthier and decentralized urban development model.

Marked by a constrained spatial growth and a unique but underused railway infrastructure originally built for mining transport, Conakry brings a rare opportunity of transit-oriented development application in a context of informal urbanization, associating BRT and railway, pedestrian accessibility and road safety with polycentric redevelopment.

The lack of urban governance and planning culture in Conakry makes many synergies between transport and land use invisible to the eyes of local decision-makers. Responding to the lack of urban development strategy and land use control, the Urban Mobility Plan of the Guinean capital came along with multiple short-term actions and decision-making tools with the aim of starting to implement the plan's orientations through smaller actions and initiatives integrated into larger strategies for the city. The article illustrates the methodology of the Urban Mobility Plan as an operational decision-making tool for Conakry and a strategic investment plan to associate economically viable infrastructure with people-oriented public spaces and accessibility for all.

Keywords

Transit-oriented development; Conakry; Polycentrism; Mass transit; African cities; Multimodal

1. Urban form, (im)mobility and impoverishment

1.1. Conakry, a spatially constrained urban growth for a booming urban population

Since the independence of Guinea, Conakry's urban population has been growing at an annual rate of 6%, with a population reaching 2.5 million in 2017, and its urban area has quintupled in size. The geography of the Guinean capital is marked by specific natural conditions: a narrow peninsula surrounded by the Atlantic Ocean at its extremity and by mangroves and wetlands, that are also the cradle of the halieutic resources of the country.

Urbanization of Conakry hasn't been coupled with economic growth or with coordinated urban policies able to address appropriate response to the demographic growth. Happening along a corridor of three to five kilometres wide, urban sprawl was led in only one direction, in the axis of the peninsula, eventually to be stopped by the Mount Kakoulima.

Figure 1 Drone view of the KM36 intersection, Dubreka

New settlements grew informally mostly along the three main roads connecting Kaloum, the historic centre and port of Conakry, with the rest of the country. Conakry (and its historic centre at the extremity) is not only a capital city but also a major port and logistic hub in Guinea and West Africa, benefiting from two specific railway lines built in the early 20th century to link Mamou, Kankan and the mining activities in Fria. These two railway lines naturally run along the urbanizing peninsula, bringing a critical potential infrastructure for public transport and accessibility to urban settlements. However, such railway has been mainly used for freight trains, at the exception of the recently operated Conakry Express, a passenger train running twice a day between Kaloum and Kagbelen, 34 kilometres away.

1.2. Constrained mobility, inefficient transport system and dramatic lack of accessibility

The importance of Conakry as a logistic hub with its Port and as a main market place in West Africa (market of Madina) attracted most of the efforts and attention in terms of planning and investment to freight traffic and logistic issues. While only three main radial trunks (Fidel Castro urban highway, Le Prince Road and Corniche Nord) are linking the city centre with the rest of the agglomeration, Conakry suffers from one of the lowest densities of urban roads among Africa cities. Primary roads are assuming multiple functions and roles, absorbing linear and informal market places, freight traffic coming from the Port and most of the motorized traffic and pedestrian flows, with almost no pedestrian space to walk on. This situation is amplified by the dramatic lack of secondary roads and paved streets giving accessibility to neighbourhoods, which diverts most of inter-neighbourhood traffic and flows to the primary roads.

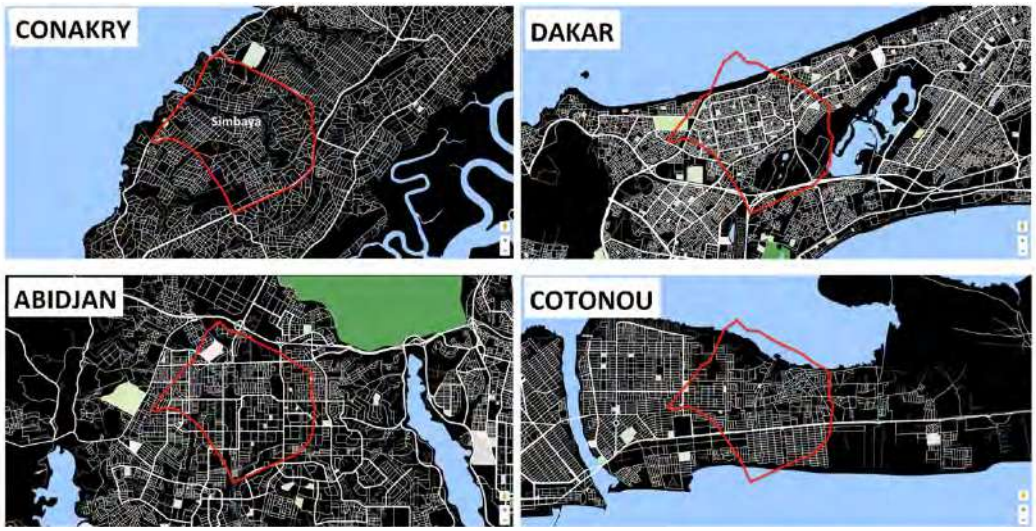


Figure 2 Compared densities of road and street networks in four West African cities

With a city centre located at the extremity of the peninsula and no decentralization policy, commuting trips have constantly increased over the years and have been concentrated on the very few main roads that were never designed for a city and for its people. Public transport, mostly consisting on minibuses called magbanas, shared taxis and taxi-motorcycles offer relatively low-cost services but with poor conditions of transport. Daily commuters face extreme conditions of road unsafety and congestion, most of them spending around 20% of their monthly income to reach their destination.

This lack of accessibility in human conditions leads to the increasing impoverishment of the urban populations and represent one of the main obstacles to a healthy urban development, as accessibility to opportunities for everyone is completely lacking. The urban form of Conakry reinforces this trend, as the fare of the journeys is based on the distance to destination. The more Conakry grows, the more its poverty increases.

2. Planning mobility for Conakry: Where to start?

2.1. The "transit master plan for Conakry", a traditional planning tool facing institutional and urban complexity

In 2017, the transit master plan of Conakry ("Plan de Déplacements Urbains" in French) was initiated and funded by the European Union and its support program to transport infrastructure, at the attention of the Ministries of Transport and of Public Works. In Guinea, urban mobility and transportation are organized and supervised by the national government. The governorate of Conakry still has little capacity to respond to the scale of urban growth's challenges faced by the city. However, the government initiated his Inter-ministerial Committee for Territorial Planning, reuniting 12 ministries. In this context, the transit master plan is at risk to be a technical study without effect. The institutional legitimacy of the plan became therefore an essential factor of success, an issue that led the team to create the Urban Mobility Working Group during the study, including all the stakeholders concerned by transportation in Conakry, and dedicated to become the working group that will implement the future urban transport authority.

In order to respond to urgent mobility issues and to anticipate the future demand and challenges, the plan has been conceived as a holistic mobility plan, targeting priorities according to feasibility with timeframes (2020 to 2040) and to scales and levels of interventions (metropolitan area, district, neighbourhood, street).

One major challenge was to elaborate actions with synergies and mutual benefits between pedestrians, mass transit and other public transport services, transporters syndicates, freight traffic and logistics stakeholders (rail & road). One of the approaches to face this complex patchwork of street/road users and transport stakeholders was to create a decision-making tool that everyone could understand. The mobility plan was therefore translated into an investment plan divided in 5-years periods, including traffic and safety measures at all scales and accompanied by design guidelines. The metropolitan scale of the vision of Conakry for 2040 has been illustrated by a physical model of 5 meters long expressing and synthetizing all the proposed actions for each mobility mode and at each spatial level.

Figure 3 Urban Mobility Plan of Conakry: Five-Year Investment Plan, period 2

2.2. Identifying the major obstacles to mobility and liveability

Eight major obstacles to a sustainable and healthy mobility of populations have been identified in Conakry. These obstacles are to be observed in the perspectives of the

demographic growth of Conakry, constrained geographically by almost no possible spatial growth. While the population of the agglomeration, including Coyah and Dubreka, will exceed 2.8 million in 2020 with an average density of 16,000 inhabitants/sq.km, these numbers are projected to be doubled by 2040. Such population growth also means a young urban population, with more than the half of it under 20 years old. The question of urban densification is more critical in Conakry than in other African cities because of its geographical specificities. Coyah, Dubreka and Kouria might absorb partly this demographic growth, but the major environmental risk is in the gradual urbanisation of the wetlands and mangroves, home to a rich but fragile ecosystem, and also an essential economic (halieutic) resource for the local population.

In this context, the most important obstacles to mobility and to viable city have been addressed:

- Conakry has only one economic and administrative urban centre (Kaloum), and its main market (Madina) is also located at the extremity of the peninsula;
- The density of roads and paved streets is dramatically low and leads all the traffic flows to the main trunk roads;
- Road safety issues are growing proportionally with the rapid urban population growth;
- Informal public transport is inefficient and becomes a source of congestion and unsafety itself;
- Existing road networks cannot allow the implementation of an appropriate public transport system with financial viability;
- The railway infrastructure running through the city is underused for both passengers traffic and freight traffic;
- Urban population density is constantly increasing in settlements that were never conceived to absorb such demographic pressure;
- The urban agglomeration is growing in only one direction, further away from the city centre, increasing the lack of accessibility and the cost of transportation for (sub)urban population.

2.3. Nine key measures to unlock Conakry's urban populations

The complex relation between the lack of planning, hyper-concentration of key economic functions, road safety issues, lack of accessibility to opportunities and impoverishment of local populations required to think beyond transportation and mobility and to anticipate appropriate land use policies. Nine key measures were identified as starting points to develop short to long-term strategies in each sector with a holistic approach:

- **Implement immediate actions** considering current physical conditions and institutional capacity, such as **low-cost interventions** on street rehabilitation in Kaloum, road safety measures, pedestrian space protection and parking management;
- Develop a **multimodal mass transit network** (heavy rail transit + bus rapid transit) using and improving existing infrastructure, adapted to a linear agglomeration of 45 kilometres long;
- **Hierarchise the street networks** of Conakry and address **design guidelines** for each type of axis, including road safety measures, pedestrian accessibility, speed limitations and parking management;
- Create or reconnect **networks of streets and secondary roads**, using existing and unpaved paths;
- Elaborate **holistic traffic plans** for each neighbourhood;
- Elaborate a multi-scale **Pedestrian Master Plan**, introducing the concepts of pedestrian corridors and multifunctional public spaces;
- Shift the majority of **road freight traffic to the railway**, and develop accordingly the **dry port** of Kagbelen, to be combined with the construction of a major market area and urban logistic hub along the railway;
- Plan a **polycentric city relying on TOD**, by decentralizing economic, administrative and logistic functions in 3 metropolitan subcentres and 9 mixed-used hubs and districts;
- Create a **metropolitan transport authority** that will be able to lead a mass transit network project and integrate land use and urban transport policies to achieve transit-oriented development (TOD).

3. The urban form challenge and the TOD approach of accessibility for all

3.1. A multimodal mass transit system using the existing infrastructure

To decentralise Kaloum and Madina's functions and achieve a polycentric city with more spatial equality in accessibility along 45 kilometres of urban settlements, three major metropolitan subcentres were proposed. Koloma would absorb government and ministries offices and administrations, as planned earlier by the national government. Sonfonia would become an urban free trade zone. Kagbelen would see its dry port developed further with enhanced railway infrastructure and logistic facilities, associated to a new primary market district able to gradually deconcentrate the activities in Madina. Every new subcentre operation is associated to affordable housing programs.

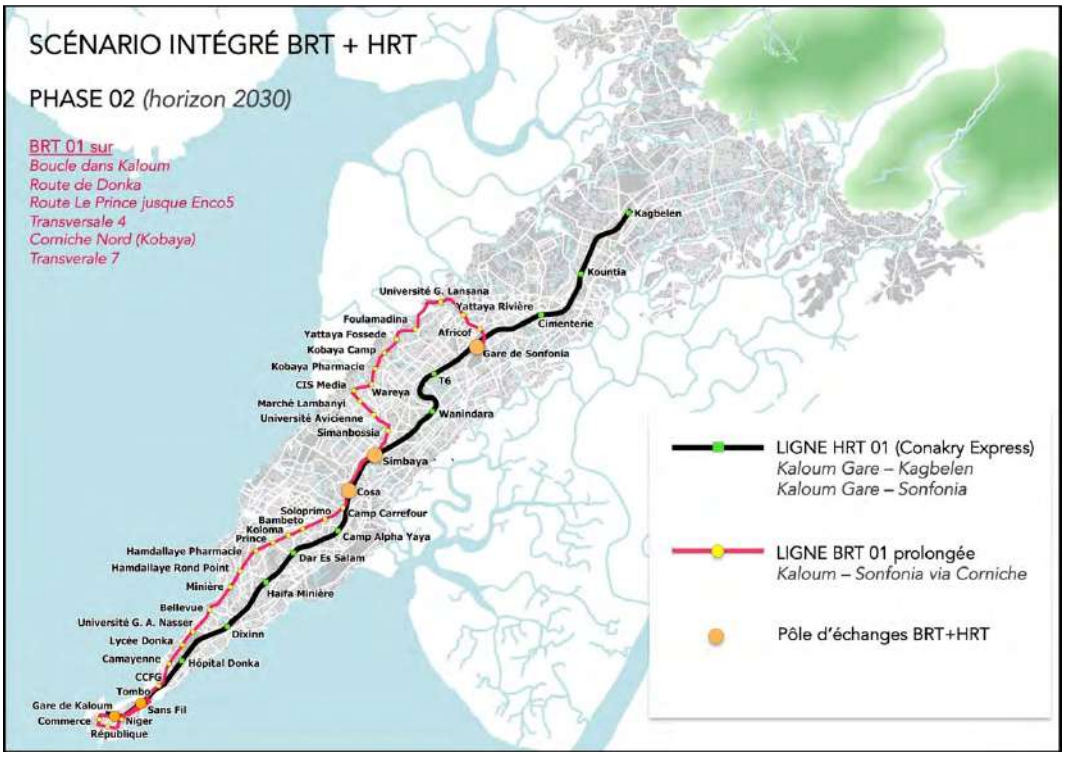


Figure 4 Projected Mass Transit Network (BRT+HRT), Horizon 2030

To make such urban decentralization feasible along one corridor, a multimodal mass transit network has been planned, combining Heavy Rail Transit (HRT) and Bus Rapid Transit (BRT) lines. The mass transit system has been planned and designed to serve most of densely populated areas, markets and potential new developments along the railway infrastructure.

By 2030, the enhanced Conakry Express service (Heavy Rail Transit) is planned to operate with 30 round trips a day between Kaloum and Kagbelen and serve 15 stations along the 34 kilometres of the CBK line. Its fleet of 15 trains (with a capacity of 2400 passengers/train) is planned to ride on a rehabilitated and reinforced infrastructure with two to three railway tracks, combining local and express services with no fare zones in order to respond to the linear urban form and its accessibility issues.

Since the mass transit system responds to a demand oriented to longer distance urban trips, the existing minibuses and shared taxis shift to shorter distance trips with lower fares, and find their spatial and economic synergy with the BRT and the HRT.

The first phases of implementation of the Bus Rapid Transit (BRT) network connect the boulevards of central Kaloum with the district of Ratoma along the Route de Donka, the Route Le Prince and the Corniche Nord along the Northern seafront to reach then the future multimodal hub of Sonfonya railway station. With its 35 kilometres of central bus lanes and 33 closed BRT stations protected from the traffic, the network is planned to operate 450 trips a day with a capacity of 205 passengers per bus and a fleet of 96 biarticulated buses.

Together, the total capacity of the multimodal mass transit system covers 235,000 trips per day and per direction, which represent an annual gain of 1 million ton of CO2 emissions for the mobility in Conakry by 2030. During peak hours, the system will be able to carry 21,500 passengers per hour and per direction.

Within mechanized daily trips, the modal share of public transport is projected to reach 41%, to be compared with the 17% observed by the surveys in 2018.

In 2030, more than 800,000 people will live in a 10 minutes walking distance from the 15 train stations and 33 BRT stations.

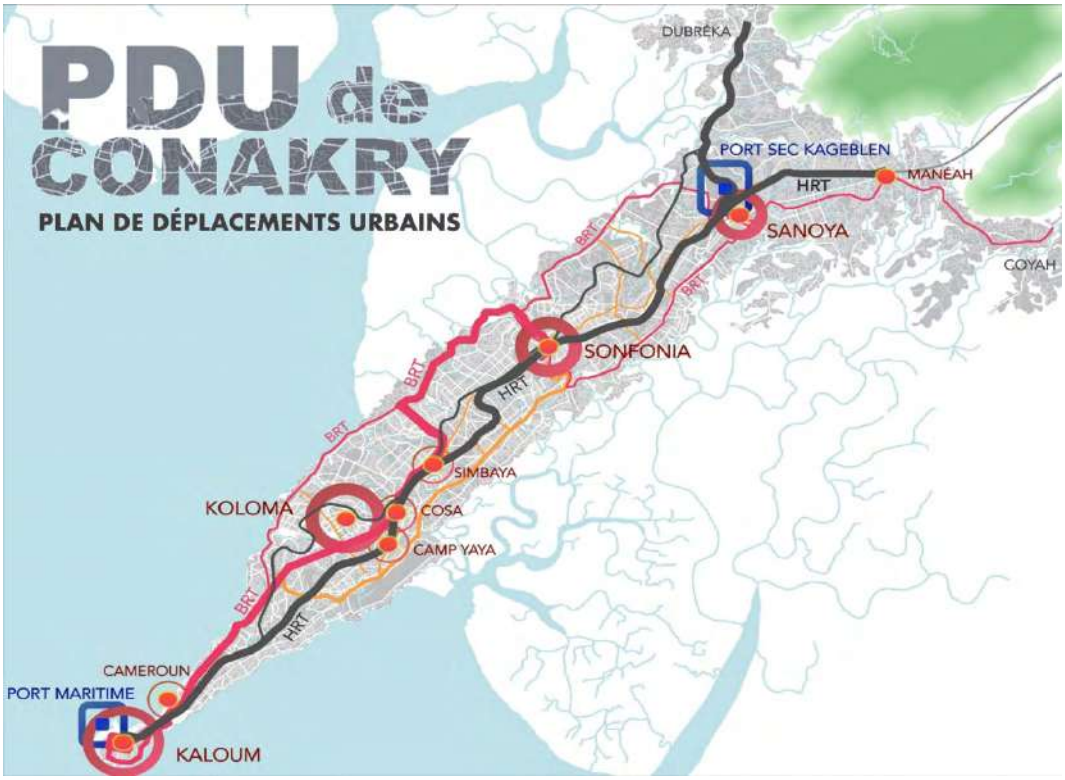


Figure 5 Conakry Polycentric Development Plan

3.2. How a mass transit system can improve urban liveability and road safety?

A synergy of 2 different mass transit services has been elaborated to solve various issues of accessibility within the neighbourhoods and slums. The advantage of the railway system (HRT) is that its infrastructure covers dense areas that are isolated from the primary roads. When the HRT network will have been extended to the second existing infrastructure of Conakry (Fria line), it will unlock a dozen of urban and suburban settlements that have suffered from isolation. Nine hundred hectares of lands have also been identified around train stations to develop affordable housing programs, markets, logistic hubs and key metropolitan functions.

Investing in railway infrastructure reinforcement with 2 to 3 railway tracks along the CBK line also means many benefits for the freight traffic since the capacity of the network will be able to absorb both passengers and freight trains. This configuration allows a better financial feasibility and sustainability of the system, as long as the institutional framework's evolution allows such infrastructure to be shared by different operators.

The financial feasibility of the reinforcement of the railway has to be viewed in a wider way if we consider this infrastructure as the future spine of the city. The plan identified it as a major asset that could include 6 meters wide pedestrian and cyclable corridors running along the 57 kilometres of urban railway lines (CBK and Fria lines).

Figure 6 Design guidelines : projected section of the Boulevard Diallo, Kaloum

Developing a BRT network brings a different attention to urban liveability improvement. In the case of Conakry, most of BRT lines have been planned on existing primary roads, currently suffering from congestion and unsafety. The integration of a BRT trunk on a primary road brings the opportunity to create a new urban boulevard associating public spaces, road safety, BRT stations and tree coverage together in the neighbourhoods that have suffered the most of social unrest and traffic accidents, such as Bambeto along the Route Le Prince. In 2018, five important road viaducts projects crossing major road intersections have been planned and funded to increase the capacity of the Route Le Prince to absorb motorized traffic demand.

One of the priorities of the Mobility Plan was to find an agreement on the immediate reconsideration of these planned works and the integration of BRT stations on each flyover.

3.3. Articulate mass transit, urban logistics and TOD

Along the study of the transit master plan of Conakry, it became evident that the logistic activities of Conakry and its Port as well as his market of Madina - one of the largest markets of West Africa - were at the heart of Conakry's transport infrastructure and mobility. Markets in Conakry are the main centres of economic vitality and traditionally spread along major roads, 'where the demand can be met'. This concentrated economic vitality is also source of traffic congestion and road safety issues, as roads have to absorb a vast diversity of pedestrian and motorized traffic flows.

The orientation of the Mobility Plan is to implement logistic hubs for consumer goods along the railway infrastructure, so new markets can be gradually located in safer areas away from the main roads and closer to the new distribution centres. Shifting urban logistics from road to rail represents a major potential transformation for road safety conditions for everyone, but it's also a tool of decentralization of the economic activities in the case of Conakry.

Figure 7 Physical model of Conakry 2040 (1/10,000)

One of the main conditions of the modal shift from road (trucks from the Port to destination such as markets) to rail (freight trains) is to develop the dry port of Kagbelen 35 kilometers away as an important logistic hub, not only for Conakry but also for Guinea. If most of the freight is transferred from the maritime port to the dry port by rail, it pushes away the trucks away from the city. The only way to make it work in terms of urban logistics is to associate the dry port development with a new commercial hub and market area which will benefit from the logistic hub of Kagbelen and its train station. Since Conakry is a "market city" (ville-marché), the combination of a national logistic platform, a commercial district, a major train station, multimodal hub and a new market could lever the polycentric potential of the city and move gradually the centre of gravity of the agglomeration in the centre of the peninsula.

Figure 8 Urban logistics and markets relocation

The strategic plan of Kagbelen area, included in the Mobility Plan, proposes a railway connection to Dubreka, connecting with the Fria railway line to be rehabilitated into a standard gauge track. The outer districts of Dubreka and Coyah wouldn't be suburban anymore but the surroundings of a major and accessible metropolitan subcentre. Sonfonia would benefit itself from its high level of connectivity with Kagbelen and emerge as another subcentre for Conakry.

Planning a polycentric Conakry relying on mass transit and TOD is currently a complex challenge because economic drivers to achieve such result are currently weak. It requires to develop creative synergies between the main economic urban sectors (commerce, logistics), shared infrastructure with financial viability and multimodal use (railway and pedestrian corridors) and TOD with local characteristics and specific needs (markets, affordable housing projects, mixed-used development). In the case of Conakry, the elaboration of the Mobility Plan illustrates how much logistics has conditioned and constrained the development of the Guinea capital and how it can be rather used to lever the financialization of a healthier urban mobility and transport infrastructure with associated benefits for pedestrians, bicycles and accessible neighbourhoods for all.

If investment strategies in economically viable transport infrastructure integrate better the social realities and local economic characteristics of African cities, an appropriate urbanism could start to emerge and open the gates to singular forms of polycentrism relying on micro urban economy, rather than on imported models of commercial urban development.

4. References

S.Goethals, A.Thiam; Franchini (2019) Plan de Deplacements Urbains de Conakry
www.pdu-conakry.info

Poverty and Urban Mobility in Conakry (2004), World Bank SSATP Report No 09/04/CKR

Case Study Paper

HEALTH DISTRICTS

Creating healthy cities

David GREEN, Perkins&Will; USA

Abstract

This paper addresses trends in research related to health in urban environments. It is focused on how regulations control development and the resulting public health outcomes. Regulations significantly impact public health and as such there should be legal and scientific mechanisms to monitor the efficacy of adopted regulations.

Cities are critical to the efficient operation of society. Beyond just issues of quality of life, they are large consumers of natural resources. There is a growing concern that the form of cities may have a profound effect on public health: chronic diseases related to obesity, heart disease, and asthma, among many others. But in general, governments are making decisions about their development in the absence of critical data and analysis that provides direction for these actions. There is a clear need to establish research that provides a scientific basis for rationalizing city planning and urban design. This is an opportunity to use the protocols driving research to inform the methodology of urban and city design.

An internationally supported system of testing and evaluation protocols, both for proposed regulations and adopted regulations, is still absent from planning and urban design processes. Jurisdictions continue to rely on theory and precedents alone when adopting new regulations. Because of the significant impact that the built environment has on the health, safety and well-being of the general population, it seems logical that the profession would adopt scientific research protocols.

In addition, this paper will examine several specific cases across the globe, regulated and designed by a diverse group of professionals, that articulate the issues outlined above and provide methodologies to frame a scientific method for planning and urban design at a consistent, international level.

Keywords

public health, development regulations, health, safety, welfare, zoning,

1. Introduction

1.1. Analytical Rigor

We have, for the past eighty years, used a quasi-scientific set of criteria to direct and regulate the design and construction of our cities and districts towns and suburbs. From the very beginning, pseudo-scientific measures formed the foundation of the professional planning movement. In this process, however, the rigors of basic research and scientific methods have been remarkably absent in reflection on the efficacy of planning's impact on the built environment. Abstract planning principles are translated into operational

regulations without a basic protocol for testing, evaluating, and modifying assumptions based on the results of evidence. The reticence of the profession to test and evaluate is further complicated by the fact that planning is ultimately implemented through a series of legal documents – regulations. Once adopted, regulations are notoriously difficult to change, both due to the precedential nature of the legal system itself and the seemingly inherent credibility bestowed upon regulation by virtue of its own adoption.

At its core, the planning profession is charged with creating rules and guidelines for the development of urban and suburban places through constitutional police powers: to provide for the health, safety and welfare of the general public. Ultimately, effectiveness of planning means, such as zoning, can and should be measured. For example, Justice George Sutherland states that plans and their regulations must "expand or contract to meet the new and different conditions which are constantly coming within the field of their operation" in the seminal Supreme Court case, Village of Euclid, Ohio v. Ambler Realty Co. (Village of Euclid, Ohio v. Ambler Realty CO, 1926). He went on to say that, "in a changing world it is impossible that it should be otherwise." What Sutherland knew as a fact, and the planning profession seems unwilling to address, is that planning is only as good as its ability to positively affect the health, safety and welfare of the people in places it impacts. And, if our impacts are not positive, we are obligated by the law to improve our regulations.

The creation of an internationally supported system of testing and evaluation protocols, both for proposed regulations and adopted regulations, is still absent from planning and urban design processes. Jurisdictions continue to rely on theory and precedents alone when adopting new regulations. Because of the significant impact that the built environment has on the health, safety and well-being of the general population, it seems logical that the profession would adopt scientific research protocols. To avoid doing this would be analogous to the pharmaceutical industry, in the absence of the Food and Drug Administration, releasing new drugs to the public without trials and then turning a blind eye to potentially negative outcomes.

2. Regulations

2.1. The Birth of Regulations

The impetus for regulating the built environment came from conditions that we can hardly imagine today. In the second half of the nineteenth century, people were living in conditions that were extremely unhealthy. For example, extreme population density grew in the Tenth Ward of lower Manhattan without infrastructural support – population densities were as high as 1000+ people per acre, or roughly 50 times the density of Manhattan today. (Allen, 2010) Most of this population lived in tenement houses with little natural light, open pit latrines, and no air circulation. With the publication of books such as Jacob Riis's "How the Other Half Lives,' the public began demanding reform through regulation and local jurisdictions responded. (Riis, 1970) One of the most important steps forward was New York State's adoption of the 1901 Tenement House Act. Figure 1 illustrates the impact of regulations as demonstrated by the evolution of houses themselves. The Tenement House Act served to open living quarters to light and air, and set the conditions for healthier living environments.

While the 1901 Tenement House Act is representative of the changes that were affecting individual building form and execution, it was with the adoption of the 1916 Building Zone Resolution of the City of New York that the role of regulations addressed what is commonly understood as zoning. The catalyst for this action was the completion of the Equitable Building in the financial district of the city. The building was reputed to cast a seven-acre shadow across the district at certain times of the day and year, with significant detrimental effect upon those other buildings in the affected area, and upon the general health and welfare of residents and office workers in the district. As a response, the city of New York adopted the Building Zone Resolution. The resolution provided for a number of requirements, including the zoning of the city into areas for residential, commercial and unrestricted uses, the requirements of yards for light and air, and restrictions on the height and form of buildings to ensure natural light and air for the district in general, not solely for the individuals occupying the buildings. The regulation had a significant impact on the quality of the city as demonstrated in Figure 2, the height and setback requirements for buildings permitted under the new resolution. Further, the regulations were easily tested and evaluated to determine the efficacy of their providing more light and air into the city streets and parks. (Building Zone Resolution, 1916)

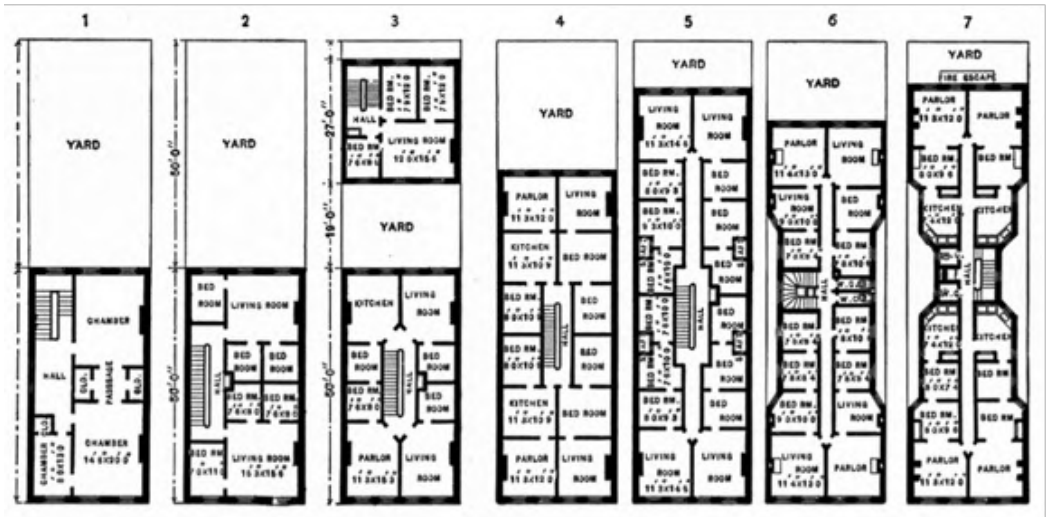


Figure 1 Tenement Transformation

Figure 1 above shows the evolution of the Knickerbocker tenement house type leading up to the 1901 Act and subsequent to the Act. The transformation from 5 to 6 demonstrates the direct, positive effect the Act had on the living conditions of the residents; in this case, the diagram illustrates shafts for natural light and air included on sidewalls between the buildings, which were lined up in rows.

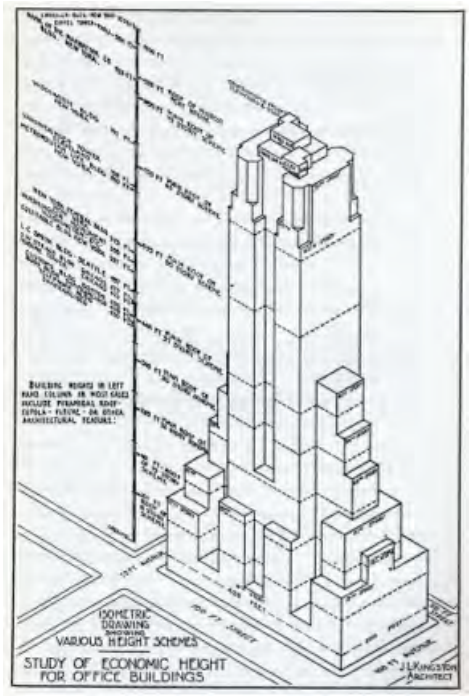


Figure 2 Diagram, 1916 Building Zone Resolution

Figure 2 above demonstrates the logic and application of new building design from the 1916 Building Zone Resolution. It specifically describes the setback requirements for new buildings to ensure light and air reaches the streets below. (Building Zone Resolution, 1916)

This original ordinance was updated and modified thousands of times over the course of 45 years until the 1961 Zoning Resolution superseded it. The adoption of this ordinance signaled the acceptance of a radically transformed understanding of the way regulations operated. Instead of relying on simple, straightforward guidelines that were easily tested, the newly adopted regulations were much more reliant on formula-driven criteria for development. This transformation created a scenario in which it was almost impossible to project the physical outcome resulting from the regulations because each project was easily manipulated based on local and site-specific conditions. This is demonstrated in Figure 3, a seemingly simple calculation to determine building massing and spacing that opened the process to infinite possible results, most of which led to unintended consequences such as degradation of the surrounding public space in terms of light and ventilation at the street level. In addition, there was almost no incremental testing of the proposal to ensure that it would garner the desired results and that those results would meet the constitutional guarantees of health, safety and welfare. While the specifics of the 1961 Resolution were not copied verbatim into other ordinances across the country, the logic of regulating the development of cities and towns and suburbs was predicated on this Resolution almost universally. The following section demonstrates two very specific regulations that were adopted, generally, throughout the country without testing and evaluation, and the impact they have had and continue to have on the built environment. (1961 Zoning Resolution, 1961)

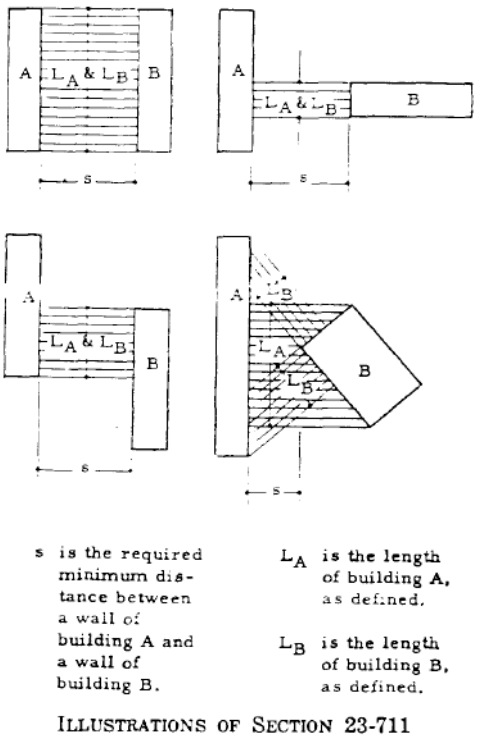


Figure 3 Diagram, 1961 Zoning Resolution

Figure above illustrates the fundamental change with the adoption of the 1961 Zoning Resolution. It describes the calculations for meeting building spacing requirements. (1961 Zoning Resolution, 1961)

The 1961 Zoning Resolution had profound impacts on the way we plan and construct cities. At the time, none of the assumptions upon which the new Resolution was based were tested; not prior to the adoption of the new code, nor after its adoption.

The impact this and other regulations had on the built environment and ultimately on public health can be demonstrated through numerous examples, two of which are outlined below.

2.2. Regulating Local Streets

In the seminal United States zoning case, Euclid v. Ambler, the core issue before the court was the question of protection of single-family neighborhoods. The case was brought to the court in a time, the 1920's, when questions of appropriate uses in these neighborhoods were critical. It was not uncommon to find toxic uses, such as rendering plants, slaughterhouses and tanneries, interspersed with people's dwellings. At the time of the case, there was a clear need to separate these extremely unhealthy operations from the districts where families lived. (Village of Euclid, Ohio v. Ambler Realty CO, 1926) Over the course of subsequent decades, however, the protection of single-family neighborhoods expanded greatly. This is demonstrated in a number of regulations adopted, especially through the 1950s, that include minimum lot sizes for single-family homes, and extreme restrictions on corner groceries, neighborhood restaurants and other uses that had historically been a part of the rich mixture of a healthy neighborhood. While there are many examples of regulations that were adopted that have, and continue to have, negative impacts on the

health, safety and welfare of the general public, there are some that stand out especially as clearly demonstrating the need for scientific study to determine the true impact they have. Further, they demonstrate the legal implication of the enactment of such regulations.

A specific example of this can be found in the subdivision ordinance adopted by the City of Atlanta in 1957. It included, as did many other ordinances adopted throughout the country at the time, a seemingly simple, clear and intelligent requirement that cut-through traffic (traffic moving through a particular geographic area with no intention of stopping in that area) should be minimized, or if possible, eliminated from single-family developments. The statement, "Local streets shall be so laid out that their use by through traffic will be discouraged," was a prominent element of the Atlanta Ordinance. (Part 15 Subdivision Regulations, 1957) The requirement has led to a very particular development pattern as demonstrated in Figure 4. Individual suburbs are designed and developed in such a way that there is absolutely no connectivity between the subject development and other contiguous or proximate developments (residential or commercial). This seemingly benign requirement has had enormous impact on the lives of the inhabitants of the communities developed under this ordinance.

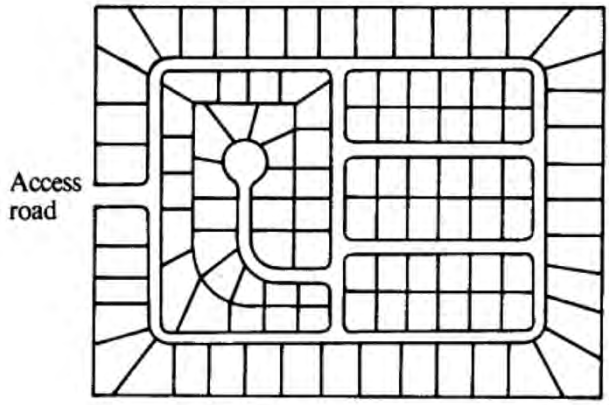


Figure 4 Diagram, Typical Street Pattern

When this ordinance was originally adopted, it was not tested or evaluated, and so no determination could be made about its ability to actually provide a healthy and safe environment for its occupants. Today there is mounting evidence that instead of being a healthy and safe development strategy, it is actually causing unhealthy and unsafe results for the inhabitants of the areas developed under the regulation. (Ewing, R., et al, 2003) Certainly further investigation is warranted to expand and verify the initial research, but this expanded research is extremely slow in coming. As with all regulations and laws, changing these ordinances is extraordinarily difficult.

It is here, in the evaluation of regulations, that the practice of following a scientifically dictated protocol for research would prove beneficial. If basic research provided the data and subsequent interpretation to correlate a regulation with specific health or safety issues, including obesity, asthma, heart disease, pedestrian and vehicular deaths and injuries, elevated crime rates, or even long-term house values (an issue of welfare), the professionals charged with creating and adopting such regulations would have much greater certainty that

they were creating healthier, safer and more economically vibrant developments, and they would be fulfilling their professional obligation to ensure the constitutional guarantees upon which Justice Sutherland based the ruling that made the regulations constitutional in the first place. Further, from a legal standpoint, it would be much easier to modify existing regulations if there was compelling scientific research to back up the proposed modifications.

2.3. Regulating Block Size

Current research indicates that walking provides health benefits; that areas of cities with more pedestrians (people walking) are safer; (Ozbil, A., et al, 2015) and that areas of cities with more pedestrian traffic, particularly commercial, are more economically robust. (Boarnet, M. G., et. al, 2008) (Litman, T. A., 2017) As with most current information regarding cities, towns and suburbs, and the efficiency of their operation, more research is needed to understand correlations between walking and urban planning. But taking the premise that more people walking in cities promotes the health, safety and welfare of the general population, current regulations can be evaluated based on their efficiency in producing developments that are conducive to pedestrian activity.

Throughout the United States, the single most difficult element to incorporate into new development, redevelopment, and other forms of modifications to a jurisdiction's physical layout is the creation of new streets. This difficulty stems from several issues: maintenance costs borne by the jurisdiction, a pre-conceived notion that more streets are less environmentally beneficial, and, as demonstrated in Section 2.0, a general belief that more streets lead to more traffic. Each of these issues demands additional research, but it is extremely difficult to replicate the highly connected street systems of cities and towns constructed in the pre-regulatory era. In this specific case we are focusing on expanding pedestrian activity, and the effect the street system and the regulations that drive street locations have on the efficacy of providing pedestrian activity.

Figure 5 Block Dimensions New York, Crosstown and Uptown

As a basis for researching the correlation between street layout and pedestrian activity, the first step is to identify areas that seem to promote pedestrian activity and those that seem to suppress it. An example of the former is New York, arguably one of the most pedestrian cities in the world. In New York, specifically Manhattan, the streets are highly connected,

with resulting block sizes of 200 feet in the north-south direction, and block sizes generally between 500 and 800 feet in the east-west direction. In this system, there appears to be a correlation between the size of the block face and the level of comfort in walking similar distances. As demonstrated in Figure 5, a walk in the north south direction of 10 blocks is perceptually different from a walk in the east-west direction of the same distance. This begins to identify the possibility that the physical distribution of streets has a direct effect on the comfort of the pedestrian, and further on the efficacy of the system to produce the desired result, more pedestrian activity. It is generally perceived to be easier to walk the half-mile uptown than the same half-mile crosstown. A similar observation was made by Jane Jacobs in her book *The Death and Life of Great American Cities*, in which she advocated for the use of short blocks to increase the number of potential route choices for pedestrians and to avoid monotonous streets. (Jacobs, 1961)

The research on block dimensions and its correlation to a supportive system for pedestrian activity is not the end, however. It is merely an analytical method for providing cities with the tools to create more energy-efficient and healthier overall systems. The increased number of people who walk due to myriad factors will have a direct impact, we assume, on the reduced use of fossil fuels for automobiles. It should also create a more efficient overall system for distribution of utilities and a more resilient infrastructure layout, which minimizes rebuilding when single buildings are reconstructed or newly constructed. In addition, increased walking should correlate, again, we assume, to decreased numbers of health problems such as early onset diabetes, heart disease and asthma. However, the basic research to prove or disprove this is currently almost nonexistent. Cities are, in aggregate, among the largest users of energy, and home to the greatest number of people, yet the national planning community and the funded research within which it is engaged, is minimal. There is a clear need for an increase in research in these areas.

The physical layout and efficiency of the pedestrian system in this case is tied directly to the original regulation that dictated where and how streets would be laid out as Manhattan developed. In this case, it was the Commissioners' Plan of 1811, a survey and plan that identified the location of streets as the city grew. The power of the regulation in this case was in the certainty of the outcome, and, in retrospect, the value of the plan for producing (or allowing) significant pedestrian activity. (Bridges, 1811)

Throughout the twentieth century, however, the methodology for the laying out of streets changed radically. As indicated in Example 1, connected streets were discouraged or prohibited. (Part 15 Subdivision Regulations, 1957) (Ozbil et al, 2011) (Peponis et al, 2008) (Peponis et al, 1997) (Peponis et al, 1998) (Christova et al, 2012) Further, streets were no longer identified in a specific plan, which might guarantee short block faces and highly connected system, but instead were placed project-by-project based on capacities of individual projects and the demands those projects would place on the vehicular efficiency of the system. The resulting pattern of development is indicated in Figure 6. It clearly shows the physical implications of the regulations, including limited intervening public streets, expanded parking requirements, and significant building setbacks, among other requirements that led to the disappearance of the connected system of pre-regulatory cities. The outcome of these regulations is development patterns that deter inhabitants from walking. There appears to be a direct correlation between the sizes of blocks (or the frequency of streets) and the level of pedestrian activity. This is further indication of the need for a rigorous research platform for the investigation of these issues.

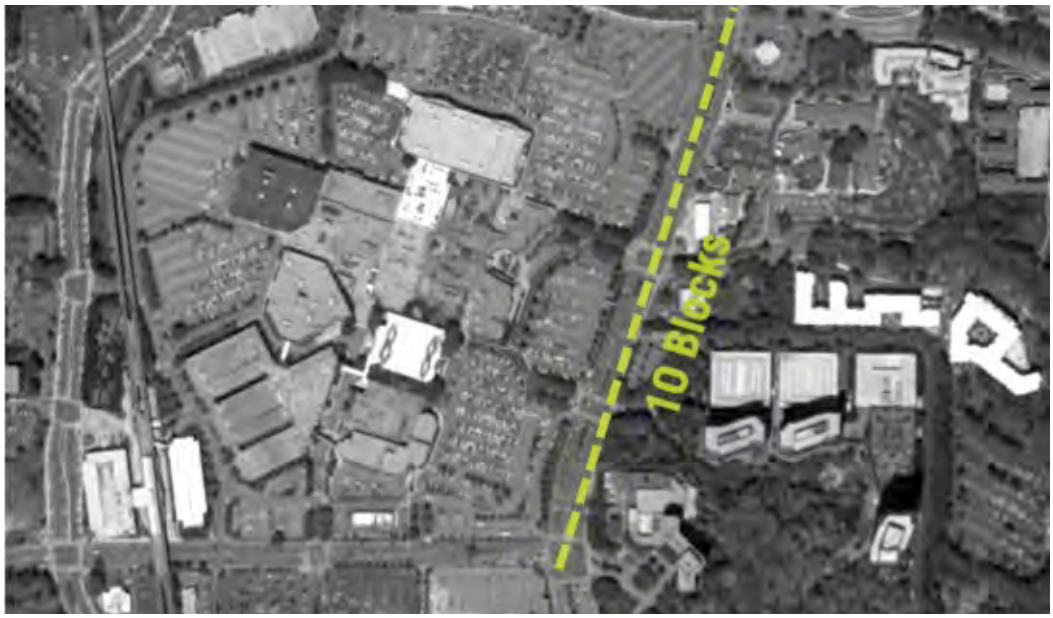


Figure 6 Block Dimensions Suburban Atlanta, Perimeter Center

2.4. Correlation Between Regulations and Development Patterns

The first trajectory is exemplified through a simple analysis of the relationship between regulations in place and block sizes. Assuming the hypothesis offered in the previous section that "walking provides health benefits" is accurate, then what was the correlation between regulations in place and the resulting block sizes, and by extension frequency of streets? Figure 7 below indicates the results of a cursory investigation into the relationship between the existence of subdivision regulations and the size of blocks. In this statistically limited sampling, the data suggests that there is potentially a significant correlation between the mere presence of a regulation and the efficacy of creating small, consistent block sizes.

The conclusion derived from this limited investigation is that there is an inverse correlation between the degree to which regulations are implemented and the efficiency of creating consistency; the stated goal of the regulation. If this is verified through further research, it implies that the regulations adopted to provide for health, safety and welfare are resulting in development patterns that are inconsistent with the goals of the regulations.

Looking more closely at a sub-set of projects, we can start to see how recent design and planning work compares to these more broad findings. A look at over 50 projects completed around the world within the last 10 years demonstrates that, despite the best intentions of the designers, the average block size for these modern district and campus plans is even larger the post-1928 block size, at 7.71 acres. When only research district projects are taken into account, the average block size is similar, at 7.59 acres (Table 1). This could be the result of the traditional "buildings in a park" typology, only recently falling out of favor for a more urban format, or it could be influenced by something else entirely. Without a rigorous analysis process it is very difficult to understand the causes and effects of design decisions.

This early work supports the proposal that there should be regional, and even national, systems in place to track these issues. The computing power and much of the data already exists, but the planning profession is slow in making moves to identify critical data that

would form the foundation for a more rigorous and directed national research agenda. (Allen, 2010)

Observation 2: the standard deviation of average block size in the following selected cities has increased from .79 to 6.14 from pre-1928 subdivision to post -1928 subdivision.

	Pre 1928 Block Size				Post 1928 Block Size		
		avg. acres	max acres			avg acres	max acres
1	Atlanta, GA	3.70	8.26	1	Atlanta, GA	22.87	44.49
2	Boston, MA	3.09	4.13	2	Boston, MA	9.45	14.46
3	Baltimore, Md	3.29	5.78	3	Baltimore, Md	14.93	22.72
4	Charleston, S.C.	4.12	6.07	4	Charleston, S.C.	16.89	25.25
5	Chicago, Illinois	3.51	4.96	5	Chicago, Illinois	14.74	19.10
6	Los Angeles, CA	4.41	7.89	6	Los Angeles, CA	8.01	16.08
7	New York, N.Y. (Manhattan)	2.60	3.67	7	New York, N.Y. (Manhattan)	7.72	13.31
8	Omaha, Nebraska	4.34	8.26	8	Omaha, Nebraska	8.27	13.42
9	Portland, Oregon	1.92	3.72	9	Portland, Oregon	2.69	4.24
10	Philadelphia, Pennsylvania	3.07	6.33	10	Philadelphia, Pennsylvania	5.03	5.88
	Average	3.41	5.91			11.06	17.90
	Median	3.40	5.93			8.86	15.27
	Std. Dev	0.79	1.80			6.14	11.42

Figure 7 Statistical analysis provided by Douglas Allen, Georgia Tech. (Allen, 2010)

2.5. Tracking and Projecting Data

Once we begin to understand the interaction of regulations and development historically, the next step is applying this knowledge to current and future projects and places. To do this involves first developing a method of recording baseline data for such projects. Perkins+Will have recently undertaken such a program for all of their urban design-scale projects. The program, called PlanMetrics, lays out 9 key metrics captured for each project greater than 5 acres. The associated data (figure 8) is then collected, compared, contrasted, and subjected to further inquiry.

The database grows as more projects are completed. In this way, Perkins+Will have begun a system of testing whether or not their own projects meet their stated intent, both defined by the clients, planners, and designers involved, but also by the regulatory context in which they are created. Data collected and referenced in Table 1 includes project area, right of way area, total public blocks, and number of intersections, for example, along with other vital statistics. With more advanced analysis, information such percentage of park area or intersection density, can be recorded and compared. An example of this level of analysis on both a single project, as well as cross multiple projects, can be seen in figures 9 and 10.

D	E	F	G	H	I	J	K	L
7546.22	5575.18	1971.03	2092.53	1795.51	1101.17	241.61	1813	1277
4051.10	3755.87	305.22	76.95	229.17	712.70	34.61	87	70
3343.48	2810.57	732.91	0.00	345.92	331.84	40.57	146	120
3301.89	2905.78	396.11	1286.77	287.70	374.04	89.66	211	105
1161.64	1011.92	149.72	660.41	107.42	154.42	40.34	505	389
1007.92	587.74	420.18	308.53	255.06	187.45	26.38	83	73
879.00	536.00	343.01	45.00	75.00	123.01	16.60	86	78
876.78	669.70	207.08	206.88	103.59	889.11	6.37	42	34
840.01	719.99	119.99	418.99	46.01	48.41	12.40	77	82
782.71	612.80	169.91	10.16	132.62	242.24	21.56	103	89
659.99	254.30	405.70	52.19	349.51	156.59	12.90	94	77
636.27	484.38	151.90	187.11	123.21	58.61	14.63	71	167
617.71	518.60	99.11	232.35	75.91	126.38	17.85	144	96

Figure 8 Sample Project Datasets from PlanMetrics

The database grows as more projects are completed. In this way, Perkins+Will have begun a system of testing whether or not their own projects meet their stated intent, both defined by the clients, planners, and designers involved, but also by the regulatory context in which they are created. Data collected and referenced in Table 1 includes project area, right of way area, total public blocks, and number of intersections, for example, along with other vital statistics. With more advanced analysis, information such percentage of park area or intersection density, can be recorded and compared. An example of this level of analysis on both a single project, as well as cross multiple projects, can be seen in figures 9 and 10.

This method is not limited to Perkins+Will projects – any district, neighborhood, city, or region around the world can be analyzed using the same method of metric collection, thereby establishing a comparable set of baseline information for projects that are anecdotally deemed “successful” or “unsuccessful.”

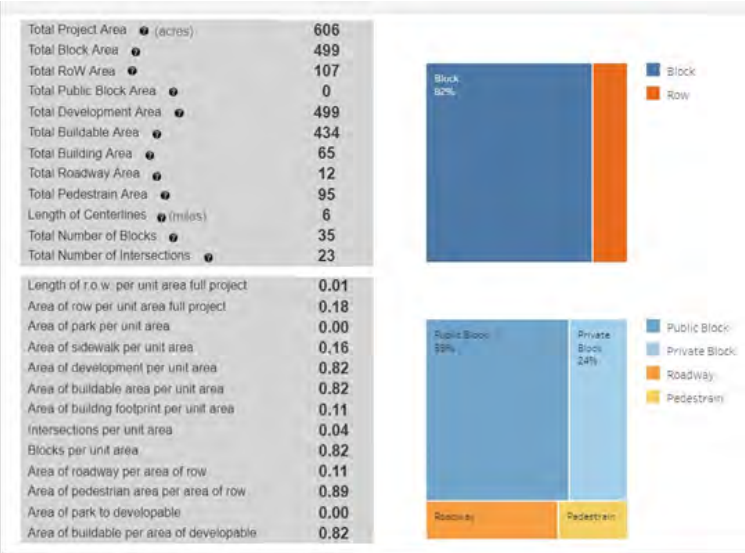


Figure 9 Sample Project Analysis from PlanMetrics

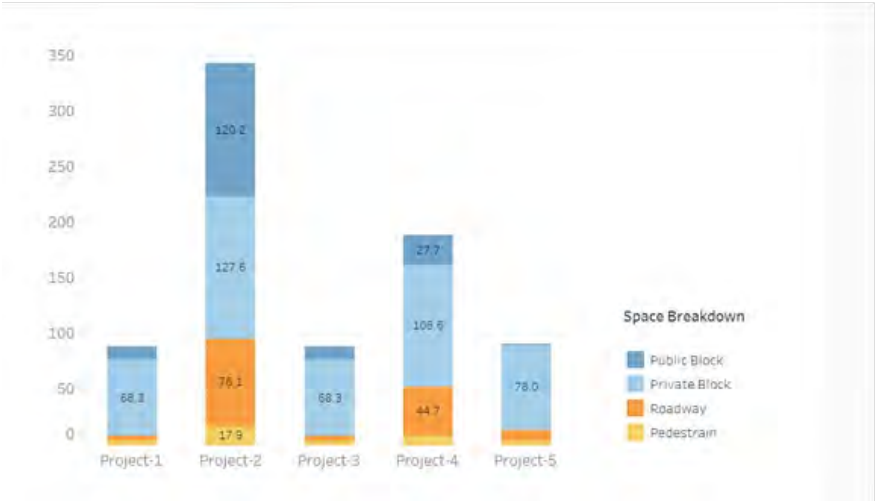


Figure 10 Project Analysis from PlanMetrics

One particular project type that lends itself to this analysis method is the research environment. Often owned (or at least operated) by a single entity, these projects are complex districts with multiple building types, public (or publicly accessible) streets and open spaces, and often their own set of governing regulations. Increasingly, research environments are districts integrated seamlessly into the larger city and thus have many of the same opportunities and challenges as the neighborhoods outlined in previous sections. Beyond the practical advantages, these places of research should be laboratories for understanding the impacts of the design standards and regulations that create them.

An example of this approach of collecting baseline data and projecting project performance is the infrastructure plan for Innovation Square in Gainesville, Florida (figure 11). The research and innovation district is located at the heart of downtown Gainesville, and is

owned and operated by the University of Florida. This complex interaction of municipal and institutional interests led to challenges in project coordination, but also interesting opportunities for learning from the project. A key concern for the stakeholder group was understanding the potential for energy efficiency onsite, as well as coordinating a complex system of utilities and public realm features. First, the team developed a coordinated strategy for they physical layout of utility infrastructure based on project goals as well as site constraints. An analysis of baseline and efficient utility use in comparable buildings was then performed to create a framework of understanding for project performance (figures 12-13). While not directly related to testing of regulations per se, this example serves as a powerful precedent of a methodology to test potential impacts of design and policy decisions before final construction has taken place.

3. Case Study One

3.1. Innovation Square

One particular project type that lends itself to this analysis method is the research environment. Often owned (or at least operated) by a single entity, these projects are complex districts with multiple building types, public (or publicly accessible) streets and open spaces, and often their own set of governing regulations. Increasingly, research environments are districts integrated seamlessly into the larger city and thus have many of the same opportunities and challenges as the neighborhoods outlined in previous sections. Beyond the practical advantages, these places of research should be laboratories for understanding the impacts of the design standards and regulations that create them.

An example of this approach of collecting baseline data and projecting project performance is the infrastructure plan for Innovation Square in Gainesville, Florida (figure 11). The research and innovation district is located at the heart of downtown Gainesville, and is owned and operated by the University of Florida. This complex interaction of municipal and institutional interests led to challenges in project coordination, but also interesting opportunities for learning from the project. A key concern for the stakeholder group was understanding the potential for energy efficiency onsite, as well as coordinating a complex system of utilities and public realm features. First, the team developed a coordinated strategy for they physical layout of utility infrastructure based on project goals as well as site constraints. An analysis of baseline and efficient utility use in comparable buildings was then performed to create a framework of understanding for project performance (figures 12-13). While not directly related to testing of regulations per se, this example serves as a powerful precedent of a methodology to test potential impacts of design and policy decisions before final construction has taken place.

From this, the project team created a system for projecting energy use based on various options, in this case both block-by-block, and by different phasing scenarios. The resulting dashboard compares these potential build-out scenarios to conventional and energy-efficient baselines, as well as the various options to each other. (Figures 14-16)

By projecting and analyzing this information in context (Figures 11-13) the project team was able to make better decisions about the balance of building types and the importance of an energy efficient scenario based on actual data, rather than intuition or standard practice.

In this situation, the scenarios tested were independent from regulation, and were limited to shifts in the balance of building typologies. However, the process of defining success, testing scenarios, and ultimately adapting design and policy based on observed outcomes in this smaller controlled environment demonstrates one potential method for developing similar tools to evaluate these and other metrics as a more comprehensive research protocol evolves.

The proactive approach to understanding utility capacity led to a unique investment model specific to this site, based on the evidence provided by rigorous analysis of the various options and the resulting detailed understanding of the preferred design scenario. Scaled up, this type of approach has the potential to influence our understanding and thus design of many aspects of research environments that we currently take for granted, as well as district and neighborhood planning and design more broadly.

4. Conclusion

4.1. Future Research Plan

Moving forward it will be key to incorporate lessons learned from the methods outlined above into a comprehensive research strategy. The approach of such a strategy should be three-fold: first, no progress can be made until there is a consistent and reliable way to gather and record data about existing and planned places. A well-defined but simple data set should be the base for informed decision-making. Second, for both society and the profession, there needs to be further study into what constitutes “success” in the various aspects of the built environment. This can include health, safety, comfort, energy consumption, and any number of other metrics which have value for the lives of people in cities and towns. Data without a contextual metric is essentially meaningless. Finally, to fully capture the power of the data, tools and systems for projecting impacts of planned designs and regulatory changes, as well as tracking progress in real time after they are realized, are crucial to verifying hypotheses about “success.” In this way a system of trial and adjustment can be created to ensure that regulations are indeed having the impact they are intended. To this end, regularizing a key set of questions about the performance of place in relation to the regulations that shaped that place is imperative in creating better laws and guidelines. While there may not yet be a mechanism for a national or international research program, individual jurisdictions and the designers and planners who work with them can begin to ask these questions and build the database that will eventually inform a larger conversation, as well as adopt and further develop tools such as those presented in Section 3. The more data that is collected and shared, the easier it will be to make the case for more universal participation in research activities, as well as changes to law and regulations that shape our physical environment.

4.2. Concluding Remarks

This paper examined the current and future trends in research as it pertains to city planning and urban design. It is intended to demonstrate the need to reconsider the methodology used in planning cities, towns, districts, and suburbs. There is a significant lack of scientific

rigor in the research protocols, and further a lack of research in general, in these arenas. The paper poses questions and identifies potential fundamental problems with the current system, and further identifies the need for support for these efforts.

Regulations drive the pattern of development almost to the exclusion of all other influences. They are legally binding and not easily susceptible to change. However, the method through which current and future regulations, and the environment in which they are created, can change is through the implementation of stringent protocols for basic research. The built environment affects our health, safety and welfare, and the rigor with which we investigate the effects on the public should be commensurate with those efforts.

Many of the questions that need to be addressed such as the relationship between urban form, pedestrian movement, and public health cannot be adequately addressed because we do not have a database of sufficient size and depth on the variables of urban configuration to adequately research the issues. Is there a relationship between energy consumption, public health, and the configuration of urban infrastructure? The same questions remain unanswered for energy consumption, and especially re-use of existing infrastructure in light of land use changes over time. What configurations offer the greatest accommodation of change? The aim of this paper is to propose that these efforts are in the national interest of the citizenry, and that as we regulate for the development of cities, we should create a research base to align the regulations that dictate our actions with scientific evidence.

5. References

1961 Zoning Resolution. (1961, December 15). The Zoning Resolution of the City of New York. New York, NY, USA: City of New York.

Allen, D. (2010). The Standard City Planning Enabling Statute and the Regulation of Suburban Block Size. Rocky Mountain Land Use Institute - Sturm College of La. Denver: University of Denver.

Anderson, W. P., Kanaroglou, P.S. and Miller, E.J. (1994). Urban form, energy and the environment: a review of issues, evidence and policy.[online]. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=EN. [Accessed 4.10.17].

Banister, D., Watson, S., Wood, C. (1997). Sustainable cities: transport, energy and urban form. [online]. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=EN. [Accessed 4.30.17].

Batty, M., Morphet, R., Masucci, P., Stanilov, K. (2014). Entropy, complexity, and spatial information. Journal of Geographical Systems 16, 363–385. doi:10.1007/s10109-014-0202-2

Boarnet, M. G., Greenwald, M., McMillan, T. E. (2008). Walking, urban design, and health: toward a cost-benefit analysis framework. Journal of Planning Education and Research, 27 (3), 341-358.

Bridges, W. (1811). Remarks of the Commissioners for Laying Out Streets and Roads in the City of New York, Under the Act of April 3, 1807. Commissioners of Streets and Roads in the City of New York. New York: The City of New York.

Building Zone Resolution. (1916, July 25). Appendix B City of New York Board of Estimate and Apportionment. New York, NY: City of New York.

Christova, P., Scoppa, M., Peponis, J., & Georgopoulos, A. P. (2012). Exploring Small City Maps. Experimental Brain Research, 223 (2), 207-217.

Doherty, M., Nakanishi, H., Bai, X. and Meyers, J. (2009). Relationships between form, morphology, density and energy in urban environments. [online]. Available from: https://lsecities.net/publications/reports/cities-and-energyurban-morphology-and-heat-energy-demand/. [Accessed 4.16.17].

Ewing, R., Schmid T, Killingsworth R, Zlot A, Raudenbush S. (2003). Relationship between urban sprawl and physical activity, obesity, and morbidity.

Jacobs, Jane. (1992) The death and life of great American cities /New York : Vintage Books.

Litman, T. A. (2017). Economic Value of Walkability. Victoria Transport Policy Institute, 1-31. http://www.vtpi.org/walkability.pdf. [Accessed 10.25.17].

LSE Cities (2014). Cities and energy. Urban morphology and heat energy demand. Final report. [online]. Available from: https://lsecities.net/publications/reports/cities-and-energy-urban-morphology-and-heat-energydemand/. [Accessed 4.10.17].

Ozbil, A., Peponis, J., & Stone, B. (2011). Understanding the Link Between Street Connectivity, Land Use and Pedestrian Flows. Urban Design International, 16 (2), 125-141.

Ozbil, A., Yesiltepe, D., Argin, G. (2015). Modeling Walkability: the effects of street design, street-network configuration and land-use on pedestrian movement. ITU A|Z, 12 (3), 189-207.

Part 15 Subdivision Regulations. (1957). City of Atlanta Code of Ordinances. Atlanta, GA, USA: City of Atlanta.

Peponis, J., Allen, D., French, S., Scoppa, M., & Brown, J. (2007). Street Connectivity and Urban Density: Spatial Measures and Their Correlationlation. 6th International Space Syntax Symposium.

Peponis, J., Bafna, S., & Zhang, Z. (2008). The Connectivity of Streets: Reach and Directional Distance. Environment and Planning B: Planning and Design, 35, 881-901.

Peponis, J., Ross, C., & Rashid, M. (1997). The Structure of Urban Space, Movement and Co-presence: The Case of Atlanta. Geoforum , 28 (3-4), 341-358.

Peponis, J., Wineman, J., Bafna, S., Rashid, M., & Kim, S. H. (1998). On the Generation of Linear Representations of Spatial Configuration. Environment and Planning B: Planning and Design, 25, 559-576.

Riis, J. (1970). How the Other Half Lives: Studies Among the Tenements of New York. Cambridge, MA, USA: Belknap Press of Harvard University Press.

Village of Euclid, Ohio v. Ambler Realty CO, 272. U.S. Supreme Court (November 22, 1926).

Research Paper

Exploring automobile dependency of housing estate residents and *kampung* dwellers in suburban Bandung, Indonesia

Fenita INDRASARI, Research Institute for Housing and Human Settlements, Ministry of Public Works; Indonesia

Abstract

Housing and transportation has become a pair of factors when it comes to decision of buying a house for the middle-income. This particular group of society is unique as they are aspired to luxury yet with limited affordability, particularly in the developing countries such as Indonesia. In many cases, housing estates are built in the form similar to gated community. Built in the suburban when usually the new housing estates are located quite in far distance to facilities, the residents are forced to own private vehicle(s) to conduct their daily activities. This situation shows the tendency of automobile dependence (Newman & Kenworthy, 1996; 1999). It has also been reflected in the vehicle ownership statistics figures and the notorious traffic congestion of Indonesian cities.

The middle-income housing and their gated community has not only impacted their own travel pattern but also the residents living in kampung adjacent to their housing estate. Kampung dwellers have also reflected the middle-income characteristics with their lifestyle and automobile dependence. It has become eminent in suburban Bandung where pockets of kampung are found to be hidden amidst the housing estates whilst cars are parked on the roadsides. This is problematic in terms of affordability where they cannot really afford to own a car or motorbike as well as to rent a parking space since they usually live in small houses at kampung.

To understand the above phenomenon, this paper tries to explore the extent of automobile dependency of the residents living at housing estate and its adjacent kampung at three locations. Data collected from questionnaires and group interviews are descriptively analysed. Results have shown that most residents travel in far distance to reach their job location but do not travel in far distance to conduct their shopping, studying, and exercise activities though some of them own a motorbike. The latter is due to the presence of mobile green grocers, warung, traditional markets, good quality schools, sport facilities and open spaces within walking distance to their houses.

However, these nearby facilities are regularly visited mostly because the residents can travel within shorter distance through access points made available for public use. These access points help to create a network of alleys and streets connecting kampung and these facilities through the housing estates. When these access points are restricted or non-existed, the travel pattern would differ as has been uttered by the kampung dwellers. In one of the cases, the following disconnections between the kampung alleys and streets of housing estates have made the kampung dwellers altered either the location or the transportation mode of their activities.

There are lessons to be learned from these travel patterns. Housing estate development shall always have access to the kampung that have existed and vice versa. Such spatial connections may contribute to a change of travel behaviour

from automobile dependence to active travel. However, it should be kept in mind that these results may not be generally applicable to other places with different socio-economic and spatial characters. Further work in the field may be benefited from more cases and larger population sample.

Keywords

Gated, housing estate, kampung, travel

1. Introduction

Housing and transportation has become a pair of factors when it comes to decision of buying a house for the middle-income. This particular group of society is unique as they are aspired to luxury yet with limited affordability, particularly in the developing countries such as Indonesia. In many cases, housing estates are built in the form similar to gated community. Built in the suburban when usually the new housing estates are located quite in far distance to facilities, the residents are forced to own private vehicle(s) to conduct their daily activities. This situation shows the tendency of automobile dependence (Newman & Kenworthy, 1996; 1999). It has also been reflected in the vehicle ownership statistics figures and the notorious traffic congestion of Indonesian cities. According to BPS (2018), the number of motorbike ownership in Indonesia has escalated from a little less than 20 million in 2002 to more than 105 million in 2016 and 113 million in 2017. According to the Tomtom traffic index, Jakarta has gained the seventh place in 2018 from the fourth place in 2017 for its notorious traffic congestion. Meanwhile based on the 2017 Inrix global traffic scorecard, Bandung is within the 'big 60' by having its roads congested for more than 45 hours a week.

While Jakarta's congestion rate have decreased according to the index, presumably due to constant improvement of its public transportation network, a similar positive trend cannot be seen in other Indonesian cities. Furthermore these traffic indexes reflect the city but do not reflect what happens at the neighbourhood level. This paper argues that, at the neighbourhood level, the middle-income housing and their gated community has not only impacted their own travel pattern but also the residents living in *kampung* adjacent to their housing estate. *Kampung* dwellers have also reflected the middle-income characteristics with their lifestyle and automobile dependence. It has become eminent in suburban Bandung where pockets of *kampung* are found to be hidden amidst the housing estates whilst cars are parked on the roadsides. This is problematic in terms of affordability where they cannot really afford to own a car or motorbike as well as to rent a parking space since they usually live in small houses at *kampung*.

2. Literature review

The impact of residential development to travel has received extensive attention in the past two decades particularly since it has mostly taken shape as gated communities with perimeter walls, gates and cul-de-sacs. Duany, Zyberk & Speck (2000), for example, have argued that cul-de-sac which originally conceived as youth's great playground has in fact made kids dependent on some adult to drive them around and lose their independent mobility. It was possible since the residential area with cul-de-sac layout increase distance

between uses that are already been segregated. Perimeter walls and gates or cluster is basically producing the effect similar to cul-de-sac's in which traffic accumulates at one point and access points are made limited or singular hence forcing everyone to overcome a lengthy distance to reach uses. They include private roads, which limit public access (Charmes, 2010; Grant & Curran, 2007).

To cope with the further distance resulted by the disconnected street layout between the ones within the housing estates and the existing road network, people who resides in the adjacent settlement may also need to own private vehicles particularly if their access to a direct route is cut-off. As a result, automobile dependency would be higher if travel options are restricted as evidenced in Indonesia as well as other Asian developing cities (Barter, 2000; Bowen, 2006; Handy, 2002; Rosa, 2007).

In terms of walking, a particular radius catchment area that is within reach of reasonable walking distance is the parameter. The distance, usually a quarter mile or 800 meters, derived from the 10-20 minutes walking with medium speed (Hess et al., 1999; Southworth, 2005). This walking distance has been considered as universal parameter which aligns with the walking speed range of pedestrian behaviour from various culture (Mateo-Babiano & Ieda, 2007). If distance between uses lies beyond the walking distance, it is more likely that people are driving their private vehicles and vice versa.

The effects of gated communities to travel, however, do not apply universally but are instead differentially distributed and dependent on lifestyle, household structure, and different capacities to overcome distance (Maher, 1994; Nicholls, Phelan, & Maller, 2015). Whilst distance is the main factor, its association to time and cost follow at the second place. Other factors that influence one's travel decision are socio-economic and physical condition. For example, one's income may affect their travel options, whilst options are available, not all options are considered as viable due to their limited affordability. Connectivity to transit has also been sought to add travel option for increasing the possibility of less car use (Cervero & Kockelman, 1997; Ewing & Cervero, 2010; Hoehner et al., 2005; Khattak & Rodriguez, 2005; Schwanen & Mokhtarian, 2005; Rodriguez et al., 2006).

3. Methods

To understand the automobile dependency phenomenon as resulted by private roads and housing estate development, this paper tries to explore the extent of private motorised vehicle use by the residents living at housing estate as well as the *kampung* dwellers living at the adjacent area. There are three study cases, as seen in figure 1, in which all of them are located in suburban Bandung and built in the early 1990s. The first study case is KM, a housing estate surrounded by perimeter walls which has three guarded gates for entry and three pedestrian access points open during the day. NH, the second case, has perimeter walls with only one guarded gate for entry. NH has two pedestrian access points which used to be open all day from Monday to Friday but then closed at all time since the middle of 2018. The third case, PC, is an open housing estate which does not have perimeter walls and guarded gates. Vehicles can enter PC from three ways while pedestrians can enter from anywhere possible since there is no perimeter wall surrounding the housing estate.

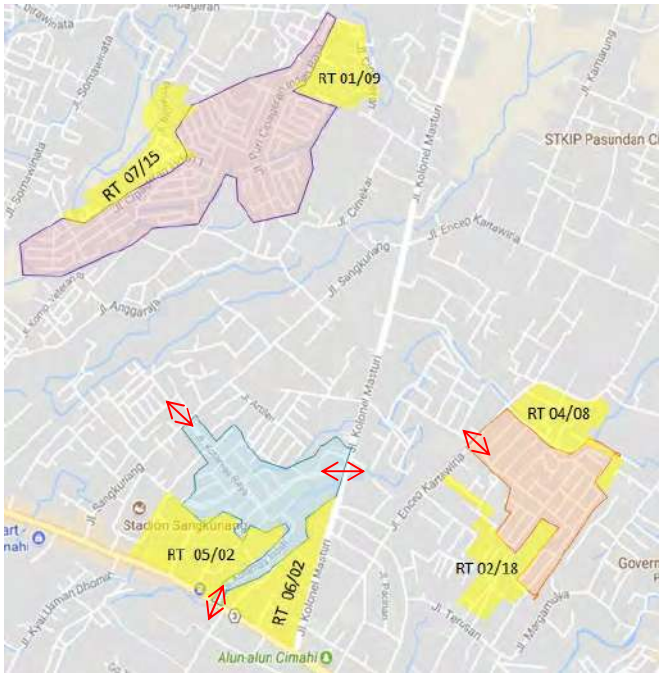


Figure 1 Location of study cases
(Bottom left-right: KM, NH; top: PC)

Data for this study comprised of mode of transportation, route and location of the activities to work, groceries shopping, study, and exercise. These data were collected using two different tools: questionnaires given to random housing estate residents and group interviews of the *kampung* dwellers. For the group interviews, participants are housewives who came to the session because of the neighbour leaders request. Prior to the group interview sessions, the author and team has come to visit the neighbour leader permission and cooperation. In discussing the analysis results, data from each group of participants are presented in separate in order to show the different pattern of mobility which may have been caused by the street network and access points as well as their associated socio-economic status. A total of 136 people have provided the data described in this study. Other than the charts and pattern shown in maps, interview quotes from the *kampung* dwellers are provided to enrich the data as an explanation to the pattern.

4. Results and Discussions

In exploring the extent of private motorised vehicle use, result of data analysis is provided into five sub-sections according to each type of activity and ended with an overall discussion.

4.1. Work

From the total amount of participants, as provided in figure 2, thirty per cent either work at home or no longer work since their retirement. Meanwhile, majority of people drive their private motorised vehicles to work which located at a various distance from 5 km to 30 km. Only a small percentage of participants who live in the *kampung* walk or ride angkot (one of the public transportation mode in Bandung) to work. None of the estate residents walk or

ride angkot to work (see the bars coded with KM-r, NH-r and PC-r). Further explanations on the mode choice and routes taken are provided in the quotes and map in figure 3.

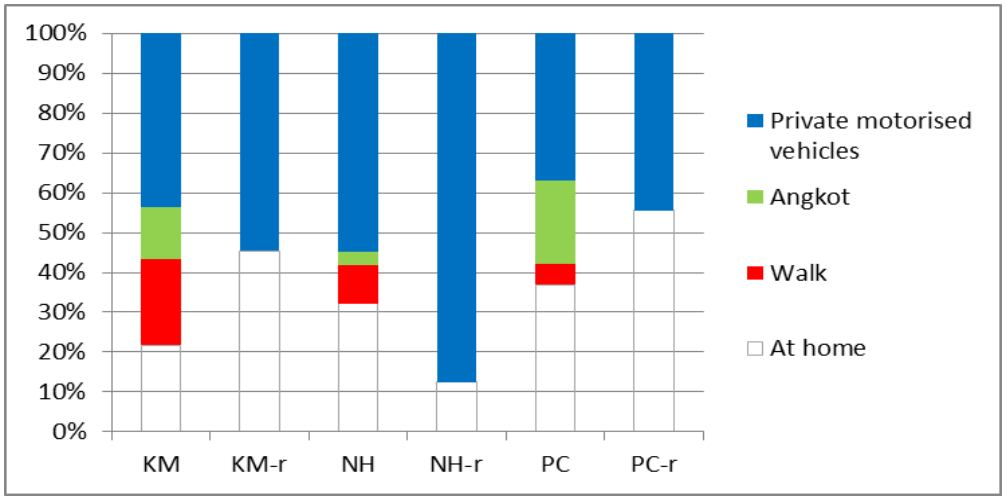


Figure 2 Mode of transportation to work

One participant who lives in the *kampung* adjacent to KM housing estate said that when her husband rides a motorbike from work, he mostly go through the *kampung* alley and rarely through the housing estate. The reason for not going through the housing estate is because of the guarded gate in which he has to ask the security guards every time he whishes to pass by as provided in the following quote:

> "At night [he] goes through the north alley … My husband usually comes home at 11 at night … though the security guards also live in this *kampung* it would still be a bother to ask [them] only to open the gate in the middle of the night" (RKM)

To ride an angkot, the *kampung* dwellers who live adjacent to KM housing estate have to walk for 300 meters through the private roads within the estate, carry on through the other *kampung* alleys, before finally reach the public roads in which several angkot routes are served. Meanwhile the *kampung* dwellers who live adjacent to PC housing estate only need to walk for 50 meters to halt Cidahu route angkot.

Walking is only done by several participants whose workplace located within walking distance from their home, including who works as household servant at the housing estate as well as those who has a warung (stall) at home. It should be noted though that walking distance radius, as has been drawn as red circle in the map, is not the same as the real network distance that one has to go through. This is evidenced in one participant's experience who sells fresh fish and seafood at Pasar Atas, a traditional market located within 250 meters radius. Drawn as red line in the map, the usual route she takes to work is 350 meters long through the pedestrian access provided by the housing estate which leads to other *kampung* alleys. Should this access is shut, she would have to walk for 1200 meters and take three times longer (drawn as yellow line). She is fully aware of this condition as seen in the quote below:

> "I work by selling fish at Pasar Atas every morning until 2 PM from 5 AM. Sometimes I ride motorbikes but I mostly walk; me and my husband. Walking

[route] is much nearer when the KM [housing estate pedestrian gate] is open. If it's closed, [I have to] walk further and take [more] time all the way to go out at the petrol station" (ISKM)

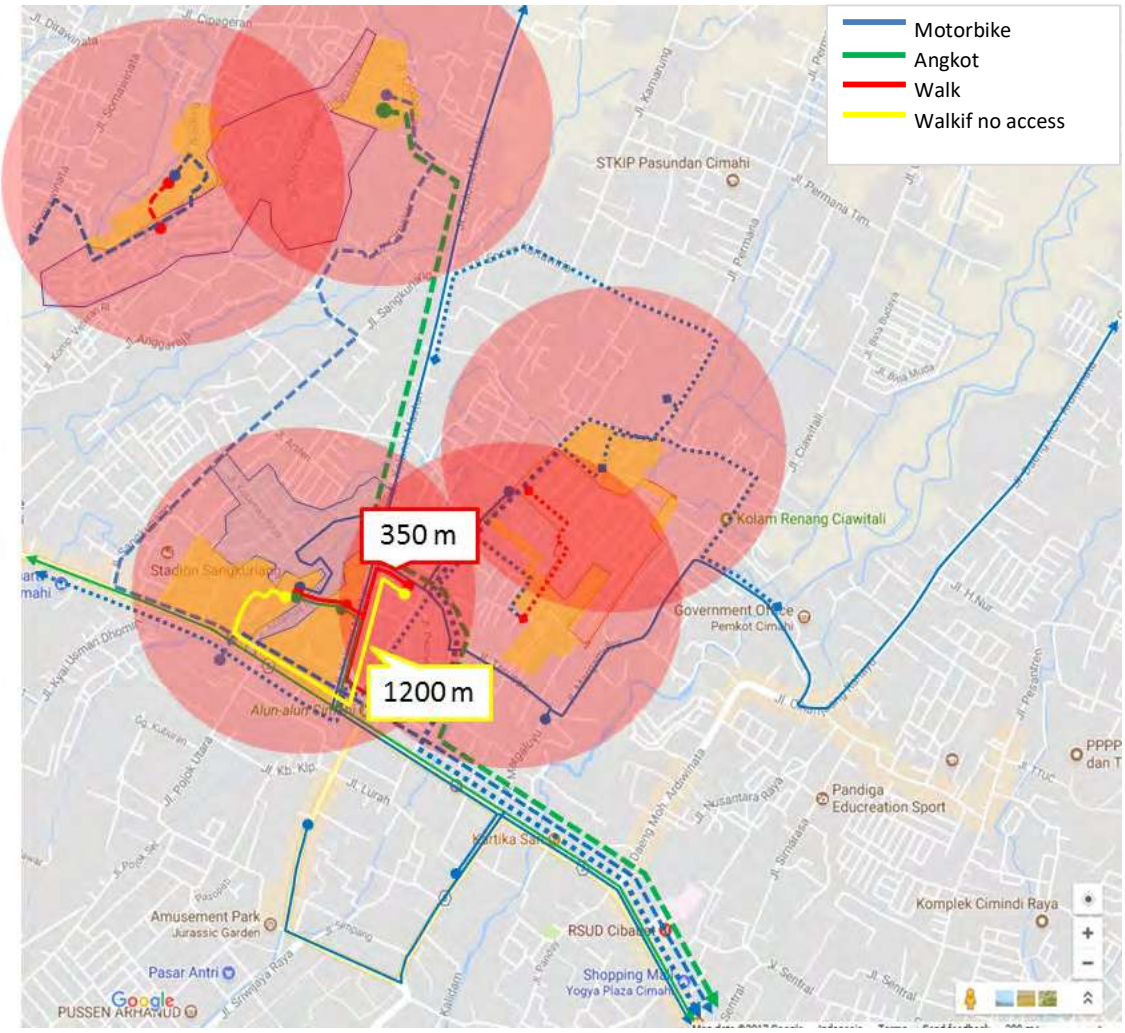


Figure 3 Route and mode of transport to work

On another case, there is a participant who used to work as a household helper at NH housing estate. She desbribed that the shut down of pedestrian access has become a factor in making a decision to resign from work. Not only her, the school children have also been affected by the access being shut. Though the *kampung* dwellers have complained, the access is still shut due to security reason. The quote below describes such conditions:

"When I used to work, I can still go through that door [pedestrian gate]. We cannot go through now. It becomes far since we have to go all the way to the front. That is why I stopped [working]. I pity the school children [since] they have to walk further. I had once being asked to be a representative of this*kampung* dwellers to deliver our complaints to NH [housing estate residents]. They [NH

residents] responded 'Go ahead [open the pedestrian gate] if you are willing to be responsible if there is any burglary here'" (INNH)

4.2. Shopping

For groceries shopping activities, the top graph in figure 4 shows that the majority of participants walk. However, there is a notable difference where the *kampung* dwellers mostly walk or ride *angkot* to buy groceries while the housing estate residents are divided between walk and riding their vehicles.

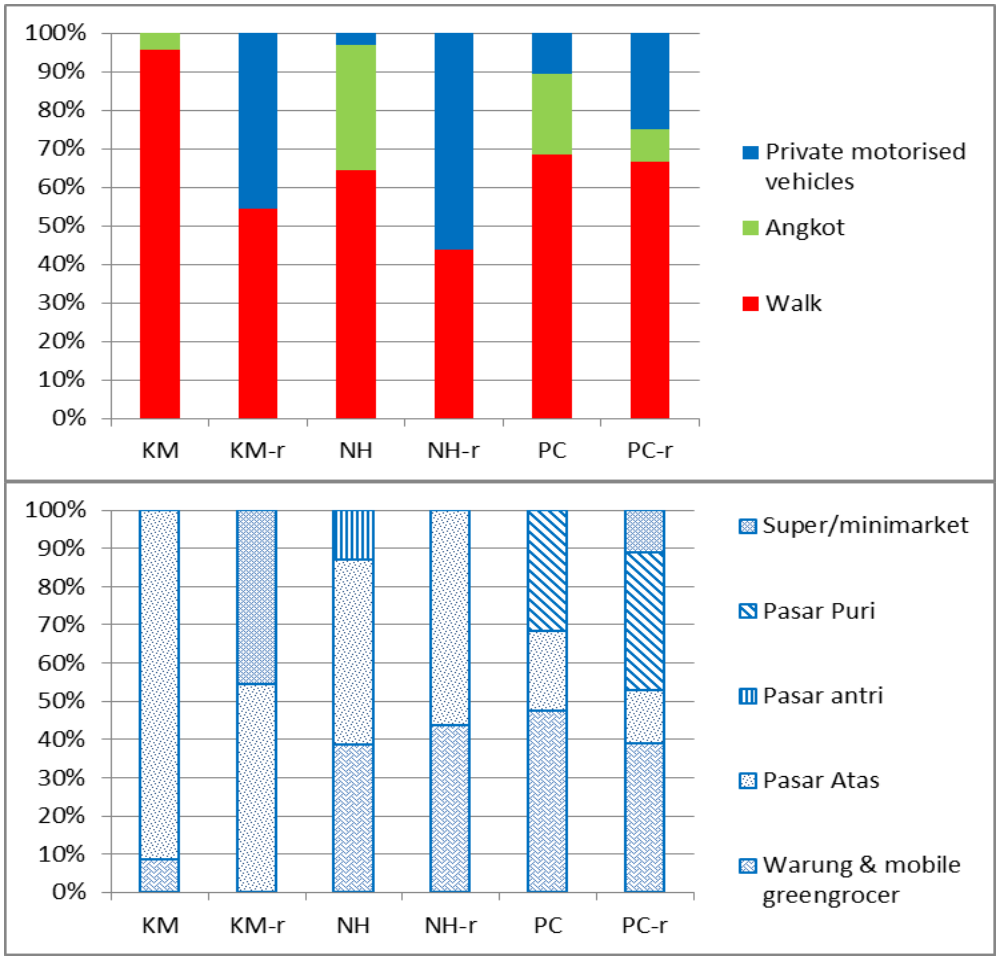


Figure 4 Mode of transportation and destination for shopping activities
(Top-bottom: Mode of transportation, shopping destination)

The bottom graph in the same figure explains that the destination for groceries shopping makes the difference of such different mode of transportation. The *kampung* dwellers all go to either *warung*/mobile greengrocer or the traditional market which very easily accessible. On the other hand, estate residents who go to the traditional market are divided: KM estate residents walk to Pasar Atas located 300 meters away, NH estate residents ride their private vehicles to Pasar Atas located 600 meters away, and PC estate residents can walk to Pasar Puri, ride angkot to Pasar Atas (2 km away), or ride their private vehicles to Pasar Antri (5 km away). The locations of these traditional markets are provided in figure 5. Looking at the shopping destination of estate residents, only a small part of residents go to supermarket:

nearly 50per cent of KM residents and 10 per cent of PC residents. The supermarket which the participants go to differ based on the distance to their houses starting from the nearby minimarket to the big supermarket within less than 5 km away. PC estate residents go to the west while KM and NH go to the east. While these residents shop once a week to once a month, the rest who shop at *warung*, mobile greengrocer and traditional market buy groceries in every two days or a few times a week.

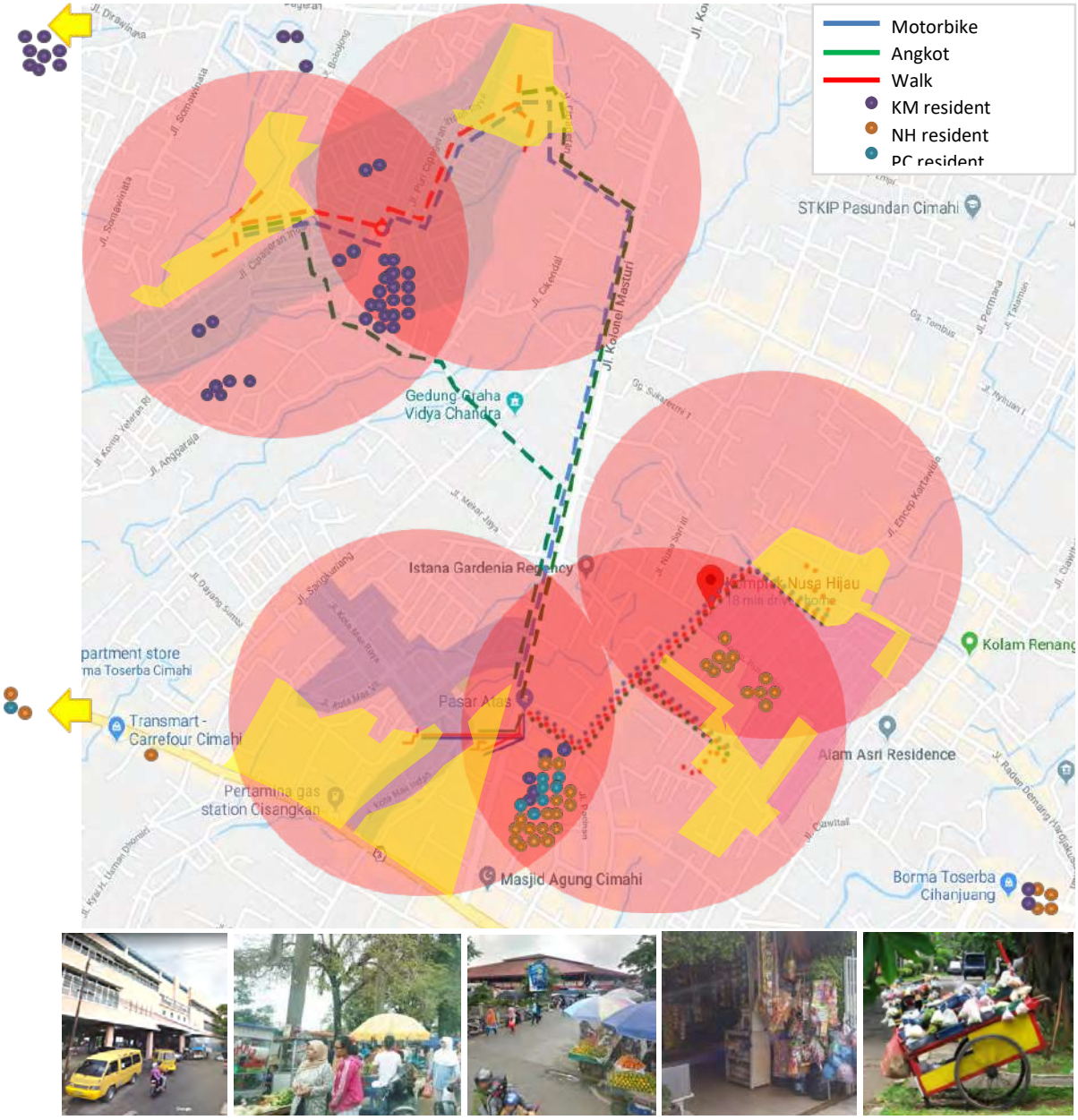


Figure 5 Route and mode of transport to shop
(Bottom left-right: Pasar Atas, Pasar Puri, Pasar Antri, typical warung, mobile greengrocer)

The patterns of groceries shopping to *warung*, mobile greengrocer and traditional market are provided in the following quotes. The reason is mostly due to the locations which incur no travel cost.

> Pasar Atas, sometimes [I shop there] everyday on foot. The price must be about the same, [I shop there] because it is near (NKM)

> Sometimes [I shop] at Pasar atas, sometimes to the mobile greengrocer. Just walk through here [to go to the market], the alleys, very near…at least 6 times a month. I buy rice [at the market] since the mobile greengrocer does not sell rice (DKM)

> I buy vegetables daily at the mobile greengrocer…or *warung*, the nearest one. I shop every day but only a little, only the necessities, spend about 2000 [rupiah]. Let the mobile greengrocer come so I do not need to spend travel cost to go the market. It is budget efficiency, honestly (TRNH)

To go to Pasar Atas which located 600 meters away from their houses, NH *kampung* dwellers sometimes ride *angkot* and sometimes walk depends on traffic as well as their mood as the quotes below describe:

> Sometimes I ride *angkot* but sometimes in the morning there is traffic congestion so I walk. It is very congested. I go there [Pasar Atas] every day (NNNH)

> If I go to Pasar Atas I ride *angkot*. If I felt like walking then I like to walk through the NH housing estate, it is nice to stroll. Most of the time [I shop at] *warung* though (INH)

4.3. School

From the total amount of participants, provided in figure 6, nearly half have no school-aged children; either their children are still very young or have become adults. The modes of transportation of these school-aged children are divided almost equally between those who walk, ride *angkot*, and ride private vehicles (drive themselves or drop by their parents). Looking at where they reside, no contrasting difference can be found between the estate residents and *kampung* dwellers, for example KM *kampung* dwellers and NH estate residents do not ride angkot to school. The school location that both *kampung* dwellers' and estate residents' children attend to are within reasonable distance in which 5 km at the furthest.

The patterns on the use of mode of transportation to school are highly varied. It differs due to high variety of factors, such as the age of the children, the angkot route, the parents' schedule, as well as friends who accompany the children. These factors are uttered by the participants in the following quotes:

> My eldest child studies at SMP Pasundan 1 di Ciawitali near the city government office. The youngest at SD Mandiri 3 Cipageran at Sawahlega. They go to school with their father. The youngest goes home on foot while the eldest rides *angkot*. The route started from KM housing estate, to Citeureup, to Police Office. The youngest walk around 10 minutes usually with friends (AKM)

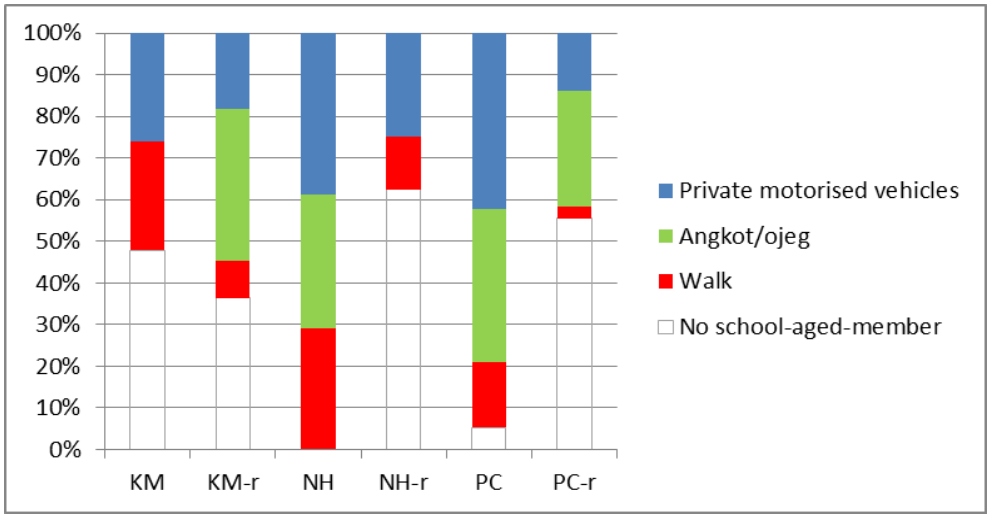


Figure 6 Mode of transportation to school

The shut down of pedestrian access in NH housing estate have affected one of the *kampung* dwellers. She said that her child has to overcome further distance from previously only 600 meters to become 900 meters. However, they are dealing with it as quoted below:

> My eldest studies at SDN Mandiri 5 Cimahi. Walk [to school] not too far through Sudarman alley. Previously [before the pedestrian gate was shut] was nearer. We though about moving to a new school, but he is now at the 4th grade so only two years left [until graduation] (ASNH)

Different to the two other locations, participants at PC housing estate and *kampung* dwellers who ride *angkot*, *ojeg* or private vehicles are much more than those who walk. The routes shown in figure 7 show that the schools are located outside the walking distance. The following quotes describe:

> The eldest child now studies at UNISBA and rides motorbike there. He used to study at SMA 3 Cimahi, SMP 3 Cimahi, and SD Cimahi 1. He rides motorbikes since the final year of junior high school (SMP). Before that, his father drops him off the motorbike (ISPC)

> **My eldest studies at SMK 3, Cipageran and the youngest at SDN Mandiri 1 at the 5th grade. The eldest usually rides Grab, the youngest rides angkot (LIPC)**

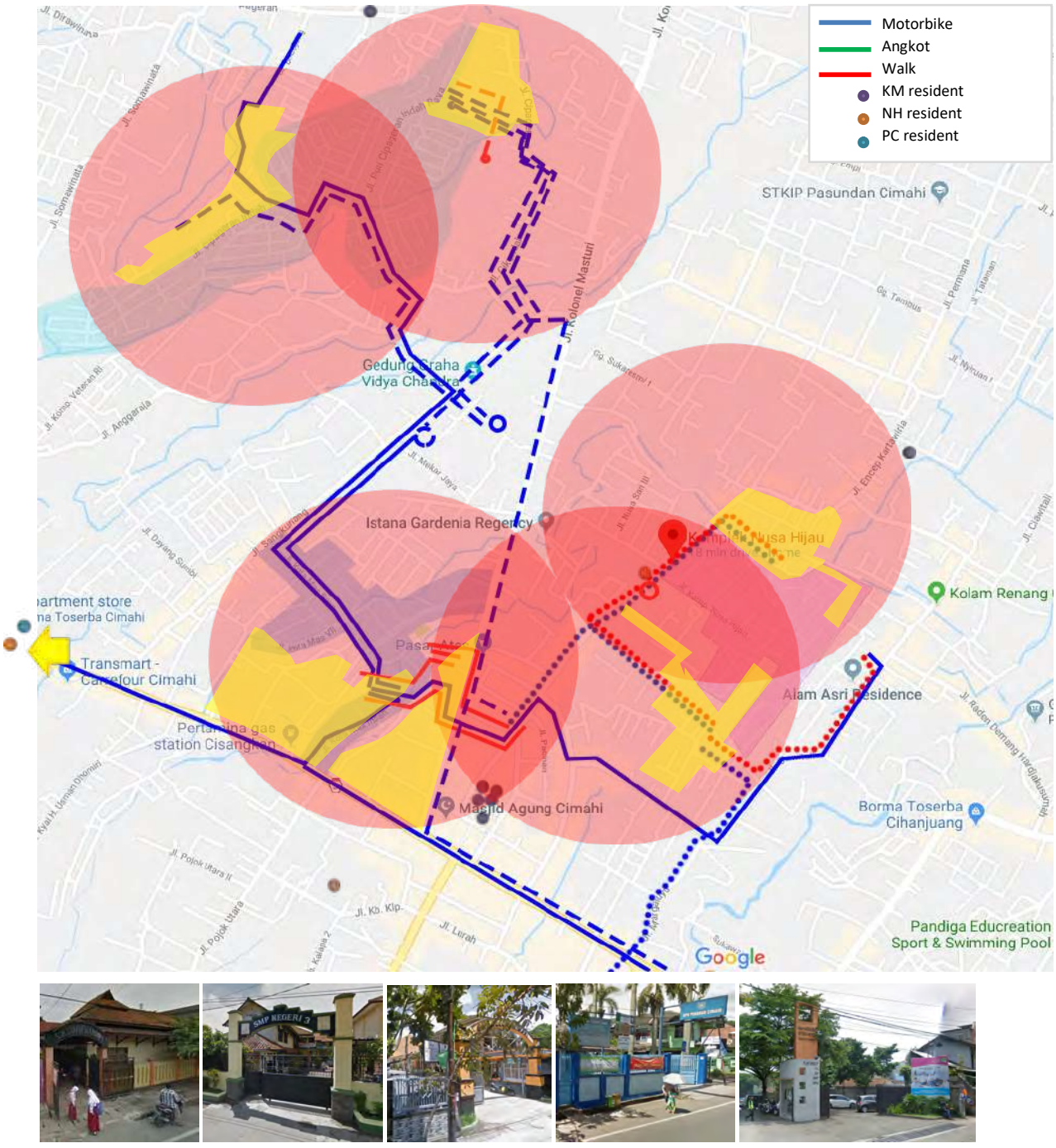


Figure 7 Route and mode of transportation to school
(Bottom left-right: public primary schools [SDN, SMP, SMK], private schools)

4.4. Exercise

For exercise activities, the top graph in figure 8 shows that around 30per cent of participants exercise at home or do not exercise. Meanwhile, 50 per cent walk as a form of exercise as well as to reach the destination to do an exercise. Only a small percentage of participants ride private vehicles or *angkot* since they travel between 3 to 5 km. Looking at where they reside, no contrasting difference on travel mode can be found between the estate residents and *kampung* dwellers.

The bottom graph in the same figure shows the destination of exercise at each case. In KM, the estate residents exercise by walking around the area. While most *kampung* dwellers exercise at Sangkuriang stadium located just on the other side of KM housing estate, some of them exercise at Brigif (5 km away) and Kenfer swimming pool (3 km away), and only a few exercise at KM housing estate. Similar to estate residents in KM, most estate residents in NH and PC exercise by walking around the area and the rest exercise at Brigif. The *kampung* dwellers in NH and PC exercise at various locations: Most NH *kampung* dwellers exercise at several locations within 1 km radius and a small portion exercise at Brigif and the NH housing estate; Most PC *kampung* dwellers exercise at the neighbourhood field, 10 per cent exercise at PC housing estate, 5 per cent at Kenfer swimming pool (3 km away), and the last 5 per cent at a nearby sport stadium.

The variety of exercise locations of the *kampung* dwellers are caused by several factors such as shopping, availability of instructor, and accompany. These factors are mentioned in the following quotes:

> [I exercise at] Sangkuriang or Brigif stadium. I exercise at Sangkuriang stadium because it is closer [than Brigif] and it has a market (*pasar tumpah*) as well. I go there through KM. If I go to Brigif I like to ride motorbike, much more to see there. Exercise while shopping (DKM)
>
> [Sometimes I do gymnastics (senam)] at RSGM (dental hospital) every Tuesday and Sunday. Usually I go to Permana…by riding *angkot* twice a week. An instructor is provided there (RNNH)
>
> We like to do gymnastics (*senam*) in the rear of Ramayana [near the old townhall] every Sunday morning. I walk there with fellows [who live] here (*ibu-ibu disini*). We never ride *angkot* since the route would be further (*jauh muter-muter*). It is better to walk, not far through shortcuts (LNH)
>
> At the old townhall we do Zumba every Sunday. At KM we exercise at 6 AM, then we continue at the old townhall at 8 AM. We walk [because] it is near (SKM).

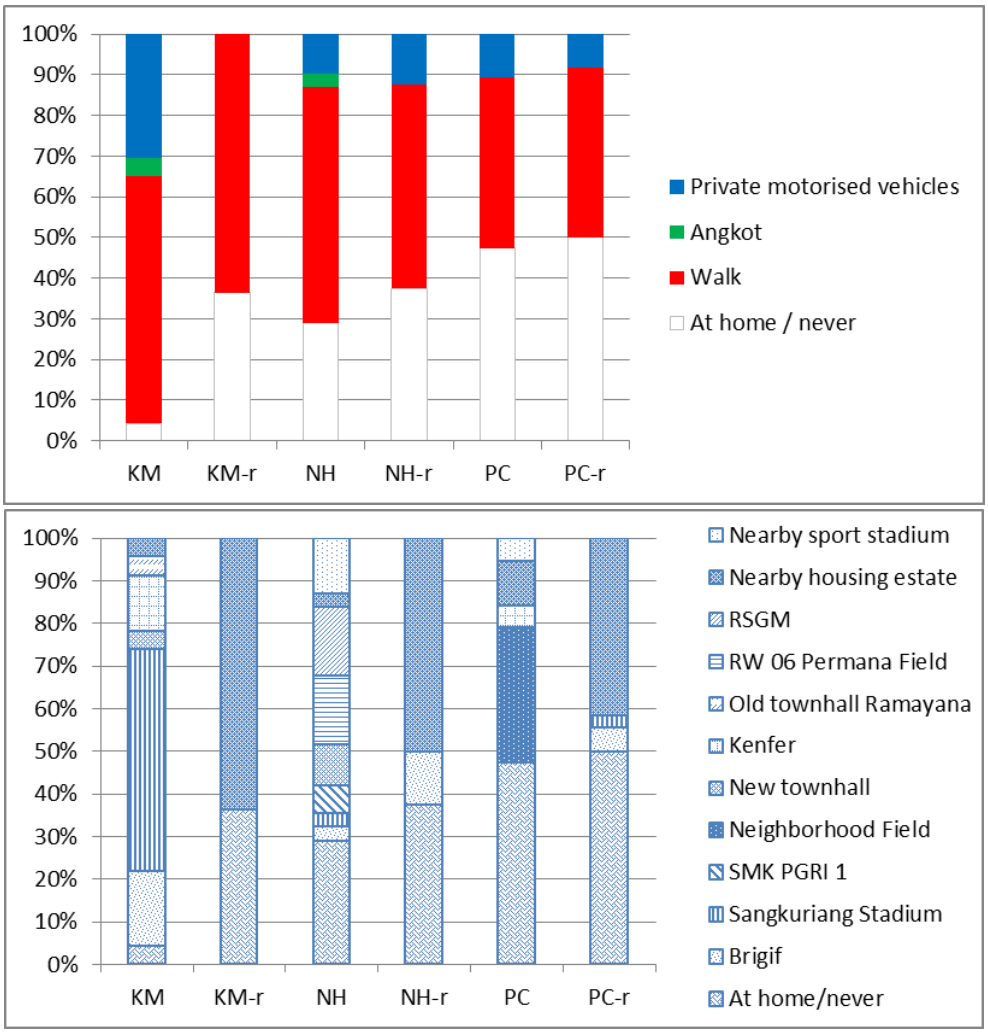


Figure 8 Mode of transportation and destination for exercise activities
(Top-bottom: Mode of transportation, exercise destination)

For the NH *kampung* dwellers, some of them used to exercise at a park in NH housing estate. However, they no longer do so since the shut down of pedestrian gate as quoted below:

> I also used to like to do gymnastics (*senam*) there [at a park in NH]. After that [the shut down of pedestrian gate] I walk [as an exercise] to Ciuyah all the way to Kamarung since I have a friend who used to be a neighbour live there. I almost never exercise [at NH] anymore. I had once exercised there by riding a motorbike but then never again (SRNH).

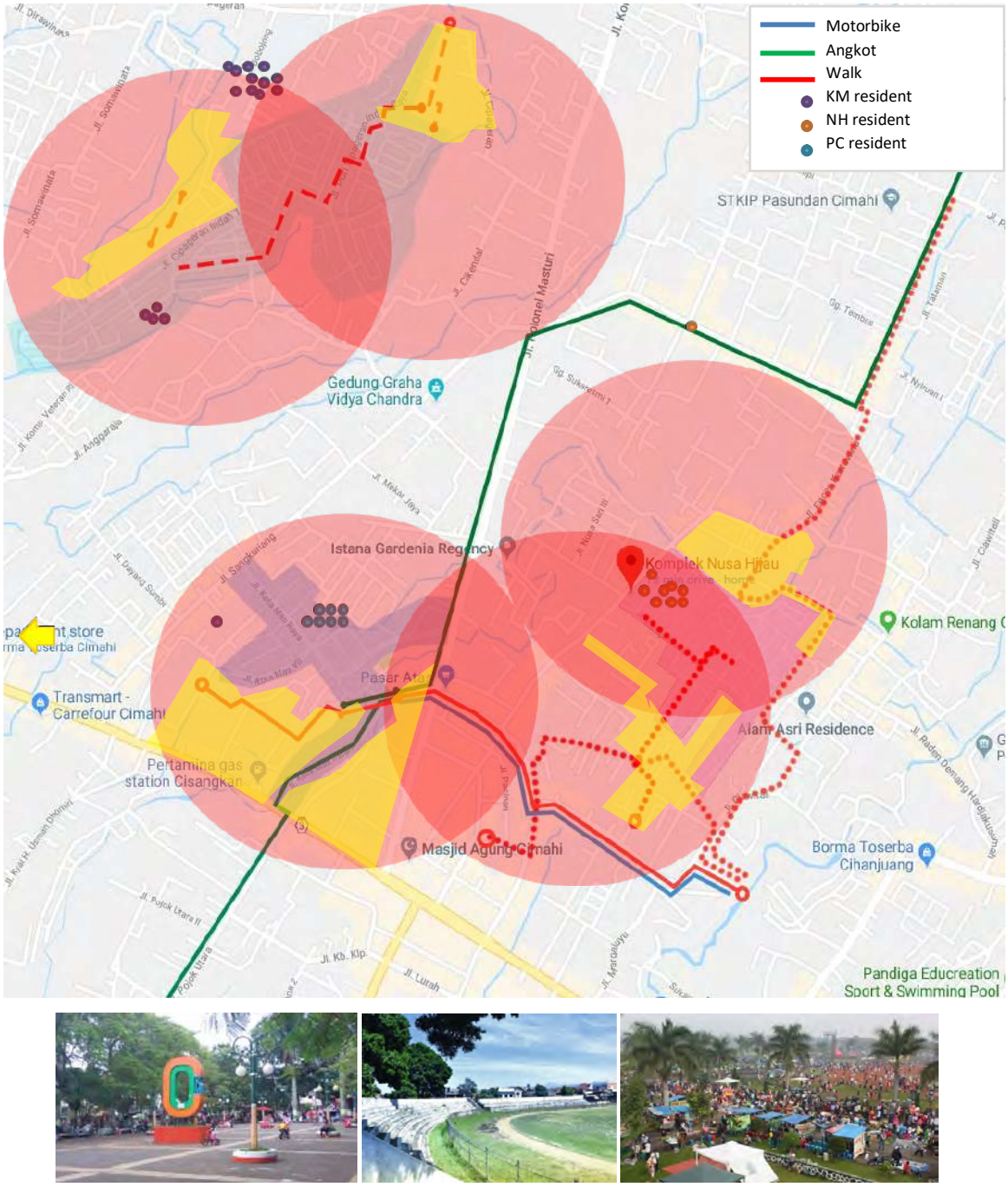


Figure 9 Route and mode of transportation to school

4.5. Discussions

To understand the phenomenon of how the middle-income housing and their gated community has impacted travel pattern, this paper tries to explore the extent of automobile dependency of the residents living at housing estate and the dwellers living at adjacent *kampung*. The journey to four kinds of activities can be grouped into the following patterns.

Majority of participants drive their private motorised vehicles to work which located at a various distance from 5 km to 30 km. Only a small percentage of participants who live in the *kampung* walk or ride *angkot* as the public transportation to work. None of the estate residents walk or ride *angkot* to work. For groceries shopping activities, the majority of participants walk. However, there is a notable difference where the *kampung* dwellers mostly walk or ride *angkot* to buy groceries while the housing estate residents are divided between walk and riding their vehicles. The children, both living at the housing estate and *kampung*, go to school by walking, riding *angkot*, and riding private vehicles (drive themselves or drop by their parents). For exercise, no contrasting difference on travel mode can be found between the estate residents and *kampung* dwellers. Fifty per cent walk as a form of exercise as well as to reach the destination to do an exercise. Only a small percentage of participants ride private vehicles or *angkot* since they travel between 3 and 5 km to do the exercise.

Most residents travel in far distance to reach their job location but do not travel in far distance to conduct their shopping, studying, and exercise activities though some of them own a motorbike. The latter is due to the presence of mobile green grocers, *warung*, traditional markets, good quality schools, sport facilities and open spaces within walking distance to their houses. However, these facilities are visited mostly because there are pedestrian access points through the housing estates made available for public use.

When these access points are restricted or non-existed, the travel pattern would differ as has been uttered by the *kampung* dwellers. A number of participants have mentioned that travelling to work, grocery shopping, school, and exercise has been made easier owing to the pedestrian access points. In one of the cases, the following disconnections between the *kampung* alleys and streets of housing estates have made the *kampung* dwellers altered either the location or the transportation mode of their exercise activities. The weaving of a network comprised of *kampung* alleys and private roads of housing estate has proven to be beneficial for the *kampung* dwellers. In several examples, such as in shopping and exercise activities, it has also changed them from riding a motorbike to walking. It has showcased the impact on creating a healthier and more affordable travel behaviour.

Owing to this pedestrian access, *kampung* alleys become connected to the streets within the housing estates and create shortcuts for pedestrian to walk through. Such network is a privilege for the pedestrian, since they cannot be accessed by cars and in some parts difficult to be accessed by motorbikes due to the narrow alleys.

5. Conclusions

There are lessons to be learned from these travel patterns. Housing estate development shall always provide access to the *kampung* that have existed and *vice versa*. Such spatial connections will promote a change of travel behaviour from automobile dependence to active travel. However, it should be kept in mind that these results may not be generally applicable to other places with different socio-economic and spatial characters. Acknowledging the large amount of gated communities in Indonesia, further work in the field may be benefited from more cases and larger population sample.

6. References

Barter, P.A (2000) "Urban transport in Asia: Problems and prospects for high-density cities", *Asia-Pacific Development Monitor*, Vol. *2* No 1, pp.33-66.

Bowen, J (2006) Tigers in a traffic jam: Urban transport in Southeast Asia. In: Wong, T., Shaw, B. & Goh, K. (Eds.). *Challenging sustainability: Urban development and change in Southeast Asia.* Marshall Cavendish Academic, pp. 108–145.

BPS (2018) Indonesia in figures. Jakarta: Badan Pusat Statistik.

Cervero, R. & Kockelman, K (1997) "Travel demand and the 3Ds: Density, diversity, and design", *Transportation Research D*, Vol. *2* No 3, pp. 199–219.

Charmes, E (2010) "Cul-de-sacs, superblocks and environmental areas as supports of residential territorialisation", *Journal of Urban Design*, Vol. *15* No 3, pp. 357–374.

Duany, A., Plater-Zyberk, E. & Speck, J (2000) Suburban nation: The rise of sprawl and the decline of the American dream, New York: North Point Press.

Ewing, R. & Cervero, R (2010) "Travel and the built environment: A meta-analysis", *Journal of the American Planning Association"*, Vol. *76* No 3, pp. 265–94.

Grant, J. & Curran, A (2007) "Privatized suburbia: The planning implications of private roads", *Environment and Planning B: Planning and Design*, Vol. *34* No 4, pp. 740–754.

Handy, S (2002) Accessibility vs mobility-enhancing strategies for addressing automobile dependence in the US. European Conference of Ministers of Transport.

Hess, P., Moudon, A., Snyder, M. & Stanilov, K (1999) "Site design and pedestrian travel", *Transportation Research Record: Journal of the Transportation Research Board*, No 1674, pp. 9–19.

Hoehner, C., Ramirez, L., Elliott, M., Handy, S. & Browson, R (2005) "Perceived and objective environmental measures and physical activity among urban adults", *American Journal of Preventive Medicine*, Vol. *28* No 2, pp. 105–116.

Khattak, A. & Rodriguez, D (2005) "Travel behaviour in neo-traditional neighbourhood developments: A case study in USA", *Transportation Research Part A*, Vol. *39*, pp. 481–500.

Maher, C (1994) "Residential Mobility, Locational Disadvantage and Spatial Inequality in Australian Cities", *Urban Policy and Research*, Vol.12, pp. 185-191.

Mateo-Babiano, I; Ieda, H (2007) "Street space sustainability in Asia: The role of the Asian pedestrian and street culture", *Journal of the Easterns Asia Society for Transportation Studies*, Vol. *7*, pp. 1915–1930.

Newman, P. & Kenworthy, J (1996) "The land use-transport connection: An overview", *Land use Policy*, Vol. *13* No 1, pp. 1–22.

Newman, P. & Kenworthy, J (1999) Sustainability and cities: Overcoming automobile dependence. Island Press.

Nicholls, L., Phelan, K. & Maller, C (2015) "*Time poor, health poor? Travel-related time poverty and resident health in a greenfield master-planned estate*", State of Australian Cities Conference 2015.

Rodriguez, D. A., Khattak, A. J., & Evenson, K. R (2006) "Can new urbanism encourage physical activity? Comparing a new urbanist neighborhood with conventional suburbs", *Journal of the American Planning Association*, Vol.72 No 1, pp. 43-54.

Rosa, J (2007) A step towards sustainable transportation behaviour: Understanding automobile ownership and mode choice through qualitative research, Master thesis, Waterloo:, University of Waterloo,.

Schwanen, T. & Mokhtarian, P (2005) "What if you live in the wrong neighbourhood? The impact of residential neighbourhood type dissonance on distance traveled", *Transportation Research Part D*, Vol. *10*, pp.127–151.

Southworth, M (2005) "Designing the walkable city", *Journal of Urban Planning and Development*, Vol. *131* No. 4, pp. 246–257.

https://www.tomtom.com/en_gb/traffic-index/jakarta-traffic#statistics

http://inrix.com/scorecard/

Case Study Paper

Urban morphology and behaviour mapping in Abu Dhabi's public spaces.

Informality as an interaction of cultural context and urban form.

Apostolos KYRIAZIS, Abu Dhabi University; UAE
Hadrien DUBUCS, Sorbonne University Abu Dhabi; UAE
Clio CHAVENEAU, Sorbonne University Abu Dhabi; UAE
Clemence MONTAGNE, Nantes Atlantique; France
Hanu DILIP, RW Armstrong; UAE
Ayesha ZAHID, Abu Dhabi University; UAE
Shafaq QAMAR, Abu Dhabi University; UAE

Abstract

Abu Dhabi's galloping growth is shepherded by a stringent set of standards and guidelines for both the public space and the built environment. Its urban form that follows the main characteristics of most new Arab cities (automobile dependency, modernist grid and monotonous suburban sprawl) has already started gaining the attention of scholarly research. However, that research body still misses a critical analysis of the dynamic interaction between the qualitative quotidian practices and the produced urban form. Such an analysis could shed light on the relationship between socio-ethnic groups and urban space programming and appropriation.

This paper presents findings from an ongoing research program for the search of a link between the design and use of public spaces, and the surrounding urban morphologies within the diverse sociocultural context of Abu Dhabi. Fourteen public spaces of the city (both formal and informal ones) were examined in terms of their typology, functions and social profile, as well as for the correlation with their urban context and the public transportation networks. In situ methodological approaches such as behavioural mapping, impromptu discussions and photography were applied in order to shed light on the intricate particularities and qualitative properties of public spaces. The mapping of the public spaces was conducted under the prospect of comparability, either between themselves or with future studies in similar cities in the Middle East and beyond.

The research program – albeit not completed yet – amplifies the importance of informality as an indicator of urban health and as a reminder of insufficient urban planning programming and urban design practices. It also underlines the importance of preserving or even pursuing informality as a catalyst of social cohesion, cultural flexibility and inclusivity. Furthermore, certain urban morphologies, related more to a higher and a more organic degree of pedestrian connectivity seem to optimally contribute to a more diverse and successful public space.

Future phases of the program could also reveal relations on the metropolitan scale with regard to mobility, public transportation needs, strategic approaches and the need to control urban sprawl and densities. This case study of Abu Dhabi could then become of valuable guidance on rewriting public space design manuals and on exporting urban doctrines.

Keywords

Abu Dhabi, informal, urban morphology, public space, culture

1. Researching Abu Dhabi

1.1. Introduction to context

While often dwarfed next to Dubai in terms of scholarly attention, Abu Dhabi is emerging as a paradigm of a new Arab city in the Gulf region. Its transformation from a seasonal fishing post to a contemporary global hub – as fuelled by the oil boom – has been achieved under a consistent and pragmatic political will (Kyriazis, 2017). Its five decades of history, although shallow compared to most cities, were enough for the city to grow to the extent that construction moratoriums were issued twice in order to allow the city life to catch up (Elsheshtawy, 2008). Automobile dependency still dominates and shapes the urban form (Montagne, 2016) resulting an expensive sprawl against both urban fronts: the desert, with a post-modernist suburban lifestyle and significant horizontal segregation; and the waterfront, through constant reclamation on a sensitive marine ecosystem and the production of exclusive expatriate-based resort-like developments (Kyriazis, 2018). Catalyst to that is the effort of the city to keep up with the latest trends on global urban design and real estate developments while pushing for high targets in tourism that led to emphasis on security and public space privatization (Samarrai, 2018). The urban and architectural scales are controlled by a meticulous set of manuals, partially aligned with the local cultural and climatic conditions. Especially with regard to the public space, it is the analytical manuals, privatization and an almost Orwellian level of security that generate a sense of over-management (Kyriazis, 2019).

1.2. The research project

In a city that was created in a tabula rasa for the sake of modernization (Al Fahim, 2014) and where the built environment is renewed to the degree of risking to eradicate even those shallow layers of modernist history (Menoret, 2013 and Elsheshtawy, 2008), its citizens – expatriate in majority – are a permanent testament of its temporality. A labor/sponsor based residency system underlines this property. However, they provide a pulse to the city as well as a seemingly uninterrupted collective memory that ensures the continuity of its existence (Elsheshtawy, 2019). The public space is their field of action. The street, the square, the alley; a space of interaction without which urban life would not exist (Lefebvre, 2003).

It is this space and its interaction with its users and the urban form that is under research. A city-wide behavioural analysis that would highlight social parameters and could associate them with the urban morphology. In this light, the research team combines forces from two institutions and three disciplines: Architecture, Sociology and Human Geography. Documenting the behavioural profile of public spaces and superimposing it to the urban form and mobility patterns would answer questions related to the genesis and impact of informality, to the consequences of zoning practices and to the interconnectivity of the public realm (Kyriazis, 2019).

Quotidian urbanism has been studied thoroughly in many cities for the last decades, following the influence of Jane Jacobs, William Whyte, Kevin Lynch, Jan Gehl and others. Middle Eastern cities were also examined, as their pre-modern, organic urbanity highlights the importance of randomness and spontaneity (Elsheshtawy, 2011; Robabecciah, 2018; Alawadi, 2019). However, this meticulous study of Abu Dhabi is critical, as the role of informality is tested – and eventually becomes essential – against a condition of over-management and overregulation. Aspects of Abu Dhabi's daily patterns have already been studied (Alawady, 2019; Elsheshtawy, 2019), but this project includes the entire metropolitan area, aspiring to juxtapose the intricate urban morphologies with the public space users and their diverse sociocultural backgrounds.

1.3. Methodology

Achieving comparability and representativeness within that mega-scale was a key target for the research project. Comparability regarded the formal/informal dualism, different neighbourhoods of the city as well as with other cities in the region. This hypothesis raised the issue of splitting the city to major parts with distinct urban/social characteristics.

The analysis of urban and statistical data would precede the social/behavioural one. However, since access to any statistical and demographic information was limited, the observational part should involve an upgraded empirical analysis, supported by impromptu discussions with public space users (instead of a formal questionnaire). Simultaneously, the role of photographic documentation became even more critical for both parts. Public space photography was a sensitive issue concerning privacy and socio-cultural particularities and special techniques were applied (Kyriazis, 2019).

Observations covered morning-afternoon-evening time slots for both weekdays and weekends, thus adjusting to quotidian religious practices and labour patterns. Furthermore, due to the extreme climatic conditions of Abu Dhabi, most daytime observations were conducted during winter. They include description of actions, brief profiles of public space users (nationality, occupation, commuting means and origin etc.) and mapping of their pathways and actions within that space. This mapping would get superimposed to the urban analysis for a spatial visualization of the observational grid. Furthermore, those profiles will be used to reveal mobility patterns at the metropolitan scale.

2. Analysis - Observations

2.1. Selection of studied public spaces

A first effort to pinpoint all existing public spaces in Abu Dhabi highlighted the volatility of the informal ones as well as the necessity of acquiring information of any elusive yet remarkable activities around the city (figure 1).

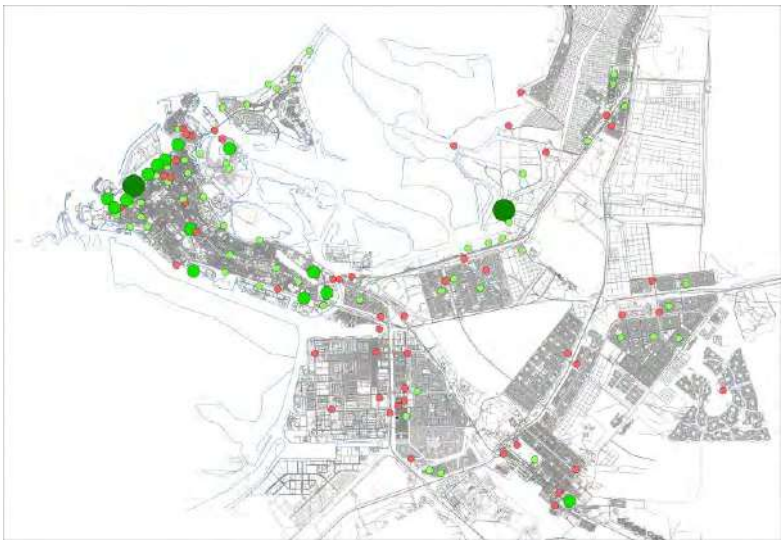


Figure 1: Map of public spaces in Abu Dhabi. Formal spaces are in green (sized after their importance/impact) and informal spaces are in red.

For addressing issues related to observations' time management and comparability without compromising its scientific principles, the city was divided in seven zones with distinct morphological characteristics and ethnic distribution (in numerical order): the downtown superblocks, the mid-island low-rise villas, the institutional Maqta channel, Khalifa City, the industrial suburbs, the desert sprawl suburbia and the waterfront expatriate free zones (figure 2).

Two public spaces were chosen from each zone; a formal and an informal one. This way, observations from all fourteen spaces in various timings and days would secure a representative enough reading with comparable results. Special attention was given to issues that could affect the objectivity of the observations, such as the intricate climate of the region and major religious events (i.e. the holy month of Ramadan).

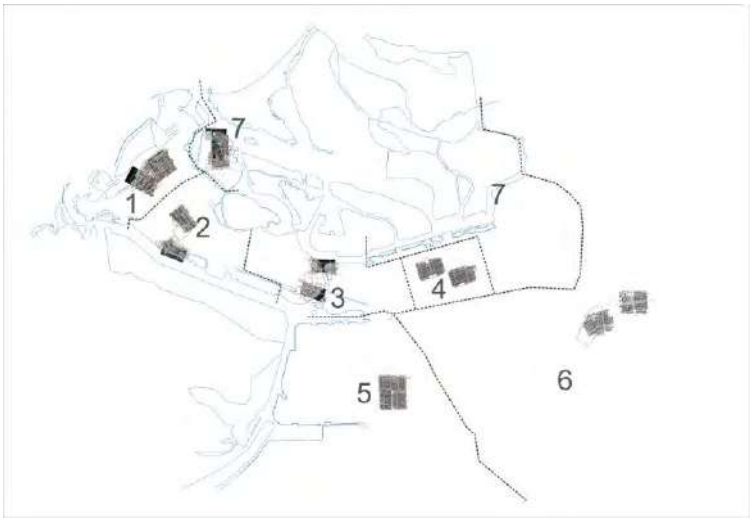


Figure 2: Map of the selected public spaces to be studied.

2.2. Urban Analysis

A layered urban analysis was necessary both for comprehending the morphological distinctions that the aforementioned grouping induced and for becoming the basis upon which the behavioural mapping will take place. All fourteen chosen spaces are depicted in thematic layers of urban morphology, namely Built-up space, building heights, land uses (ground floor and overall), pedestrian space and road network (figure 3).

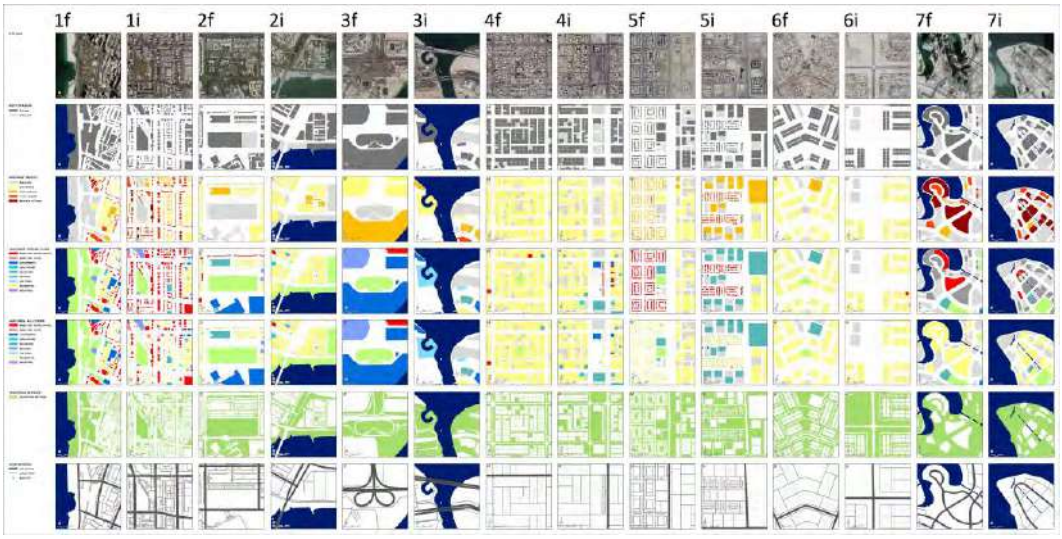


Figure 3: Urban thematic maps of the fourteen assigned spaces (as numbered in Figure 2 with "f" and "I" standing for Formal and Informal). All mapped areas are 1x1km in dimensions.

The theme maps alone reveal patterns of relations between the studied spaces and their urban surroundings. Density, heights and plots' shapes consist a first level of reading related to walkability, accessibility and porosity.

3. Observation findings

3.1. Behaviour mapping

While only few observation slots remained at the time this paper was authored and most of the digital mapping process is still under way, several significant findings have already emerged. These findings are a fruition of activity observations, qualitative information from the public space users and from the mapping itself.

The research team sought for both formal and informal activities – regardless of the formal/informal status of the site itself. This distinction was elusive (especially in formal spaces) but clear once occurred. However, activities on informal public spaces also display timing and usage patterns, thus highlighting the absence of formal public spaces or the absence of specific uses/activities within them, in major parts of the city.

However, this project focuses not only on the public spaces themselves, but also on their relation with the surrounding urban morphology. The mapping of pathways and activities (figure 4) focuses more on the latter.

Figure 4: Mapping of pathways and activities of public space users (source: authors).

3.2. Formal Public Spaces

The formal public spaces chosen in this project can be divided into three categories, in terms of design sequence: The ones that were created and designed at an ad-hoc basis, like the famous Corniche downtown park (as part of the waterfront regeneration). The parks with plots allocated by Master Plans that got developed later in an isolated fashion (like the parks of areas 4f, 5f and 6f shown on figure 4). Lastly, the parks that were created in residual urban spaces i.e. within highway junctions (like the park on area 3f).

Observations showed that in most of these public spaces, informal actions were less than few and they were usually hinging on alternative use of sport courts (due to overpopulation in other, popular sports), small-scale and time-limited occupation of playground equipment (by sleeping Municipality workers or smoking youth) and arbitrary car parking at unpaved edges of the areas. Security personnel assigned by the Municipality however rapidly quench most of these cases. Other surprises like trash collectors searching on bins and users of quad-bikes inside grass-landscaped areas were rare.

Regardless of the size and importance of the public spaces, it seems that their success depends on the presence of flexible areas within them; areas devoid of a program, areas open to experimentation, adaptation and customization. In the studied cases, this is manifested by open areas of greenery that can easily adapt to cultural particularities and habits (i.e. family pic-nicks) but also absorb extra demand in popular segments of the park (i.e. football courts etc.). Furthermore, such spaces are also capable of accommodating local-scale attractions introduced by individuals that rent their needed space from the Municipality. Thus, some revenue comes back to the local authorities (or to park managers) and at the same time, initially unforeseen uses enrich activity options.

3.3. Informal Public Spaces

The informal spaces chosen are either underdeveloped (or not developed at all) public spaces or undeveloped private plots. While many informal spots of Abu Dhabi have established some kind of permanence – albeit a delusive one – many others disappear or appear at surprisingly frequent rates, underlining a condition of temporality. Practically speaking, figure 1 would need constant updating.

Informal spaces usually serve in absence of formal alternatives in a neighbourhood. Therefore, they highlight the deficiencies of the preceding master plans in supplying public spaces in general or specific facilities that could address demand from local residents. This also indicates a gap on the usually top-down urban planning processes and their inability to reflect on the social dynamics of the city. Abu Dhabi – as well as many of the Arab cities of the Gulf – is highly ethnically diverse with the indigenous population occupying only 19% of the total (SCAD, 2018), the majority being from the Indian subcontinent (India, Bangladesh and Pakistan). In this light, it is not surprising to witness so many spontaneous cricket games (especially in sectors 3, 4, 5 and 6). Other sports performed are volleyball (mostly by Indians in the 5i spot), badminton (on pedestrian sidewalks of the 1i area) and football.

In most of these cases, informal gatherings function as community condensers. The Indian volleyball gatherings on area 4f resonated as friends' meetings after working hours, to end up in running neighbourhood championships. Similar settings appear in cases like the Bangladesh square (Elsheshtawy, 2019). Such post-work ethnic gatherings also display a sense of resistance to the daily routine, to labour anxieties and transience.

However, the expatriate communities are not the only ones that express their quotidian anxieties this way. The local youth (including other Arabs) also try to unwind themselves and socialize in manners related to automobiles and engine sports in general, a phenomenon frequently met in the region (Menoret, 2013). The Bateen beach (sector 2i) is a hot spot for impromptu jet ski races during the sunset. To this direction, the informal cases of the areas 4i and 6i are indicative of the consolidation of the private car as a personality extension as well as of the profound impact of the monopoly of this means on shaping the city's urban morphology. The car is used to shortcut big-sized, dirt/sand-covered city blocks and to stop at canteen stations for drive-through dinner orders. Canteen stations are an upcoming trend in Abu Dhabi: apart from following major events in the city (about sports, concerts and the like), they also make self-organized groups, occupying informal public spaces next to highway entrances to the residential suburbs. This trend is so vibrant that the Municipality have been trying to settle the canteen groups in temporarily formalized areas.

3.4. Illegality Vs Informality

The use of unfenced vacant private plots and the performance of several actions in formal public spaces have often been the subject of criticism from local authorities. After raising issues of security and socio-cultural particularities, informal behaviour is sometimes demonized or even penalized (Gulf News, 2018). However, wide scholarly research has shown that security issues truly arise in the absence of street life and informal urbanism (Jacobs, 1961). In addition, such measures tend to strengthen the sense of segregation and temporality and actually function as a catalyst for informality and a reply to oppression (Menoret, 2013).

Interestingly, there is also the issue of a proper definition of informality and illegality by both local authorities and designers. This became apparent on many of the formal spaces through the popular action of barbequing. While barbequing is a favorite task for many park visitors (mostly with an Arabic background), the official parks' signage was clearly prohibiting it. Some of the parks were later equipped with special built-in barbeque stations but the signage remained. Fishing is another popular but occasionally controlled activity. Conversations with Pakistani and Indian fishermen found in the 7i site implied a matter of public space clarity and quality in terms of preserving a high-end image of a public space and matching it with the "values" of its urban surroundings.

3.5. Informality and Space Privatization

The need to issue special permits for photography in the sectors 2f and 7f reminded the research team of other impactful space-generating forces of the city: the very real estate players, developers and private stakeholders. Public space privatization under the theoretical approaches of neoliberalism and the motivation of surplus value generation (Lefebvre, 2003) by definition oppose the notions of openness and inclusivity (Harvey, 2013). They deny any element of surprise and improvisation as they advocate for a fully monitored "surgery room" urbanism with predefined experience provisions. However, observations showed that public space privatization eradicates (but does not completely annihilate) informal activity, as even in the most diversely designed spaces users' unpredictability and the need for customization are inherent properties with universal value.

Further support to this approach comes from an incident prior to the observations' launch. The initial choice for the 7i sector was a countrywide known kite surf beach in Yas Island. Situated on the opposite side of the Yas global entertainment hub (that includes venues like the Yas Marina F1 race track, the Ferrari World and the Warner Bros World amongst other luxurious destinations), this beach was an informal haven for kite surfers and the like. It offered ideal wind alignments, easy access from a nearby highway and zero development; a setting naturally expressing the sense of freedom associated with these sports. However, in ignorance to the dynamics and potential of that attraction, permits were granted for private water sports facilities that fenced the area. Consequently, kite surfers stopped using that beach, all informal activities ceased to exist and the city lost a unique attraction.

3.6. Behaviour and the urban morphology

Most of the aforementioned cases and behaviours were the products of in situ observations. However – as aspired from the early stages of this project – their juxtaposition to the urban context (figure 4) should provide valuable insight on the dynamic interface and their intertwining properties that form or provoke each other.

Density does not seem to be associated with any kind of activity (formal or informal) apart from increasing the total amount of flows and the rate of unpredictability. However, its morphological manifestation makes a difference. The use of podiums on high-rise buildings on Reem Island (areas 7f and 7i), fully occupied with car parking spaces for the towers' dwellers, strips the street level of any life and produces elevated areas of exclusivity. Thus, pedestrian flows and activities of any kind in adjacent spaces are limited and channelled, with fewer opportunities for spontaneous socializing. In full contrast, on-street retail maximizes the randomness of pedestrian flow (areas 1i, 4i, 5i). Similar to that dualism, formal parks with single entry point like the Umm Al Emarat park (2f) are isolated from the urban fabric and have more predictable flows.

Moving to lower densities, the key sociocultural notion that shaped the urban morphology is privacy. The public-private dualism becomes more absolute and distinct than ever in the form of the plot walls that surround the "floating" or setback villas. The sikkak (pedestrian alleys) in between are the only reminder of an obsolete morphology and typology of Arabic residential architecture, the courtyard house. The transition was rapid and tailor-fitted the urge for display of an upgraded social status (Kyriazis, 2018). Public spaces 4f, 6f, 4i, 6i and even 2f are surrounded by such housing plots and pedestrian flows to/from them is streamlined through the sikkak in between.

However, low density, extreme zoning and sprawl pay their own price. Large plot sizes and oversized street corridors increase distances and discourage walking. Even in the ideal temperatures of the Abu Dhabi winter, the majority of people drive small to middle distances to reach a park. Furthermore, rigid zoning practices left suburbia devoid of local retail shops. This was a documented (by discussions with users) shortage that if restored, it could attract more people from greater distances.

3.7. Urban mobility

While the research phase of mobility in the metropolitan scale is still in process, several key points have emerged, using the interviews and part of the urban analysis.

Most (but not all) of the selected public spaces are serviced by means of public transportation (bus in particular). However, really few of the users select the bus to visit them. Cars consist the majority of means used, with walking, bicycle and motorcycle following.

With regard to distances travelled on purpose for a park visit, it became clear that formal spaces' users may travel bigger distances – even across the city. Apart from the cases of 1f (Corniche) and 2f (Umm Al Emarat park) that are country-wide known public spaces and may attract large numbers of people from afar, smaller parks also attract people from afar due to the existence of specialized facilities (i.e. football courts etc.). Opposed to them, most trips to/from the informal spaces come from their related neighbourhoods. Exceptions to this observation are activities related to community bonding, like the volleyball matches of area 5i.

4. Conclusion

What started as a humble attempt of this research team to document and map some of the already familiar public spaces of Abu Dhabi, ended up as a revelation. Under the seemingly permanent flashy wrapping of curtain wall urbanism and exclusive (in every sense) architecture, there lies a layer in flux. People, citizens and visitors that live, work, move, socialize and get entertained. They acknowledge transience as a constant and they resist on a daily basis. It is that quotidian struggle that is showcased.

The urban form contributes as an inherent piece of the condition. It highly affects urban mobility, quantities and qualities of public space and behavior within. The public spaces are the recipients of this quotidian anxiety. Therefore, proper planning, programming, designing and maintaining of these open spaces is key to the ability of a city to absorb all those vibrations and clashes.

Informal urbanism and informal behavior are major components of this relation. They are urban and social health indicators, as adaptation, improvisation and surprise are elements that produce and ensure openness, democracy and inclusivity. They imply smart and active citizens, in an era that "smart" only addresses corporate interests (Koolhaas, 2014). Informality is not theofied but becomes essential in disclosing weaknesses, shortages and environments of exclusion and conflict that otherwise would remain elusive.

The behavior mapping of Abu Dhabi's public spaces, apart from the value of documentation itself, is a project that may argue in favor of updating the existing city manuals and guidelines with filling in a gap between urban governance and a textbook yet sterile urban morphology: the social layer, the people, both owners and users. A pathway towards actual social sustainability. This may include an argument for a shift towards program flexibility. Neighborhood and public space design could invest in introducing participatory processes. The city should develop reflexes that would enable it to harness the values of informality. Furthermore, this project could set a paradigm for research on behavioral mapping and social mobility in all Arab cities in the region and beyond, with similar sociocultural and climatic conditions.

5. References

Al Fahim Mohammed (2013) From rags to riches. A story of Abu Dhabi, Abu Dhabi: Makarem

Alawadi Khaled (2019) Life-scapes beyond bigness, Catalog of the UAE National Pavilion at the 16th Venice Biennale of Architecture 2018, Abu Dhabi: Artifice Press limited

Egypt Ministry of Culture (2018) Robabecciah: the Informal City, Catalog of the Egyptian National Pavilion at the 16th Venice Biennale of Architecture 2018, https://www.robabecciah.com/

Elsheshtawy Yasser (2008) The evolving Arab city: Tradition, modernity and urban development. London: Routledge

Elsheshtawy Yasser (2011) (In)formal Encounters: Mapping Abu Dhabi's Urban Public Spaces. Built Environment. 37, 92.

Elsheshtawy Yasser (2019) Temporary cities. Resisting transience in Arabia, London: Routledge

Gulf News (2018) Dh500 fine for playing cricket in undesignated area, Gulf News, 22 January 2018, https://gulfnews.com/going-out/society/dh500-fine-for-playing-cricket-in-undesignated-area-1.2160650 (accessed on June 2019)

Harvey David (2013) Rebel cities. From the right to the city to the urban revolution, London: Verso

Jacobs Jane (1961) The death and life of great American cities, New York: Random House

Koolhaas Rem (2014) Are Smart Cities Condemned to Be Stupid?, Archdaily, 10 December 2014, https://www.archdaily.com/576480/rem-koolhaas-asks-are-smart-cities-condemned-to-be-stupid (accessed on June 2019)

Kyriazis Apostolos (2017) The Morphology of Abu Dhabi's Superblocks: A modernist vision, at: Atiner, 2017: Athens Journal of Architecture, Vol.3, Issue 4. e-ISSN: 2407-9472

Kyriazis Apostolos (2018) A cultural paradox and the double shift of the housing typologies in the Arabic Gulf area: Undergraduate research studies in Abu Dhabi, at: ARCC, 2018: The built environment; Shaping the Quality of life Conference Proceedings, Volume 2, p. 90-98, ISBN: 978-1-935129-24-0

Kyriazis Apostolos et. al. (2019) Behavioral mapping of Abu Dhabi's public spaces: Urban research photography and cultural clashes, On the Surface Conference Proceedings, Lisbon, Portugal. https://www.scopionetwork.com/bookstore/bookofabstracts-2019

Lefebvre Henri (2003) The Urban Revolution, Minneapolis: University of Minnesota Press

Menoret Pascal (2014) Joyriding in Riyadh. Oil, urbanism and road revolt, New York: Cambridge University Press

Montagne Clemence (2016) Urban Development and Urban Planning at Abu Dhabi and Dubai; Politics, Actors and Mobility (translated from French), PhD Thesis, December 2nd 2016, Paris-Sorbonne University, Paris France.

Samarrai Kais (2016) The evolution of Abu Dhabi City's urbanization and the sustainability challenge, at: Al-Asad M. and Mehrotra R. (2016), Shaping Cities; Emerging models of planning practice. Berlin: Hatje Cantz.

SCAD (2018) Statistical Yearbook of Abu Dhabi 2018, https://www.scad.gov.abudhabi/Release%20Documents/SYB_2018_EN_9Sep%20_Chart%20Correction.pdf accessed on 21/6/2019

Case Study / Project

Health and the city:

creating built form and planning for the physically active

Slawomir LEDWON

Abstract

One of the most common cases of deaths in developed countries are non communicable diseases - such as obesity, heart related problems and diabetes. Many of these are easily preventable and can be managed by each individual. Paradoxically the evolution of our civilisation, technology and growth of cities has lead to many diseases of affluence, which pose a great threat to the society.

Contemporary planning practices have introduced the concepts of walkability and connectivity to make pedestrian movement easier, reduce traffic and manage resources. They have discussed the shift from individual motorised transport to cycling in terms of sustainability and efficiency. But what is missing in this discussion is which features of the built form encourage people to exercise and be more active in cities, thus more healthy. Even in the simplest activities like walking, jogging or running can make a huge impact of the well being of citizens. But they also need an encouraging environment.

There is a growing awareness among citizens regarding healthy lifestyle. That includes not only proper nutrition and balanced diet, general health but also physical fitness. Instead of watching television, which quite recently seemed as a popular and attractive leisure activity, people prefer to spend time exercising, training and taking care of their bodies. It doesn't matter if their goals are how they look, feel or fit they are. Each of those have one thing in common äóñ better health and longer life expectancy.

This case study discusses the principles of good design for healthy cities. How cities can be more suitable for physical activities of its citizens? Which built form features are most appropriate for that? How to design the environment which would aid healthy lifestyle? Strategies for encouraging active lifestyle in cities are also discussed. It also presents the initiative of ActiCity (acticity.org) to promote good urban design and planning for aiding active and healthy lifestyle. The project currently focuses on running in cities.

Applicability of the study's findings are universal, as they explain a set of guidelines and refer to case studies of best practices that can be implemented in other cities. It pitches the ideas for further development, research and implementation of the proposals. It discusses measuring the performance and use of space, such as the runnability index.

Case Study / Project

Empirical study on the evaluation of publicness of public space

- taking Chinese megacity as the case

Juan LI, Anrong DANG

Abstract

China has been exploring the way of applying the market economy in Chinese context. The market force will play a more dominant role in resource allocation in the next phase and the dependence of urban development on private investment will be reinforced continuously. The issue of privatization of public space in Chinese cities, especially in megacities, starts drawing the attention of academic fields in urban studies. However, researches addressing the impact of privatization on Chinese urban public space are rare.

This research aims at providing a lens for elaborating the following questions which include: 1. how public the public space is in Chinese megacities, 2. what factors impact the publicness of urban public space, 3. whether there exists a great difference in the publicness of publicly owned public space versus that of privately owned public space. Based on an extensive literature review, this research theoretically deduces that the main factors impacting publicness are multidimensional and interactive which include accessibility, management, and inclusiveness. By an in-depth analysis of the three dimensions, an elaborate measurement model including six sub-dimensions and 20 indicators has then been proposed within Chinese context in light of existing models. This research has applied the measurement model to both publicly and privately owned public space in a Chinese megacity -Beijing- to conduct a comparative analysis of the two types of public space. Taking Beijing as the case, empirical study finds that the overall scores of publicness of both sorts of public space indicate no great difference. Nevertheless, scores of the three dimensions impacting publicness show inconsistent results with the overall scores. Privately owned public space get a higher score on the accessibility dimension than its publicly owned counterparts, but a much lower score on inclusiveness dimension. The management dimension demonstrates the biggest difference between the two sorts of public space that publicly owned public space shows more care about the maintenance of space while privately owned public space put more efforts on the control of space.

To sum up, the privatization of public space shows a partially negative impact on the publicness of public space from the perspective of multidimensional analysis. This research also makes significant progress on the evaluation of inclusiveness dimension which has posted a great difficulty in the measurement of users' density and diversity within a specific public space. Taking advantage of emerging new data, this research could take a direct look at the users of public space and give a precise picture of how diverse the users are and how different publicly and privately owned public space are in the inclusiveness dimension. Besides, the measurement model developed in this research is flexible and open-ended, and it can be adjusted and applied according to different cultural context. In this way, we hope to provide a useful tool for urban planners, designers, policymakers and governments who bear the goal of an inclusive city in mind.

Research Paper

CHILDREN-FRIENDLY DESIGN OF URBAN PUBLIC SPACE

based on the study of shanghai,china

Author SHUAI LI, Tongji University; China

Abstract

At present, more than 50% of children live in big cities.But with the increasing number of motor vehicles and shrinking public spaces , children have less and less opportunities for outdoor activities, resulting in obesity and sub-health problems. Therefore, it is very important to build children-friendly public spaces in metropolis. This study takes the Shanghai,china as an example.Firstly,through questionnaires,it is found that ensuring the safe movement of children and inspiring their spontaneous activities are key points to build children-friendly public spaces.Meanwhile, The public spaces near the home are the most used environment by children. Therefore, open spaces in metropolis areas need to be planned carefully for children near their homes.Then it is way much better to make sure children's places of daily life, such as homes, schools, green spaces, sports venues and so on, can be connected in a safe path. Secondly, for building the safe path for children ,the safety of each spot along the path is analyzed by SP method, which is a mathematical algorithm , in order to find the risk factors and to avoid them in the future. Then we establish the action plan of "line space + point space" to build the children-friendly urban public space system. Line space refers to meeting the basic safety space needs of children through the improvement of the routes to school, including reducing the impact of motor vehicles, safe road facilities, and enhancing road lighting system. "Point space" refers to the promotion of children's outdoor activities through the arrangement of multi-level outdoor children's playgrounds and green spaces, including safe green parks, security platforms and so on. Finally, it is hoped that the "Safety Line Space + Interesting Point Space" plan will establish a safe and inspiring path for children to travel,linking home, school, green space and sports venues,which they use mostly in their daily life. Then we can ensure the safe movement of children and inspire children's spontaneous games in big cities for a children-friendly goal.

Keywords

Child-friendly design, Children's independent mobility(CIM), Safe path space,Stated preference(SP) method

1. Theoretical research

1.1. Child-friendly city

The concept of Child Friendly City (CFC) was put forward at the Second UN Conference on Human Settlement Environment in 1996. The meaning of CFC is: a city governance system that can hear the voice of children and realize their needs, priorities and rights (Shen , 2015). The goal is to reach the four basic rights of children : the right to subsistence, the right to development, the right to protection and the right to participation. In the same year, in order to

make the world aware of the importance of big cities for children's growth and the urgency of response measures, UNESCO launched the "Growing up in the City" (GUIC) plan, and proposed that children can walk safely on the streets alone, meet and play with other children, live in an environment free of pollution and green space, and upgrade the original neighbourhood.

Thus, the Netherlands, Austria and other places carry out a large number of systematic practices, and become a global model. The research on the relationship between children and urban space in China starts around 1990. Some scholars use Beijing, Shanghai and other big cities as objects to find that the playspace in business complex gradually become an important space for city children (Li,1999), or set up safety facilities in high-rise residential areas and point out specific guidance (Shen,2015). Until recent years, Changsha, Shenzhen and other cities have put forward the slogan of creating child-friendly cities.

1.2. Spatial influence factor of children's independent mobility(CIM)

"Children can walk safely on the street alone" is the four construction principles of building a child-friendly city in GUIC plan.Over the past decades, the degree of freedom of children under 18 years of age to engage in public space activities without adult companionship has declined dramatically (Hillman et al., 1990; Kingham & Usher, 2007). It causes that increased use of cars to pick up children; increased obesity among children; reduced use of public spaces such as parks and streets; and increased fear of strangers among children (Malone, 2007). At the same time, Kingston (2007) pointed out that if five-year-olds could not play independently, they would not be able to actively interact with their peers and would be more dependent on their mothers, which to some extent led to the aggravation of obesity, autism, violence and anti-social problems of urban children. Therefore, many scholars are focusing on the influence factor, especially on building environment of public space .

Table 1 Spatial influence factor of CIM according to references

auther	country	sample	Spatial Influencing Factors
Leobach and Gilliland (2014)	Canada	143, girls=94, boys=49	Residential location type,distance from home to school,people density,land use mix,proportion of people,commercial land use,intersection density,road density
Villanueva(2012)	Australia	1132, girls=499, boys=478	Distance from home to school
kytta(2004)	Finland	223, girls=80, boys=147	Recreational facilities
Islam(2014)	Bangladesh	109, girls=42, boys=67	Proportion of residential,commercial land use,intersection density,dead end street,vehicular street width
Broberg and Sarjala(2015)	Finland	202, girls=108, boys=94	Distance from home to school,people density,recreation density,road density,proportion of main roads
Carver(2014)	UK	977, girls=499, boys=478	Land use mix,road density,proportion of main roads

Broberg(2013)	Finland	901	Distance from home to school,residential density
Fyhri and Hjorthol(2009)	Norway	1282, girls=705, boys=577	Distance from home to school
Christian(2015)	Austrilia	181, girls=100, boys=181	Distance from home to school,recreational facilities
lin chang(2009)	Taipei	168	Distance from home to school,intersection density,vehicular street width,residential location type
Monsur（2011）	Bangladesh	60, girls=16, boys=44	Distance from home to school、recreational facilities、dead-end street、vehicular street width

We can see that distance from home to school (8 times in the table), density of recreational facilities (5), density of intersections (4), density of people flow (4), land use (2), width of traffic roads (2), proportion of commercial land (2), proportion of main roads (2), population composition (1), proportion of commercial land (1) all affect children's independence. Significant indicators of travel are established.

1.3. Stated Preference Method

Stated Preference Method is a spatial research method based on user preference, that is, "people's subjective preference for multiple alternatives under hypothetical conditions" (Fang , 2015). The SP method obtains people's spatial environment preferences in complex situations through scenario preference questionnaire, and can anticipate factors that do not exist, so it can be easily transplanted to the planning and design of spatial environment. It is widely used in traffic analysis and environmental assessment abroad (Louviere, 2000). However, domestic research is relatively late. Fang (2015) uses SP method to study the recreational preferences of Shanghai residents'country parks, and puts forward specific research paths of SP method. Zhu(2016) is conducive to SP method to study the evaluation and optimization of urban road bicycle travel environment in Shanghai. The research path of SP method is as follows: firstly, through pre-investigation, obtain spatial elements and levels; through orthogonal design, extract preference options, form questionnaires; data collection, establish discrete selection model and other major steps.

STRP1：Pre-survey: Determining Elements and Levels STEP2：Orthogonal Design to Extract Selection

STEP3：Data Collection and Establishment of Discrete Selection Model

STEP4：Analytical Model, Practical Application

Figure 1 4 steps of SP method

2. Research Design

2.1. Subject: City children (Grade 4-6)

The object of this study is children in urban environment. According to the research of children's developmental psychology, children aged 6-12 use outdoor space most actively. Children aged 10-12 have mature acceptance of concepts and self-reaction ability. The research on children's independent and safe walking path space is mainly aimed at children

aged 10-12.According to the situation of China.,the age corresponds to children are grades 4 to 6 in primary school. Therefore, two primary school students of 4-6 th grade are selected as the main research objects (Fig. 2). The surrounding built environment is rich, close to the city's commercial center, with typical urban road organization, high traffic density, many shops and other city conditions.

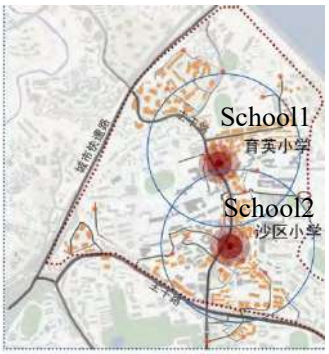


Figure 2 Research area

2.2. Pre-survey design

As for the pre-survey, the questionnaire needs to determine and evaluate the relevant elements and levels of children's safe path space to school. Firstly, the parents and students in the survey area were pre-surveyed by combining 10 significant indicators affecting children's safely individual movement with 15 indicators collected from existing studies. Each respondent selected the most influential factors to them. Finally, 10 factors related to the creating of safe path are identified, and the uncontrollable elements of children's psychological planning are eliminated. Each factor contains 2-4 levels. The definition and level of these elements are shown in Table 2. Level 1 is the most safe category for parents and students, while the effect of other levels decreases at one time. These elements are divided into three categories: path space elements, path traffic elements and path social elements. Spatial factors include distance from home to school, recreation place, danger place, proportion of commercial land use; path traffic factors include vehicle flow, number of crossing the street, cross street help ; path social factors include density of people,people composition,density of Help-seeking facilities.

Table2 Influence factors and levels by pre-survey

kinds	Influence factors	level1	level2	level3	level4
path space elements	distance(m)	<500	500-1000	>1000	
	Recreation place	none	Community Garden	park	shop
	Danger place	none	Underground passage	Construction site	
	Proportion of commercial land use	high	middle	low	
path traffic elements	Vehicle flow(number of car/an hour)	<1000	1000-2000	>2000	
	number of crossing the street	0	1-2times	3-5times	>5times
	Cross street help	Street Guider	Traffic lights	Zebra crossing	none
path social	Density of people （number of	>60	2-60	<2	

element s	people/minute)				
	People composition	Familiar people	Unfamiliar people		
	Density of Help-seeking Facilities	high	middle	low	

2.3. Data collection

Based on SP method, the questionnaires let the children and their parents choose the best one among the two virtual children's paths, and use SPSS to orthogonalize them, resulting in 128 paths with representative, homogeneous and independent elements, 64 selection scenarios, which were randomly distributed to the subjects in five sets of questionnaires. The axonometric mapping of children's school path elements is placed on both sides of the text description comparison table, and the related influencing factors on the path are visually represented by the graphic (Figure 4), so that the respondents can make quick choices without looking at the table. The online questionnaire is combined with the field survey. 158 valid questionnaires for parents were collected.

Choise10. Which path do you think is more safer?		
Path 1	Influence factors	Path 2
500-1000	distance(m)	500-1000
none	Recreation place	shop
Underground passage	Danger place	Construction site
<1000	Proportion of commercial land use	>2000
1-2 times	Vehicle flow(number of car/an hour)	0
Traffic lights	number of crossing the street	Traffic lights
Street Guider	Cross street help	none
2-60	Density of people (number of people/minute)	>60
Familiar people	People composition	Familiar people
high	Density of Help-seeking Facilities	high

Figure 3 question example in the questionnaire

3. Spatial Preference Model of Children's Safety Routes

3.1. Model Construction

The SP method obtains the relative importance of each factor through parents and children 'view on children's safe path selection, which is in line with the theoretical basis of discrete choice model - stochastic utility theory. According to this theory, the effect of safe environment on parents is the judgment basis when individuals make choices, that is, when respondents answer questionnaires, they will choose the most effective safe environment for them to go to and from school. The expression of the discrete selection model used in this paper is as follows:

$$V_i=\alpha_1 dis+\alpha 2 rp1i+\alpha_3 rp2i+\alpha_4 rp3i+\alpha_5 dp1i+\alpha_6 dp2i+\alpha_7 pl1i+\alpha_8 pl2i+\alpha_9 vf+\alpha_{10} nc1i+\alpha_{11} nc2i+\alpha_{12} nc3i+\alpha_{13} cs1i+\alpha_{14} cs2i+\alpha_{15} cs3i+\alpha_{16} dop+\alpha_{17} pc1i+\alpha_{18} dohcf1i+\alpha_{19} dohcf2i$$

In the formula, I is the choice of the path, I is the plan of choosing different children's paths to and from school. Vi is the visible utility of choosing a certain path. α 1-19 is the element to be fitted by the model. The other variables are the important impact indicators listed in Table 2.

3.2. Model Results

Using Nlogit5 software to fit the model, the results are as follows: Table 3, which shows the mean value of variable parameters, and also the parameters used in subsequent evaluation applications. The overall goodness of fit of the model is Rho Square = 0.3598, which is a good result in similar studies. Except for the medium density of help-seeking facilities (significance 0.84) and the construction site (significance 0.798) in the hidden danger space elements, the parameters of all variables have reached a high statistical significance, and accord with the common sense. According to this analysis, most of the construction sites in the city have obvious protection and isolation measures, and urban children have a strong sense of prevention, so the effectiveness of this experiment is not significant. At the same time, parents think that medium-density rescue facilities such as alarm booths and patrol posts are not enough for children's safety. They should increase the layout density, so the indicators are not significant.

Table3 Model results from Nlogit5

factors	level	Level in model	parameter values(α)	Significance
distance(m)	continuous variable	dis	-0.0086	<0.0.05
Recreation place	none	-	0	-
	community Garden	rp1	-2.23264	<0.001
	park	rp2	-1.01894	<0.001
	shop	rp3	-0.1661	<0.001

Danger place	none	-	0	-
	underground passage	dp1	-1.3651	<0.001
	construction site	dp2	-0.57926	0.7928
Proportion of commercial land use	high	-	-2.48264	<0.001
	middle	pl1	-1.56894	<0.001
	low	pl2	-0.5861	<0.001
Vehicle flow(number of car/an hour)	continuous variable	vf	-0.21278	<0.001
number of crossing the street	none	-	0	-
	1—2times	nc1	-0.12355	<0.005
	3—5times	nc2	-0.21278	<0.001
	>5times	nc3	-0.35482	<0.005
Cross street help	street guider	-	0	-
	traffic lights	cs1	0.06709	<0.001
	zebra crossing	cs2	-0.11536	<0.001
	none	cs3	-0.80477	<0.001
Density of people （number of people/minute)	continuous variable	dop	0.284	<0.001
Density of Help-seeking Facilities	high	-	0	-
	middle	dohcf1	-0.50889	<0.001
	low	dohcf2	-0.07749	<0.84
Log-likehood = -59.04922				
Rho Squar = 0.3598				

Note: Some variables have no specific measurement index, so they are in the form of virtual variables. In each variable, the lowest level of utility is set at 0, compared with other levels.

The model constructed in this paper is the utility model of children's safe routes to school. The idea is to find out some factors affecting children's safety and to avoid them. The optimal level of the elements is set to 0, and the reference values are mostly negative, which shows that the selected elements have a negative impact on the safety of the path (Fig. 5).

From the results, we can see that among the three factors, the path space factor, the path traffic factor and the path social factor have a significant impact on children's school safety. Among them, the path space factor and the path traffic factor are the main factors affecting parents'judgment.

In terms of road space elements,recreation place in urban path elements become the most worrying factor for parents,especially the community garden and park. Through interviews and analysis, it is known that children in cities have less space for outdoor activities, and the special outdoor space for children is also scarce. While playing in general space, children are more likely to encounter collisions, falls, scratches and other injuries when playing. At the same time, Parents are more worried that the lower proportion of commercial space will be dangerous to children because of the vitality of streets and the reduction of crowds. Finally, we found that the farther away from school, the lower the utility, but the impact is not significant. Because in the current urban environment, high-quality teaching resources are not fully distributed equally, parents let students enter a far schoo for better educational resources, andparents do not think that distance factors will bring more harm.

In terms of road traffic elements, motor vehicle traffic is not as worrying to parents as it is in the traditional sense. Parents are worried about whether their children can get help in the process of crossing the road and the number of times they cross the road. Because in the urban environment, the impact of motor vehicles is inevitable, the number is not terrible..But the number of roads has a significant impact, and the more the number of times, the greater the degree of concern of parents. Meanwhile zebra crossing is not safe in the eyes of parents. Only street lights and street guide without assistant crossing can improve the safety of the path.

In terms of path social factors, the density of human flow has a positive impact on safety utility, and the greater the density of human flow, the higher the safety utility. However, the composition of the population has no significant impact on the utility. It may be that in the urban mobility environment, it is difficult for parents and children to find a large number of familiar people. Meanwhile, the medium and low density of help-seeking facilities have a negative impact on the safety utility. Parents believe that only high density security posts, patrol mobile platforms and so on can guarantee children's safety.

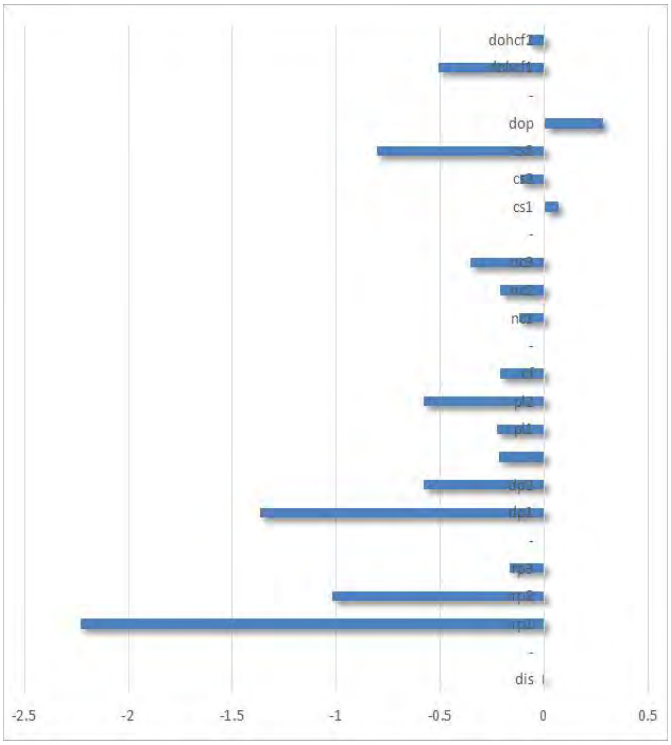


Figure 4 Model results

4. Conclusion

Based on the above model, we can find the preference for the spatial factors of children's safe path of public space in high-density urban environment. It is found that the factors of path space, path traffic and path society have significant effects on children's safety. Among them, the path space factor and the path traffic factor are the most important factors.And recreation place、 dangerous place、 crossing the street without any help are the top3 influential factors.Therefore, we can modify and adjust the most effective indicators one by one.

Firstly, for path space element.Recreation place on the way are the first objects to be adjusted, which have the greatest impact on children's safety , especially the open public space most commonly used by children such as community parks and street corner parks.. At the same time, Attention need to be paid on dangerous space such as underground passage. They also need to maintain a certain proportion of commercial space of children's way to and from school, so as to form vitality and gather people, so as to provide more weight for children. Social public protection.

Secondly, for path traffic element.We need to improve the traffic assistance for children when crossing the street. The high traffic volume in the city can not be changed. What parents really worry about is whether the children have assistant facilities such as street guide, traffic lights, zebra crossing and so on in the process of crossing the street. In the case of crossing the street, the safety effectiveness shows positive value. At the same time, the relevant signs such as student's path guide board can also play a positive role. Effect.

Thidly,for path social element. We can increase the density of students'help-seeking facilities and increase patrol posts and mobile security platforms during the period of students' going to and from school. At the same time, urban space should pay attention to the attraction of the density of human flow and create a good public space atmosphere, which will also bring positive effects on children's safety.

Finally we establish the action plan of "line space + point space" to build the children-friendly urban public space system. Line space refers to meeting the basic safety space needs of children through the improvement of the routes to school, including reducing the impact of motor vehicles, helping children to across the street, setting crossing points near schools during school hours,increasing the density of students'help-seeking facilities. "Point space"

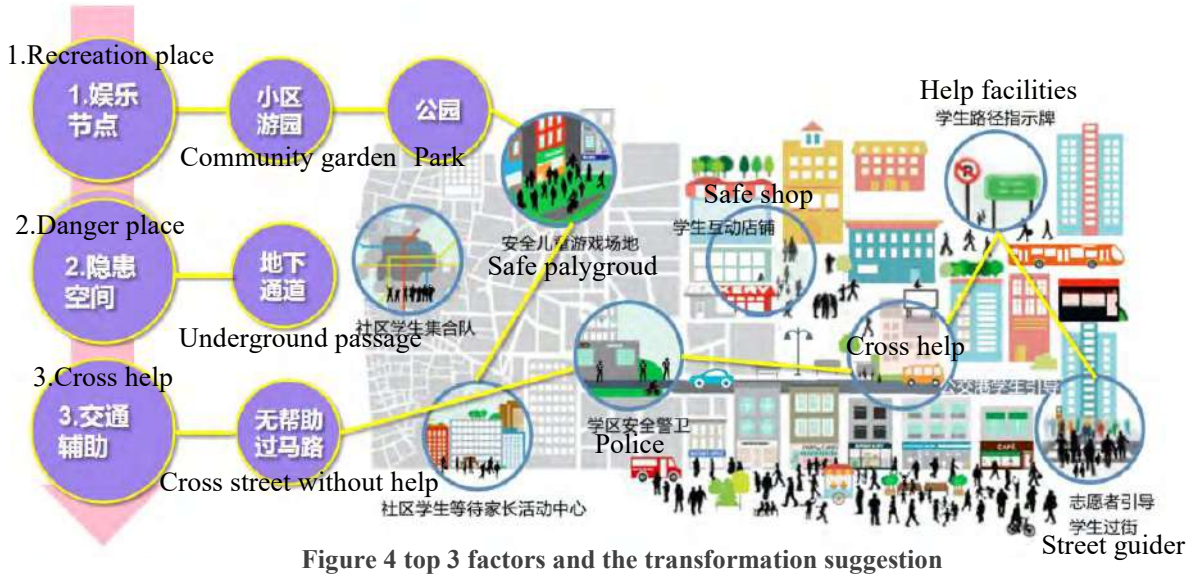


Figure 4 top 3 factors and the transformation suggestion

refers to the promotion of children's outdoor activities through the arrangement of multi-level outdoor children's playgrounds and green spaces, including safe green parks, security platforms and so on. Hope this through this study, we can provide a reference evaluation index for children's safe travel space environment in high density urban environment, and also provide the steps and key points for regional transformation.

5. References

Shen Yao;Kinoshita Isami;He Lei(2015)“Study on the development characteristics and re-developing direction of children's playing space in high-rise housing estate”Human Geography,Vol.30NO.3(June)

Li hongyu;Xu shaoming(1999)“The play space of children in city”New architecture,Vol.25 NO.6(February)

Loebach, J.E.;Gi11i1and, J.A.（2014）“Free range kids? Using GPS-derived activity examine childrens neighborhood activity and mobility”. Environ. Vol.48 NO.3 421-453.

Villanueva. K， Gi1es-Corti. B;Bnlsara. M;McCormack, G.R.;Timperio, A.;Middleton, N., Beesley, B;Trapp, G.（2012）“How far do children travel from their homes?” Health Place. Vol. 18 No. 2 , 263-273.

Kytta, M（2004）.“The extent of children's independent mobility and the number of actualized affordances as criteria for child-friendly environments”Environ Psvchol. Vol. 24 No. 2 , 179-198.

Islam ， M.Z.;Moore,R.;Cosco,N.（2014）“Child-friendly,active,healthy neighborhoods:physical characteristics and childrens time outdoors” Environ.Behav.Vol. 48 No. 5 , 711-7.

Broberg, A;Satjala, S（2015）“School travel mode choice and the characteristics of the urban built environment: the case of Helsinki, Finland”. Transport Policy. Vol. 37 , 1-10

Carver, A.; Panzer, J.R;Jones, A.P.; van Sluijs, E.M.（2014）“Independent mobility on the journey to school: a joint cross-sectional and prospective exploration of social and physical environmental influences.” Journal of Transport&Health. Vol. 1 No. 1,25-32.

Broberg, A.;Salminen, S.; Kytta,M（2013）“Physical environmental characteristics promoting independent and active transport to children's meaningful places”. Appl Geogr. No.38,43-52.

Fyhri, A;Hjorthol. R（2009）“Children's independent mobility to school, friends and leisure activities”J. Transp. Geogr.Vol. 17No. 5,377-384.

Christian. H.E;Klinker, C.D;Villanueva. K;Knuiman. MW;Foster, S.A; Zubrick, S.R;Divitini. M;Wood. L;Giles-Corti.,B.（2015）“The effect of the social and physical environment on children's independent mobility to neighborhood destinations”. I.Phys. Act. Health 12 (Supply 1), S84-S93.

Lin ,J.J.;C:hang, H.T.（2009） “ Built environment effects on children's school travel in Taipai”: independence and travel mode. Urban Stud. Vol. 47 No. 4 , 867-889.

Monsur, M.， Islam,Z.（2011） “Impact of street design on children's independent mobility in Dhaka city”. 82-88

Fang jia;Wang de;Zhu wei;Song shan（2015） “Residents’ recreation preference of the country park in Shanghai:a stated-preference analysis”.LA Planning and Design. No. 6(May)

Louviere J J, et al（2000）Stated Choice Methods: Analysis and Applications Kindle Editio Cambridge University Press.

Zhu wei;Zhai baoxin;Jian dan（2016）“Evaluation and optimization of urban bicycle travel environment based on a visualized SP method ” Urban Planning. No. 3（March）

Research Paper

Neighborhood Environment and the Elderly's Subject Well-being

Xuhui LIU, Phd candidate, Department of urban planning, Tongji University; China

Yifan YU, Professor, Department of urban planning, Tongji University; China

Xin SUI, Department of urban planning, Tongji University; China

Abstract

Background:

In the context of an aging society, the physical and mental health and quality of life of the elderly have received more and more attention. Among them, in the field of mental health of the elderly, subject well-being is an important concern.

Many studies have shown that the environment has a certain impact on people's mental health. In the field of landscape, public health and architecture, most of the studies focus on the natural environment, including the number and proportion of green space, the distance to green space, the characteristics of green space, as well as the building density, building form, road network density and layout in the built environment. However, in China, the specific environment elements that are more comprehensive and more closely linked with urban planning and management need to be studied.

Objectives:

Relevant research shows that more than 80% of the activities of the elderly are completed within 1 km of the neighborhood. This study takes neighborhood environment as the main research area and research object. The objectives include: 1, to find the status of the elderly's subject well-being in Shanghai; 2, to find the impact of the neighborhood environmental factors on the subject well-being of the elderly; and therefore, 3, to put forward some suggestions for neighborhood planning to promote the subject well-being of the elderly.

Methods:

Based on the data of the Fourth Survey on the Living Conditions of the Elderly in Urban and Rural Areas of China, 3431 urban residential samples in Shanghai were selected and analyzed in this study. The subject well-being comes from the question, "General speaking, do you feel happy?" Options include five levels, ranging from very happy to very unhappy. According to the existing literature and the specific requirements of Shanghai urban planning compilation and management, the environmental factors are summarized as 20 indicators in four aspects: natural environment, housing conditions, urban form and facility environment. According to the sample address, the environmental factors indicators are calculated in GIS. The data are analyzed by the method of path analysis in Mplus7.4.

Results:

70.9% of the respondents felt very happy or happy, while only 2.2% of the respondents said they were unhappy or very unhappy. Non-agricultural household registration, higher education, better self-rated economic status of the elderly, the better of the subject well-being of the elderly. Under the control of the basic characteristics and socio-economic attributes of the elderly, the per capita green space area, housing construction area, road network density and location conditions have a significant impact on the well-being of the elderly.

Conclusion:

Under the control of socio-economic variables, community environment can significantly affect the subjective well-being of the elderly. In the planning of community life circle, improving the level of green space per capita in the community, improving the housing conditions of the elderly, and building a high-density road network system are effective measures to promote the subject well-being of the elderly.

Key words:

The elderly, Subject well-being, Neighborhood environment.

1. Background

1.1. Ageing is a major challenge for the current society

In the world, the population is growing rapidly and the trend of aging is spreading rapidly. According to the World Population Outlook issued by the United Nations in 2017, the total population of the world is about 7.6 billion by 2017, of which 910 million people are over 60 years old. With the low fertility, the global aging problem is becoming more and more serious. The report issued by the World Health Organization points out that the impact of population ageing is usually more important than population growth (WHO, 2008). Compared with developed countries, the social and economic development speed of developing countries often fails to catch up with the development speed of population aging (WHO, 2003). Aging has become an important issue facing all countries in the world.

China has entered the stage of rapid aging development. By the end of 2016, the total population of China was 1.374 billion, of which 16.1% were over 60 years old and 10.5% were over 65 years old (National Statistical Bureau of the People's Republic of China, 2015). Shanghai has entered an aging society since 1979. According to statistics, as of 2017, the registered population of Shanghai is 483.6 million people aged 60 and above, accounting for 33.2% of the total population, and 317.67 million people aged 65 and above, accounting for 21.8% of the total population (Shanghai Aging Science Research Center, 2018). The state and local governments have promulgated relevant policies for the cause of ageing, which provide guidance for the development of the cause of ageing. Paying attention to the elderly, promoting healthy aging and active aging are important issues in urban development.

1.2. Better well-being of old age is an important goal of the cause of aging

According to WHO's definition of health, psychological well-being is an important part of the health of the elderly. Under the guidance of healthy aging and active aging, the mental health of

the elderly is an important goal of our work.

Since Wanner Wilson wrote The Relevant factors of self-reported well-being in 1967, psychological research on well-being has gone through more than 40 years. Well-being is the central issue of philosophy, ethics, economics and sociology. Well-being index is the focus of the government. If GDP (gross domestic product) and GNP (gross national product) are the criteria to measure the wealth of the country and the people, then the Gross National Happiness Index (GNH) is the criterion to measure the happiness of the people, and the wealth of the country is for the happiness of the people and for "creating our happy life" (the conclusion of the report of the 16th National Congress of China, 2002). CCTV put forward slogans such as "Starting towards Happiness" as the expression of "Happiness Fever" at the media level.

2. Literature review

2.1. Subject well-being

The explanation of well-being in the 1997 edition of Wechsler's English Dictionary is: a good or satisfactory living condition; a state of health, happiness and prosperity.

The study of happiness can be traced back to ancient Greek philosophy. Traditionally, the concept and theory of happiness can be classified into two basic types: hedonic and eudemonia. The hedonic view of "happiness theory" originated from Aristippus's philosophy. The Eudaimonic view of happiness comes from the perspective of Aristotelian school. Aristotle puts forward the view that happiness is the self-realization of human beings, therefore, his theory of happiness is also called perfectionism (Zhang Lu, Zuo Bin, 2007).

Based on different philosophical traditions, there are two orientations in the study of modern well-being: Subjective well-being (SWB) and Psychological well-being (PWB). Subjective well-being develops from the theory of happiness. It pays attention to emotions and life satisfaction. It believes that human happiness is expressed by human emotions. Happiness means satisfaction with life, with more positive emotions and fewer negative emotions (Diener E, Eunkook S, Richard L. et al., 1999); and psychological well-being is expressed by reality. The present theory evolves to focus on personal growth, self-acceptance, autonomy, life goals and so on (Zhang Lu, Zuo Bin, 2007).

Diener, an American scholar, put forward in 1984 that subjective well-being refers to the overall assessment of the quality of life of an evaluator according to his own criteria. His research on subjective well-being has a great impact on Chinese scholars (Li Zhi, Xie Chaohui, 2006). Diener (1984) believes that the basic characteristics of subjective well-being are subjectivity, relative stability and integrity.

The well-being of the elderly is not only an important criterion for judging the quality of life of the elderly, but also one of the necessary conditions affecting their physical and mental health. (He Quan, Zhang Shi, Wang Ping, 2015).

A large number of studies have shown that subjective well-being is an important comprehensive psychological index to measure the mental health level and personal quality of life of the elderly (Zhang Wei, Hu Zhongming, Li Hongjuan, 2014).

2.2. Influencing factors of subject well-being

Initial research on objective influencing factors was mainly carried out along the dimensions of demographic projects. Wilson pointed out in his Relevant Factors of Self-proclaimed Happiness that happy people are young, healthy, well-educated, well-paid, religious, married, and intelligent and so on. These projects are considered to be the determinants of happiness. With the deepening of research, many studies have pointed out that objective factors have little explanatory power on well-being. Demographic items (such as gender, income, intelligence level, etc.) can only explain less than 20% of the changes in well-being, while external environment can only explain 15% of the changes in well-being (Jin Huihong, Chen Yu, 2012).

It has been found that age is an important factor affecting people's well-being. Many studies have confirmed that happiness decreases with age (Baird, Lucas, & Donnellan, 2010; Godoy-Izquierdo et al., 2013; Mroczek & Spiro, 2005). However, some studies have found that the relationship between happiness and age is a U-shaped curve (Lobos et al., 2016). At the same time, from the perspective of gender, there is no significant difference in the overall SWB between men and women. However, gender differences still exist in different dimensions of SWB (Wang Fang, Chen Fuguo, 2006).

A literature review found that happiness is not associated with age, but that it is important to have good social relations as well as be self-confident and extroverted (Ferraz, et al., 2007). Although happiness is a subjective experience, it is related to psychological and socio-cultural traits (Ferraz, et al., 2007), social support, and social engagement in activities outside the family (Seligman, 2003). Social capital and social participation are also important factors (Cooper et al., 2011). Good interpersonal relationships can lead to an increase in positive emotions, and individuals can achieve high happiness (Wang Fang, Chen Fuguo, 2005). Social support and social participation in extra familial activities (Seligman, 2003). Health is also a influencing factor of subject well-being. Nan, et al. (2014) found that the relationship between happiness and mental health was greater than that between physical health. A study found that illness does not directly lead to a decline in happiness, but what matters is the degree to which illness interferes with everyday functions (Angner et al., 2013).

2.3. The Impact of Environment on Mental Health and Subject Well-being

Environment refers to the total of natural and artificially modified natural factors affecting human survival and development, including atmosphere, water, ocean, land, mineral deposits, forests, grasslands, wildlife, natural relics, human relics, nature reserves, scenic spots, cities and villages (the Environmental Protection Act of the People's Republic of China, 2015). Natural Environment (NE) is the sum of all kinds of natural factors surrounding people and the material basis for human survival. Built environment refers to all kinds of buildings and places that can be reconstructed by man-made construction, especially those that can be changed by policy and human behavior, including the location and design of residential, commercial, office, school and other buildings, as well as the location and design of pedestrian, bicycle, greenway and road (Handy S L, et al., 2002). Built environment is a combination of a series of elements related to land use, transportation system and urban design. As one of the important factors to promote public physical activity and health, built environment is an important entry point for urban planning to actively intervene in health (Lu Feidong, Tan Shaohua, 2015).

Neighborhood is the main place where people live and the basic unit of a city. Neighborhood

include hardware elements such as space environment, facility configuration, and software elements such as social humanities. As the basic unit and space carrier of people's living and social interaction, neighborhood is closely related to people's health and well-being (Croucher et al., 2007; Hu Yuting, 2017).

More and more studies have confirmed that the built environment has a significant correlation with people's mental health. Although there are various methods and different conclusions in these studies under different backgrounds, it has become a fact that the environment has an impact on human behavior and other factors, or in a way of direct exposure, affects human mental health.

In conclusion, the environmental factors affecting mental health mainly include the following aspects: green space, housing, density, road network, etc.

2.3.1. Green space

A number of research cases showed that the increase in the number of green spaces is conducive to improving people's mental health level and promoting people's health perception. Canadian research shows that increasing tree planting in a city block can improve people's health awareness in a way that is equivalent to an increase in personal income (Omid Kardan et al., 2015). The total number and area of public green space are significantly correlated with better mental health and support dose-response relationship. Providing adequate public green space within local neighborhoods and walking distance is important for positive mental health (Wood, L., 2017).

The proportion of green space is the proportion of the area of green space/green space in a certain range, and green coverage is also used to characterize it. The percentages of green space within 3 km radius interact significantly with the number of health complaints and perception of general health caused by stressful life events (Agnes E. van den Berg et al., 2010); the areas occupying more than 8% of the park area are positively correlated with SRH (Parra, D.C., etc., 2010); and those living in neighborhoods with higher percentages of green space are positively correlated with self-reported health (Parra, D.C., 2010). People reported a lower risk of sleep deprivation (Thomas Astell-Burt et al., 2013); people living in urban areas with more green spaces (a high proportion of green spaces) were happier, showing significantly lower mental pain and higher happiness (Mathew P. White, Ian Alcock et al., 2013). Characterized by the percentage of green space in the 1km buffer zone, the residents in the greenest area had lower risk of psychological distress and less sedentary time than those in the least green area. Interaction between sports activities and green space was observed (Thomas Astell-Burt et al., 2013). Vegetation coverage is positively correlated with the lower prevalence of depression, anxiety and stress. There is a quantifiable relationship between mental health and the natural characteristics of the neighbourhood that people actually experience (Daniel T. C. Cox et al., 2017).

2.3.2. Density and Road Network

The density of built environment includes population density and construction density (such as volume ratio, housing density, etc.).

The construction density of the built area within 300 meters of the residential area has a significant correlation with mental health. In the study of Sarah Foster et al. (2010), residential

density is the ratio of residential area to the number of residential buildings in the service area, and it is one of the constituent indicators of community morphological index. The community morphological index was significantly correlated with the decrease of crime fear.

Street network accessibility is characterized by street sports potential (overtaking volume of street sections) and street connectivity (the number of sections connected to a certain section, i.e. the density of street intersections). Research shows that the reduction of psychological distress is associated with higher accessibility of local street networks ("mobile potential") (Chinmoy Sarkar et al., 2013). Using street connectivity in a 0.5-mile buffer zone as a measure of design, poor street connectivity has a negative impact on life satisfaction [Xinyu (Jason) Cao, 2016].

The number of intersections is also an important indicator of street network. Street connectivity is calculated by the ratio of three-way intersection to total service area. The comprehensive community morphology index is significantly related to the reduction of crime fear. A more walkable community is also a place where residents feel safe (Sarah Foster, 2010). The number of total intersections within the radius of 300 meters around the residential area was significantly correlated with the happiness dimension (Elizabeth J Burton et al., 2011).

2.3.3. Service facilities

Australian studies found that, independently of other factors, the higher the degree of land use mixing, the higher the risk of depression (Dick Saarloos, 2011). Retail service availability was associated with a 40% increase in the risk of depression, regardless of other factors, including other land use. Although local retail stores help walking, this may increase the risk of depression in older men (Dick Saarloos, 2011). The use of cultural facilities is positively correlated with the physical and mental health and subjective well-being of the elderly (Liu, Y., et al., 2017).

2.3.4. Location

Residential location is characterized by seven categories: major town centers, major town districts, major town margins, large town centers, large town margins, small towns and villages. Research shows that residential location in urban and rural areas is one of the measures of the constructive environment with the greatest number of significant correlations with health (Elizabeth J Burton, et al., 2011). Mental health is determined by neighbourhood level. Residents living in neighborhoods farther away from the city center tend to have better mental health (Hongwei Dong, Bo Qin, 2017).

Therefore, we can see that environmental factors can be divided into two categories. One is the environmental factors of physical space itself, such as location, green space level and density, road network and other characteristics. On the other hand, it is the environmental factors of service facilities, which represent the public service level of the environment, and service facilities are often based on the physical space environment.

Mathew P. White, et al. (2017) pointed out that although people are increasingly interested in the relationship between natural environment and subjective well-being (SWB), previous studies have various limitations in methodology and theory. Under the background of Shanghai's high-density human settlements and Oriental culture-oriented environment, it is worth discussing the relationship between built environment and mental health, especially with people's subject well-being which has been paid more and more attention. The environmental

construction towards good subject well-being will be a necessary Supplement for the research in the above-mentioned fields.

3. Objectives

Based on the survey data and combined with the existing characteristics of Shanghai's urban planning compilation and management, this paper mainly answers the following questions:
1. The general well-being and distribution characteristics of the elderly in Shanghai at present;
2. Under the control of other variables, does the built-up environment of community affect the well-being of the elderly? What is the impact?
3. What aspects should we pay attention to in the construction of a well-being-oriented community environment?

4. Methods

4.1. Data sources

Based on the data of the fourth survey on the living conditions of the elderly in urban and rural areas of China (the fourth survey), 3431 urban residential samples in Shanghai were analyzed. The data are sorted in spss22 and analyzed in Mplus7.4 by the method of path analysis.

4.1.1. Neighborhood Environment

According to the existing literature and the specific requirements of Shanghai urban planning compilation and management, the environmental factors are summarized as 11 indicators in five aspects: green space, housing conditions, urban form (including building area volume ratio and road network density) facility environment, and location. According to the sample address, the environmental factors indicators are calculated using the GIS platform.

4.1.2. Subject well-being

Subject well-being comes from the question in the fourth survey, "In general, do you feel happy?" Options include five levels, ranging from very happy to five very unhappy.

4.1.3. Control variables

(1) Gender
This index data comes from the "the fourth survey" questionnaire. In the "A - basic information" part of the questionnaire, there are questions about “A1- the gender of the elderly interviewed ", "1" is male and "0" is female.
(2) Age
This index data comes from the "the fourth survey" questionnaire. In the "A - basic information" part of the questionnaire, there is a question “A2 -the age of the interviewed old people". The age of the elderly is divided into six age groups: 1: 60-64 years old, 2: 65-69 years old, 3: 70-74 years old, 4: 75-79 years old, 5: 80-84 years old and above.

(3) Household Registration

This index data comes from the "the fourth survey" questionnaire. In the "A - Basic Information" section of the questionnaire, there is a question " A3 -What type of household registration do you belong to?" There are three options: "1 agriculture, 2 non-agriculture and 3 unified household registration".

(4) Education

This index data comes from the "the fourth survey" questionnaire. In the "A - basic information" part of the questionnaire, there are six options: "A5 -your educational level", including "1 have not attended school (including literacy classes), 2 primary schools (including private schools), 3 junior middle schools, 4 senior high schools/secondary vocational schools, 5 colleges, 6 undergraduates and above". The higher the value, the higher the educational level of the elderly.

(5) Marital status

This index data comes from the "the fourth survey" questionnaire. In the "A - basic information" section of the questionnaire, there are questions "A8- your current marital status", "1 have a spouse, 2 widow 3 Divorce, 4 never married." The data are arranged as nominal variables, 1 as having a spouse and 0 as having no spouse now.

(6) Economic situation

This index data comes from the "the fourth survey" questionnaire. In the "E- Economic Situation" section of the questionnaire, there is a question, "Which of the following do you think your economic situation belongs to?" There are five choices: "1 very abundant, 2 relatively abundant, 3 basically enough, 4 more difficult, 5 very difficult", The lower the value, the better the self-assessment economic status of the elderly.

4.2. 3.4. Analytical methods

(1) GIS (Geographic Information System)

The GIS platform is helpful to calculate the spatial relationship of data and to express it intuitively. It is the basic work platform of this study.

(2) SPSS 22

Data are collated and basic descriptive analysis is carried out.

(3) Mplus 7.4

Path analysis is carried out.

5. Results

5.1. Descriptive analysis

Table 1 Happiness of the elderly interviewed

		count	percentage（%）	Effective percentage（%）	Cumulative percentage（%）
effective	Very happy	712	20.8	20.8	20.8
	Comparatively happy	1719	50.1	50.1	70.9

	Generally happy	921	26.8	26.9	97.8
	Comparatively unhappy	60	1.7	1.7	99.5
	Very unhappy	17	.5	.5	100.0
	total	3429	99.9	100.0	
missing		2	.1		
total		3431	100.0		

The proportion of the elderly who choose "relatively happy", "general" and "very happy" is the highest. More than half of the elderly feel "relatively happy", and only 2.2% feel "relatively unhappy" and "very unhappy".

5.1.1. Population differences

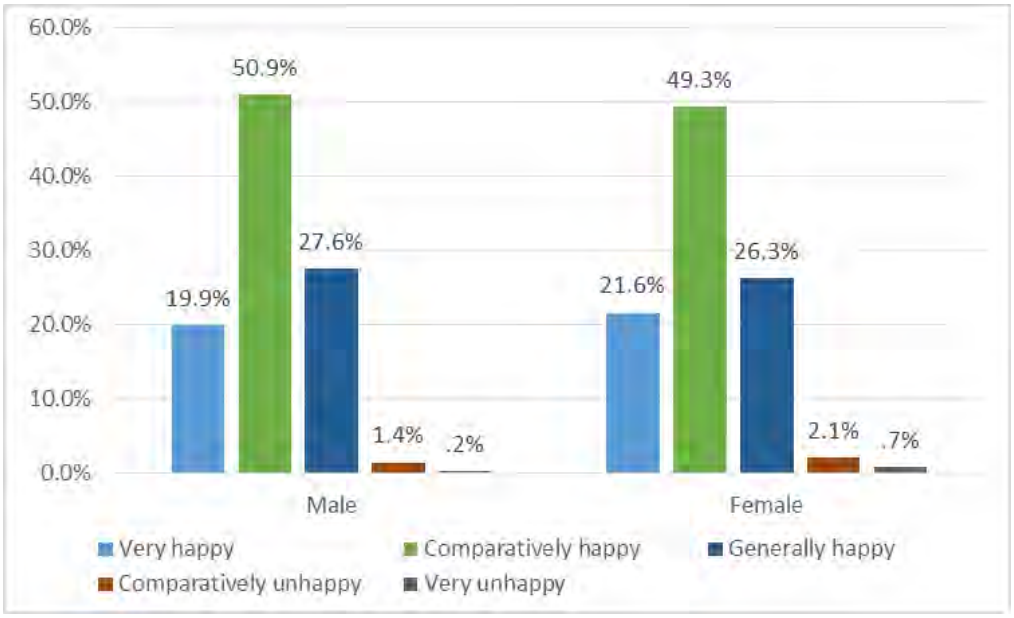


Figure 1 Differences in happiness among the elderly interviewed by different genders

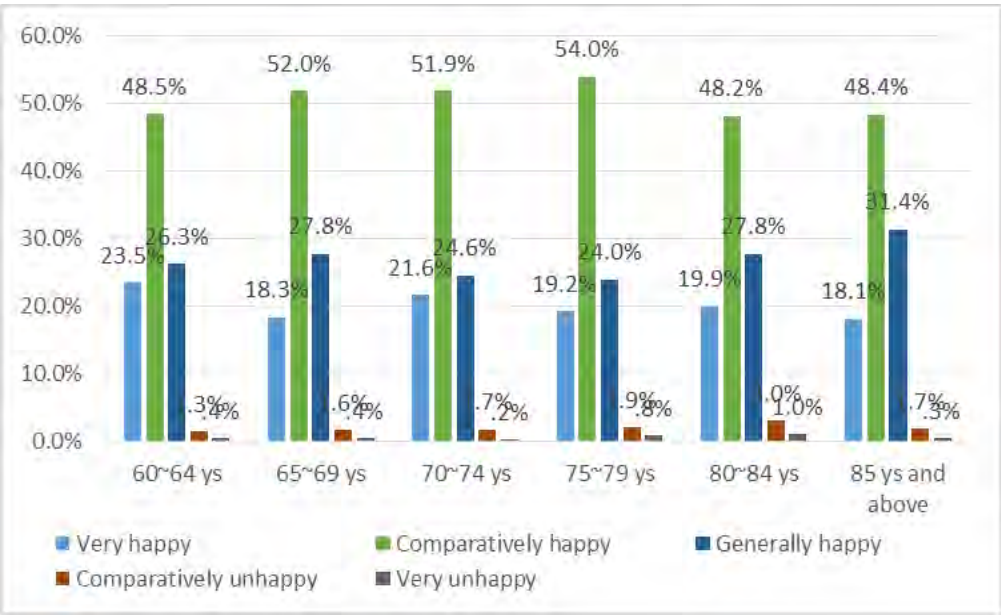


Figure 2 Differences in happiness among the elderly interviewed at different ages

There is no significant difference in happiness between men and women. There was no significant difference in happiness among the elderly of all ages.

5.1.2. Regional differences

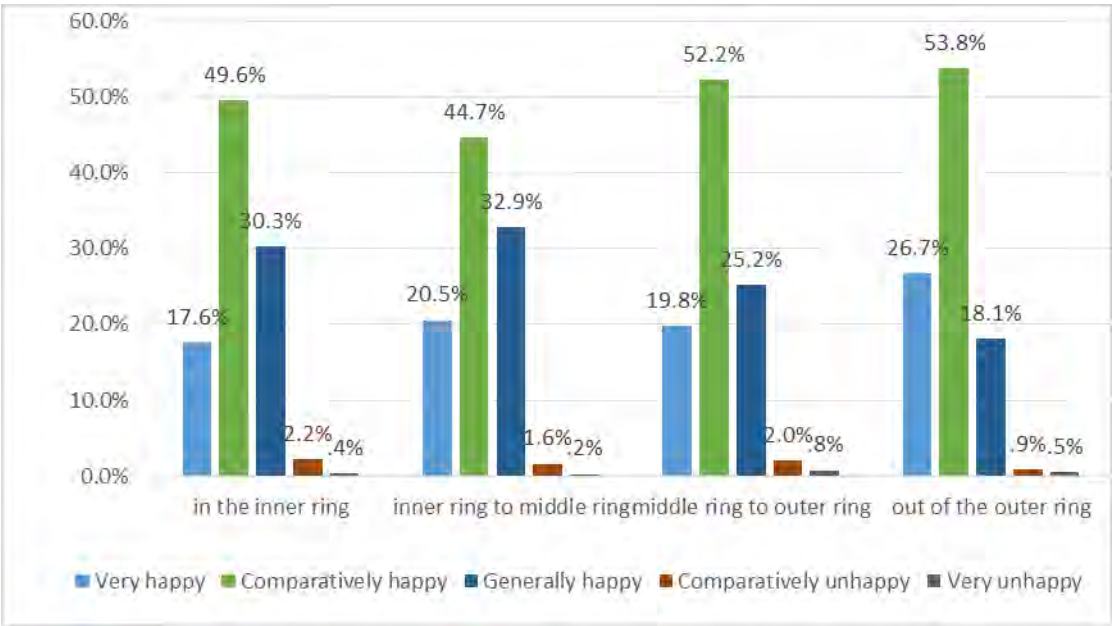


Figure 3 Regional differences in happiness among the elderly interviewed

There were significant differences in happiness among the elderly in different regions (Sig < 0.001). The proportion of "very happy" and "relatively happy" old people outside the central city is higher than that in the central city; the proportion of "general" and "relatively unhappy" old people is lower than that in the central city; the proportion of "very unhappy" old people is 0.2%-0.8%, and there is no significant difference in different regions.

5.2. The impact of community environmental factors on the well-being of the elderly

5.2.1. Impact of green space, housing and urban form

Table 2 Model 1

The Influencing Elements of Happiness	Estimate	S.E.	Est./S.E.	P-Value
Gender	-0.025	0.016	-1.535	0.125
Age	0.023	0.018	1.302	0.193
Household register	**-0.091**	**0.017**	**-5.331**	***
Marital status	-0.03	0.018	-1.683	0.092
Education	**0.148**	**0.018**	**8.25**	***
Self-reported economic status	**-0.314**	**0.018**	**-17.811**	***
Proportion of green space area	0.01	0.018	0.562	0.574
Per capita green space area	**0.055**	**0.017**	**3.248**	**0.001****
Housing area	**0.099**	**0.018**	**5.454**	***
Housing type	0.03	0.016	1.894	0.058
Volume ratio	0.013	0.017	0.753	0.451
Road network density	0.018	0.02	0.906	0.365
Location(Distance to downtown)	**0.076**	**0.024**	**3.181**	**0.001****

Among personal characteristics, household registration, educational level and self-assessment of economic status have significant effects on the well-being of the elderly. Non-agricultural household registration, older people with higher education level, and older people with better self-assessment of economic status, have higher happiness.

From the point of view of material space environment factors, the per capita green space area, housing construction area and distance to the city center have a significant impact on the well-being of the elderly. The more green space per capita and housing construction area per capita, the higher the happiness of the elderly. From the location of the elderly, the farther away from the city center, the happier the elderly are.

5.2.2. Impact of public facilities

Table 3 Model 2

The Influencing Elements of Happiness	Estimate	S.E.	Est./S.E.	P-Value
Gender	-0.024	0.017	-1.472	0.141
Age	0.028	0.018	1.613	0.107
Household register	**-0.089**	**0.017**	**-5.237**	***
Marital status	-0.028	0.018	-1.539	0.124
Education	**0.148**	**0.018**	**8.238**	***
Self-reported economic status	**-0.311**	**0.018**	**-17.672**	***
Proportion of green space area	0.014	0.018	0.776	0.438

Per capita green space area	0.034	0.018	1.86	0.063
Housing area	**0.104**	**0.019**	**5.586**	***
Housing type	0.027	0.016	1.619	0.106
Volume ratio	0.011	0.017	0.625	0.532
Road network density	**0.058**	**0.027**	**2.131**	**0.033***
Location(Distance to downtown)	**0.088**	**0.025**	**3.529**	***
Number of public service facilities	-0.025	0.029	-0.865	0.387
Medical distance	0.003	0.017	0.152	0.879
Number of transport facilities	-0.043	0.026	-1.655	0.098
Distance of traffic facilities	0.018	0.018	1.049	0.294

After adding the facility environment variables, we found that besides the significant impact of personal characteristics in model 1 on the well-being of the elderly, the per capita green space area, housing construction area and distance to the city center are still the significant factors affecting the well-being, but the per capita green space area is no longer significant, and the density of road network has also become a significant environmental factors. As far as the environmental factors of facilities are concerned, there is no significant correlation between the number of public service facilities, medical distance, the number of transportation facilities and the distance to transportation facilities and the well-being of the elderly.

6. Discussion

6.1. Personal characteristics and the subject well-being of the elderly

Previous studies have consistently confirmed that individual socioeconomic attributes have a significant impact on mental health (Claire Dujardin et al., 2014; Becky P. Y., Loo et al., 2017; Hongwei Dong, Bo Qin, 2017), and that in the process of environmental impact on mental health, there are differences among different populations in the process of environmental impact.

The household registration system has an important impact on the distribution of people's resources and living opportunities, and has become the most important parameter to depict the inequality of China's social structure (Zheng Bingdao, Wu Xiaogang, 2013). Studies have confirmed that household registration has an important impact on people's political, economic and professional status (Lu Yilong, 2008). Using the survey data from 2010 to 2013, Li Wenjie and Luo Yuhui (2016) found that the social stratum structure of the agricultural household registration population has obvious physical labor characteristics. Agricultural household registration holders are far less likely to enter the management class or even the non-manual labor class than Non-peasant household registration holders. Due to the difference of social resources obtained by household registration, the physical health and mental health of the elderly with different household registration will be affected. In this study, household registration has a significant impact on the subject well-being of the elderly. The elderly with agricultural household registration have a worse sense of happiness than those with non-agricultural household registration.

Similarly, the educational level has a certain impact on the occupational and economic status of the elderly and the corresponding social resources. Studies have also confirmed that education has an important impact on health (Hu Guangyu, Duojun, 2010). In this study, educational level has a significant positive impact on the well-being of the elderly. The higher the educational level, the better the subject well-being of the elderly.

Previous studies have found that income level, education level, social stratum and social network all have an impact on the health of the elderly at a significant level of 1% (Liu Changping, Wang Lianjie, 2017). Economic status has a significant impact on the mental health of the elderly (Yang Benfu et al., 1999; Ning Ziheng et al., 2001; Tangdan, 2010; Hu Guangyu, et al., 2010; Zhang Xia, Yang Yifan, 2017). Like previous studies, economic status has a significant positive impact on the well-being of the elderly. The better the economic situation is, the happier the elderly will be. Economic status is one of the most important factors affecting the health and well-being of the elderly.

6.2. Green space and the subject well-being of the elderly

Green space is an important environmental factor in existing research. The quantity of green space is a very important and common environmental measure index. However, in the existing studies, few studies have linked the number of green space with the number of population, considering the per capita green space occupancy level under different population densities. From this perspective, green space is measured and the impact of the environment on human health is analyzed.

In the process of analysis, in terms of the number of green space, considering only the green space density represented by the proportion of green space area, there is no significant correlation between the number of green space represented by the proportion of green space area in community life circle and the physical health and mental health of the elderly.

Further in-depth analysis of the current situation of green space distribution in Shanghai shows that the proportion of green space in the studied neighborhoods has a slight downward trend from the city center to the periphery. Although the spatial distribution of green space is relatively balanced in the city center and the periphery, considering the distribution of population, from the perspective of per capita index, the distribution of green space in the city obviously still has great differences. According to the population density of each research neighborhood and the calculation of the per capita green space area, the research community from the city center to the periphery shows a significant trend of gradual increase, that is, from the city center to the periphery, the per capita green space area enjoyed by the per capita is increasing. From the per capita index, the per capita green space level in the suburbs is significantly higher than that in the central city. From the perspective of the whole city, the per capita green space level of each community is more than 100 times different, and only from the per capita green space level of each community in the central city, the per capita green space value is 10 times different.

In this study, the proportion of green space has no significant impact on the health of the elderly. While combined with the analysis of per capita green space index, we find that per capita green space area is significantly related to the subject well-being of the elderly. Compared with the spatial distribution, per capita green space area is a more effective indicator to promote the mental health of the elderly.

Therefore, for green space, it is not enough to consider the balance of spatial distribution. More

importantly, it is to match the population distribution in order to better integrate with the actual needs of people. Only by combining with human needs and serving as the basis of spatial layout, can we better and more effectively play its internal functions and achieve the original purpose and goal of planning.

6.3. Housing Conditions and the subject well-being of the elderly

Existing studies have shown that good quality of housing and neighborhood environment and safe social environment are the main reasons for the improvement of subjective and physical health of the elderly (Liu, Y., 2017). Living in Low-Rise housing, better living conditions and healthy physical and social environment have a significant impact on positive mental health (Ghuncha Firdaus, 2017).

Path analysis shows that housing area has a significant positive impact on the subject well-being of the elderly when controlling the basic socio-economic attributes of the elderly and considering the impact of all built-up environmental factors such as community location. Housing construction area reflects the quality of housing conditions for the elderly. Meanwhile, the larger building area is related to the larger number of people living together (Sig. = 0.010), which is conducive to reducing the loneliness of the elderly and improving their mental health.

Relevant analysis shows that there is no significant correlation between the housing conditions of the elderly and their self-reported economic status. Therefore, it can be said that housing conditions are independent of economic status and have a significant positive impact on the subject well-being of the elderly themselves.

6.4. Road network density and the subject well-being of the elderly

Studies have confirmed that high road network density has a positive impact on mental health [Chinmoy Sarkar et al., 2013; Xinyu (Jason) Cao, 2016]. High-density road network design is often associated with more diverse functional layouts and promotes walking opportunities for the elderly to their destinations, thereby enhancing their social participation and physical activity. Considering the facility environment data at the same time, the analysis of this study shows that the consistency with the above study, road network density has a significant role in promoting the subject well-being of the elderly.

6.5. Location and the subject well-being of the elderly

Location has a significant impact on the elderly's subject well-being. This is consistent with the above descriptive, that is, the elderly in the periphery of the central city are significantly better than those in the central city in terms of subject well-being.

Location reflects the difference of population distribution. At the same time, location also determines the characteristics of various elements of built environment. At the same time, location also reflects different social and economic conditions.

6.6. Facility Environment and the subject well-being of the elderly

There are small number of researches that take public facilities directly as an independent variable to analyze the relationship between environment and health. However, the number of public facilities is often related to the diversity of land use and road network density. The higher the diversity of land use within the community, the more public facilities. Land use diversity has been shown to have a significant impact on mental health. For example, although the overall

impact of land use combination is not significant, it also has a positive and negative impact on life satisfaction (Xinyu (Jason) Cao, 2016). The higher the degree of land use mixing, the higher the risk of depression (Dick Saarloos, 2011). Previous study (Zhu Weijue, 2010) has also showed that medical distance has a significant positive impact on the health of the elderly. The nearer the medical distance, the better the physical health performance of the elderly.

In this study, land use mixing degree was not directly measured, but in terms of the number of public facilities, medical distance, transport facilities and transport facilities distance, these facility environmental variables were not significantly related to the well-being of the elderly.

7. Conclusion

Based on the sample of elderly people in Shanghai, this study explored the relationship between neighborhood built environment and elderly's subject well-being. The path analysis in the structural equation model shows that the household registration, educational level and self-assessment of economic status of the elderly can significantly affect the well-being of the elderly. Under the condition of controlling the basic social and economic attributes of the elderly, some neighborhood environmental factors have significant effects on the happiness of the elderly, including per capita green space area, housing building area and distance to the city center. When the environmental variables of facilities are added, the influence of green space is not significant, and the density of road network has a significant positive impact on the well-being of the elderly.

This study of the elderly in Shanghai is consistent with the existing research conclusions, which confirms the positive effect of green space on mental health, as well as the significant impact of road network density, housing conditions and location (distance to the city center). From the perspective of community construction, improving the per capita green area index, increasing the density of road network and improving housing conditions will be conducive to enhancing people's happiness.

8. References

[1] ED, Diener; et al. (1999) "Subjective well-being: three decades of progress", Psychological Bulletin, Vol. 2 No. 125(March).

[2] ED, Diener; et al. (2000) "New direction in Subjective well-being research: the cutting edge", Indian Journal of Clinical Psychology, No. 27.

[3] ED, Diener(2000)"subjective Well -Being -The science of Happiness and Proposal for National Index", American Psychologist, Vol 55, No. 1.

[4] Miao, Yuanjiang (2009) "Happiness Index in Development", Nanjing Social Science, No. 11 (November).

[5] Duan, Jianhua (1996) "Summary of Subjective Well-being", Psychological Dynamics, Vol. 4 No. 01.

[6] Zhang, Lu; Zuo, Bin (2007) "Self-fulfilling Happiness: A Review of Psychological Well-being

Research" Progress in Psychological Science, Vol. 15 No. 01 (January).

[7] Li, Zhi; Xie, Chaohui (2006) "Literature Review on Subjective Well-being in China" Journal of Chongqing University (Social Science Edition), Vol. 12 No. 4 (August).

[8] He, Quan; Zhang, Shi; Wang, Ping (2015) "The Impact of Community Management on the Well-being of the Elderly in the Construction of 'Livable Community for the Elderly': A Case Study of Hangzhou", Northwest Population, Vol. 36 No. 4 (April).

[9] Zhang, Wei; Hu, Zhongming; Li, Hongjuan (2014) "Influencing factors of subjective well-being of urban elderly", Population and development, Vol. 20 No. 6 (December).

[10] Jin, Huihong; Chen, Yu (2012) "A Study on Happiness and Professional Happiness", Modern Marketing: Xueyuan Edition, No. 10 (October).

[11] Pedro, Konsesan; Romina, Bandero; Lu, Yanhua (2013) "Literature Review of Subjective Well-being", Overseas Theoretical Dynamics, No. 7 (July).

[12] Nan, H; et al. (2014) "Psychometric evaluation of the Chinese version of the subjective happiness scale: Evidence from the Hong Kong family cohort", International Journal of Behavioral Medicine, Vol. 21 No. 4 (April).

[13] Seligman, M. E. (2003) "Positive psychology: Fundamental assumptions", Psychologist, Vol. 16 No. 3 (March).

[14] E., Angner; J., Ghandhi; K. Williams Purvis; D. Amante; J. Allison (2013) "Daily functioning, health status, and happiness in older adults", Journal of Happiness Studies, Vol. 14 No. 5 (October).

[15] Bruna, Moretti Luchesi; et al. (2018) "Factors associated with happiness in the elderly persons living in the community", Archives of Gerontology and Geriatrics, No. 74 (October).

[16] Wang, Fang; Chen, Fuguo (2006) "Influencing factors of subjective well-being", Chinese Behavioral Medicine Science, Vol. 14 No. 6 (June).

[17] L, Handy S; Boarnetmg; R, Ewing; et al. (2002) "How the built environment affects physical activity: Views from urban planning", American Journal of Preventive Medicine, Vol. 23 No. 2S (August).

[18] Lu, Feidong; Tan, Shaohua (2015) "Research on the Impact of Built Environment on Physical Activities: Progress and Reflection", International Urban Planning, Vol. 30 No. 2 (April).

[19] K, Croucher; L, Myers; R Jones; et al. (2007) "Health and the physical characteristics of urban neighborhoods: A critical literature review", Glasgow: Glasgow Centre for Population Health.

[20] Yu, Yifan; Hu, Yuting (2017) "International Research Progress on the Impact of Community Building on Environmental Health: Literature Review and Consideration from the Perspective of Physical Activity", Journal of Architecture, No. 2 (February).

[21] Kardan, Omid; et al. (2015) "Neighborhood greenspace and health in a large urban center", Scientific Reports, Vol. 5 No. 1 (July).

[22] L., Wood; et al. (2017) "Public green spaces and positive mental health - investigating the relationship between access, quantity and types of parks and mental wellbeing", Health & Place, Vol. 48 (November).

[23] E. Agnes; et al. (2010) "Green space as a buffer between stressful life events and health", Social Science & Medicine, Vol. 70 No. 8.

[24] D.C., Parra; et al. (2010) "Perceived and objective neighborhood environment attributes and health related quality of life among the elderly in Bogotá, Colombia", Social Science &

Medicine, Vol. 70 No. 7 (April).

[25] Astell-Burt, Thomas; Feng, Xiaoqi; Kolt, Gregory S. (2013) "Mental health benefits of neighbourhood green space are stronger among physically active adults in middle-to-older age: Evidence from 260,061 Australians", Preventive Medicine, 2013. 57(5): 601-606.

[26] White, Mathew P.; Alcock, Ian; Wheeler, Benedict W.; Depledge, Michael H. (2013) "Would You Be Happier Living in a Greener Urban Area? A Fixed-Effects Analysis of Panel Data", Psychological Science, Vol. 24 No. 6 (April).

[27] Cox, Daniel T. C.; et al. (2017) "Doses of Neighborhood Nature: The Benefits for Mental Health of Living with Nature", BioScience, Vol. 1 NO.2 (January).

[28] Foster, Sarah; et al. (2010) "Neighbourhood design and fear of crime: A social-ecological examination of the correlates of residents' fear in new suburban housing developments", Health & Place, Vol. 16 No. 6 (November).

[29] Sarkar, Chinmoy; Gallacher, John; Webster, Chris (2013) "Urban built environment configuration and psychological distress in older men: Results from the Caerphilly study", BMC Public Health, No. 13 (December).

[30] Cao, Xinyu (Jason) (2016) "How does neighborhood design affect life satisfaction? Evidence from Twin Cities", Travel Behaviour and Society, Vol. 5 (September).

[31] Burton, Elizabeth J; Mitchell, Lynne; Stride, Chris B (2011) "Good places for ageing in place: development of objective built environment measures for investigating links with older people's wellbeing", BMC Public Health, No. 11 (December).

[32] Liu, Y., et al. (2017) "Healthy urban living: Residential environment and health of older adults in Shanghai", Health & Place, Vol. 47 (September).

[33] Dong, Hongwei; Qin, Bo (2017) "Exploring the link between neighborhood environment and mental wellbeing: A case study in Beijing, China", Landscape and Urban Planning, Vol. 164 (August).

[34] Dujardin, Claire; Lorant, Vincent; Thomas, Isabelle (2014) "Self-assessed health of elderly people in Brussels: Does the built environment matter?", Health & Place, Vol. 27 (May).

[35] Loo, Becky P. Y.; Lam, Winnie W. Y.; Mahendran, Rathi; Katagiri, Keiko (2017) "How Is the Neighborhood Environment Related to the Health of Seniors Living in Hong Kong, Singapore, and Tokyo? Some Insights for Promoting Aging in Place", Annals of the American Association of Geographers, Vol. 107 No. 4 (July).

[36] Zheng, Bingdao; Wu, Xiaogang (2013) "Hukou,'Agricultural to Non-Agricultural' and income inequality among urban residents in China", Sociological Research, Vol. 28 No. 1 (January).

[37] Lu, Yilong (2008) "Does household registration still work - household registration system and social stratification and mobility", China Social Science, No. 1 (January).

[38] Li, Wenjie; Luo, Yuhui "Social Stratum Structure Analysis under Urban and Rural Household Registration System - Based on 2010-2013 CGSS Data", Jianghan Academy, Vol. 35 No. 5 (October).

[39] Yang, Benfu; Liu, Dongguang; Shao, Guangfang (1999) "Jining City, the status of elderly depression and its influencing factors", Chinese Journal of Gerontology, No. 4 (February).

[40] Ning, Ziheng; et al. (2001) "Investigation and analysis of depressive symptoms and their influencing factors among the elderly in Macao", Chinese Journal of Mental Health, No. 5 (May).

[41] Zhang, Xia; Yang, Yifan (2017) "Research on the Influencing Factors of Mental Health of Middle-aged and Elderly People in China - Empirical Analysis Based on CHARLS Data", Vol. 5 No. 2 (February).

[42] Wang, Hong; et al. (2005) "Research progress on psychosocial factors of geriatric depression", Geriatrics and health care, Vol. 11 No. 3 (June).

[43] Tang, Dan; Zou, Jun; Shen, Jiliang; Zhang, Ling (2006) "Influencing factors of subjective well-being of the elderly", Chinese Journal of Mental Health, Vol. 20 No. 3 (March).

[44] Liu, Changping; Wang, Lianjie (2017) "Study on the influence of socioeconomic status on the health status of the elderly", Population Science of China, Vol. 37 No. 5 (October).

[45] Firdaus, Ghuncha (2017) "Built Environment and Health Outcomes: Identification of Contextual Risk Factors for Mental Well-being of Older Adults", Ageing International, Vol. 42 No. 1 (March).

[46] Zhu, Weijun (2015) "Social Capital and Aging Health: An Empirical Study Based on the Comprehensive Survey Data of Shanghai Communities", Social Sciences, No. 5 (May).

Research Paper

STRATEGIES ON HEALTHY URBAN PLANNING & CONSTRUCTION FOR CHALLENGES OFRAPID URBANIZATION IN CHINA

Chengcheng LIU, Tianjin;China

Abstract

In the past 40 years, China has experienced the largest and fastest urbanization development in the world. The infrastructure, urban environment and medical services of cities have been improved significantly. The health impacts are manifested in the decrease of the incidence of infectious diseases and the significant increase of the life span of residents. However, the development of urbanization in China has also created many problems, including the increasing pollution of urban environment such as air, water and soil, the disorderly spread of urban construction land, the fragmentation of natural ecological environment, dense population, traffic congestion and so on. With the process of urbanization and motorization, the lifestyle of urban population has changed, and the disease spectrum and the sequence of death causes have changed. Chronic non-communicable diseases have replaced acute infectious diseases and become the primary threat to urban public health. According to the data published by the famous medical journal The LANCET on China's health care, the economic losses caused by five major non-communicable diseases (ischemic heart disease, cerebrovascular disease, diabetes mellitus, breast cancer and chronic obstructive pulmonary disease) will reach US$23 trillion between 2012 and 2030, more than twice the total GDP of China in 2015 (US$11.7 trillion).

Therefore, China proposes to implement the strategy of "Healthy China" and develop the policy of "integrating health into ten thousand strategies". Integrate health into the whole process of urban and rural planning, construction and governance to form a healthy, equitable and accessible production and living environment. China is building healthy cities through the above four strategies.

The main strategies from national system design to local planning are as follows.

First of all, the top-level design of the country. There are two main points: one point, the formulation of the Healthy China 2030 Plan determines the first batch of 38 pilot healthy cities and practices the strategy of healthy city planning; the other point, formulate and implement the national health city policy and issue the National Healthy City. The evaluation index system evaluates the development of

local work from five aspects: environment, society, service, crowd and culture, finds out the weak links in the work in time, and constantly improves the quality of healthy city construction.

Secondly, the reform of territorial spatial planning. In order to adapt to the rapid development of urbanization, China urban plan promote the reform of spatial planning system, change the layout of spatial planning into the fine management of space, and promote the sustainable development of cities. To delimit the boundary line of urban development and the red line of urban ecological protection and limit the disorderly spread of urban development as the requirements of space control. The bottom line of urban environmental quality and resource utilization are studied as capacity control and environmental access requirements. The grid management of urban built environment and natural environment is carried out, and the hierarchical and classified management unit is determined.

Thirdly, the practice of special planning for local health and medical distribution facilities. In order to embody the equity of health services, including health equity, equity of health services utilization and equity of health resources distribution. For the elderly population, vulnerable groups and patients with chronic diseases, the layout of community health care facilities and intelligent medical treatment are combined to facilitate the "last kilometer" service of health care.

Finally, urban repair and ecological restoration design are carried out. From the perspective of people-oriented, on the basis of studying the comfortable construction of urban physical environment, human behavior and the characteristics of human needs, to tackle "urban diseases" and make up for "urban shortboard".

China is building healthy cities through the above four strategies. Committed to the realization of a constantly developing natural and social environment, and can continue to expand social resources, so that people can enjoy life and give full play to their potential to support each other in the city.

Keywords

the strategy of "Healthy China", national system design, territorial spatial planning, integrating health, intelligent medical treatment, urban repair and ecological restoration design

China's rapid urbanization has brought great challenges to the urban environment. Therefore, China proposes to implement the strategy of "Healthy China" and integrate the concept of health into national strategies such as top-level policy design, territorial space planning reform, smart city big data, urban repair and ecological restoration design.

In the past 40 years, China has experienced the largest and fastest urbanization development in the world. The infrastructure, urban environment and medical services of cities have been improved significantly. The health impacts are manifested in the decrease of the incidence of infectious diseases and the significant increase of the life span of residents. However, the development of urbanization in China has also created many problems, including the increasing pollution of urban environment such as air, water and soil, the disorderly spread of urban construction land, the fragmentation of natural ecological environment, dense population, traffic congestion and so on. With the process of urbanization and motorization, the lifestyle of urban population has changed, and the disease spectrum and the sequence of death causes have changed. Chronic non-communicable diseases have replaced acute infectious diseases and become the primary threat to urban public health.

According to a study on The burden of disease in China published by The prestigious medical journal The LANCET, from 1990 to 2017, The mortality rate of chronic non-communicable diseases has increased significantly in The past three decades, and The top five causes of premature death are stroke, ischemic heart disease, lung cancer, chronic obstructive pulmonary disease (COPD) and liver cancer. This has been accompanied by continued declines in maternal and child mortality. High blood pressure, smoking, salty diets and outdoor air pollution are the top four risk factors for death and loss of life in 2017.The shift in China is largely the result of economic growth and improved education, and is closely linked to the development and effective implementation of China's national action plan for communicable diseases. The study found that people in China's eastern cities, coastal areas and wealthy provinces are generally healthier than those in rural and poor areas in the west. And a set of medical and health data research data show that during 2012 to 2030 in China, five major noncommunicable diseases (ischemic heart disease, cerebrovascular disease, diabetes, breast cancer and chronic obstructive pulmonary disease) caused economic losses will amount to $23 trillion, is China's GDP in 2015, more than two times ($11.7 trillion). China is also facing a severe aging population. As the average population ages, age-related diseases, such as musculoskeletal diseases, impose increasingly severe economic and medical burdens on individuals, families and the government. In addition, a growing number of working-age people spend most of their time in office environments, leading to an increase in the incidence of lower back and neck pain, suggesting that policies are needed to prevent this occupational hazard, and that improvements in tobacco consumption, high-salt diets, air pollution and other problems remain slow.

Figure 1 The leading causes of death in China (1990-2017)

Take cardiovascular and cerebrovascular diseases as an example to study the impact of urban environment on human health. There are many reasons for the difference of cardiovascular mortality, but the reasons are external and internal, which are mainly attributed to the environment and lifestyle. The incidence of cardiovascular and cerebrovascular diseases increases year by year, which is not only related to the improvement of diagnosis level, but also closely related to the aggravation of air pollution and the acceleration of lifestyle pace in recent years. According to data from the Chinese center for disease control and prevention, the number of deaths from various diseases attributed to outdoor air pollution was analyzed. The results showed that the threat of major cardiovascular and cerebrovascular diseases caused by haze was higher than that of lung cancer. The data showed that the amount of coal burned and the concentration of fine particles (PM2.5) in the air were positively correlated with the death from coronary heart disease and cerebrovascular disease, among which the amount of coal burned and PM2.5 concentration in northeast and north China were higher than those in other regions. Dust and harmful gases in the air (such as carbon monoxide and sulfur dioxide) not only increase the burden of the respiratory system, but also seriously affect the function of the cardiovascular system, destroy the function of the cardiovascular endothelial system, and promote the occurrence of atherosclerosis and myocardial infarction.

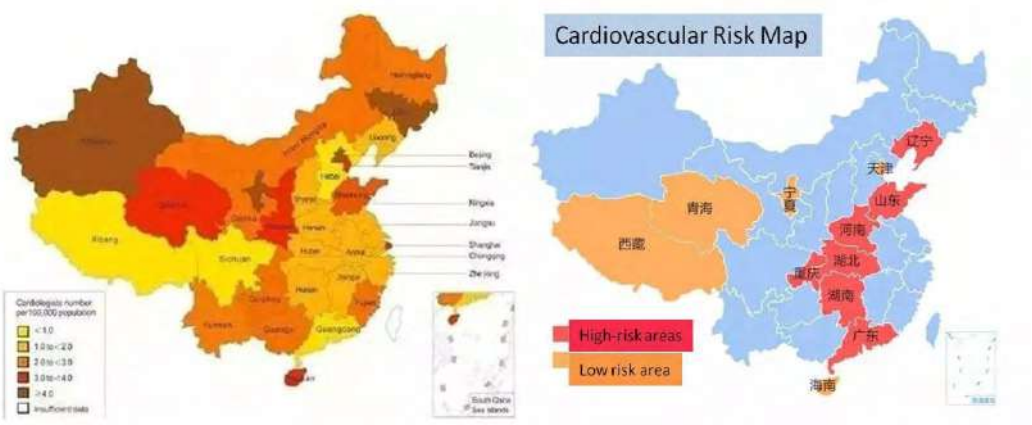


Figure 2 Cardiovascular risk map

Therefore, China proposes to implement the strategy of "Healthy China" and develop the policy of "integrating health into ten thousand strategies". Integrate health into the whole process of urban and rural planning, construction and governance to form a healthy, equitable and accessible production and living environment. The main strategies from national system design to local planning are as follows.

1. First of all, the top-level design of the country

There are two main points: one point, the formulation of the Healthy China 2030 Plan determines the first batch of 38 pilot healthy cities and practices the strategy of healthy city planning; the other point, formulate and implement the national health city policy and issue the National Healthy City. The evaluation index system evaluates the development of local work from five aspects: environment, society, service, crowd and culture, finds out the weak links in the work in time, and constantly improves the quality of healthy city construction.

1.1 Main strategy on "Healthy China 2030" Program Outline

In order to build a healthy China and improve people's health, China has launched a healthy China strategy: the outline of the "healthy China 2030" plan. Industrialization, urbanization, population aging, disease, ecological environment and lifestyle changes, etc., to maintain and promote health brings a series of new challenges, health service supply insufficient overall and the contradiction between the growing demand is still outstanding, health development and coordination of economic and social development needs to be enhanced, needs to solve the relationship between health as a whole from the national strategic level important and long-term problems. National health is the fundamental goal of building a healthy China. Based on the two focus points of the whole population and the whole life cycle, provide fair and accessible, systematic and continuous health services, and achieve a higher level of universal health. The main strategic content of urban planning includes four parts: popularization of healthy life, optimization of health services, construction of healthy environment and development of health industry. Including optimization of health services, improve the health care, construction of health environment, development of health industry related to urban planning and construction sector specific strategies are: to improve the physical quality, strengthening the universal public health services in-depth development, strengthen the key crowd health services, health movement, strengthen the environmental problems affecting health management, perfecting the system, development of health service of new forms of public safety.

Main strategic contents	Major planning strategies
Promoting healthy living	◎Improve the physical fitness of the whole people: improve the public health service system
Optimizing health services	◎Strengthening public health services that cover all the people: promoting equal access to basic public services and health; ◎Provide high-quality and efficient medical services: improve the medical and health service system, such as the layout and planning of urban medical and health facilities. We will strengthen health services for key population groups, such as promoting healthy ; aging and planning the layout of old-age care facilities. Such as maintaining the health of the disabled, such as barrier-free urban planning
Building a healthy environment	◎Further carry out health campaign: strengthen the comprehensive improvement of urban and rural environmental health, build healthy cities and healthy villages and towns; ◎We will intensify efforts to deal with environmental problems affecting health: we will carry out prevention and control of air, water and soil pollution, implement a plan to discharge all industrial pollution sources to standards, and establish and improve systems for monitoring, investigating and assessing environmental and health risks; ◎Improve the public safety system: promote road traffic safety, improve emergency response capacity
Develop health industry	◎New types of health services: Internet health services, TCM health tourism, health culture and medical tourism, health culture and sports medical rehabilitation, and health service clusters

Figure 3 Main strategic contents of Healthy China 2030

1.2 National healthy city evaluation index system

The national healthy city evaluation index system includes 5 first-level indicators, 20 second-level indicators and 42 third-level indicators, which can objectively reflect the overall progress of the construction of healthy cities in various regions. Taking into account China's vast territory, large population and uneven development of the national conditions, is a healthy city construction should follow the basic requirements. When building healthy cities, local governments should, on the one hand, work in accordance with these indicators, and on the other hand, solve and improve prominent local health problems and their influencing factors based on the characteristics of each city, so as to carry out the construction of healthy cities as a whole.

2. Secondly, the reform of territorial spatial planning

After 40 years of exploration, great achievements have been made in China's urbanization development. At the same time, this stage is also a stage of "crossing the river by feeling the stones", and we need to constantly summarize experience and gain and loss. Therefore, in order to adapt to the changes brought by the rapid development of urbanization, China has promoted the reform of the spatial planning system, from spatial planning layout to spatial refinement governance, and promoted the sustainable development of cities. China has the following sectoral planning sequences: economic and social planning sequences, urban and rural construction planning sequences, land and resources planning sequences, regional development planning sequences, ecological and environmental protection planning sequences and so on. Among them, there are 23 ecological and resource and environment constraint plans, and 68 development and construction plans. In order to better unify these plans, avoid waste and protect the ecological environment, the state studies to define the boundary line of urban development, the red line of urban ecological protection, and limit the disorderly spread of urban development as space control requirements based on the "evaluation of resource and environment carrying capacity" and "evaluation of the suitability of land space development". Study the bottom line of urban environmental quality and the upper limit of resource utilization, as capacity control and environmental access requirements. Grid management of urban built environment and natural environment, and determine the classification of management units.

2.1 "Double Evaluation"

The "double evaluation" is "resource and environment carrying capacity evaluation" and "land space development suitability evaluation". Land space planning is an important basis and means for macro-control of rational development, utilization and governance of land, and an effective way to regulate the relationship between development and resources and environment. As the basis of national spatial planning, "double evaluation" needs to meet the inherent requirements of "necessity", "utility" and "usability" put forward by national spatial planning, and fully support the compilation of national spatial planning. "Double evaluation" is the essence of the regional resources and environment characteristics of cognitive tools and methods, finally exports should strengthen the conclusion of the analysis, respectively to form "bearing pressure - carrying capacity - bearing potential" and "problem

and to partition pattern - risk identification -" development potential analysis conclusions of three levels, increase support to space planning.

2.2 Designation of "Three Zones & Three Lines"

"Three districts and three lines" : according to three types of urban space, agricultural space and ecological space, three control lines, namely urban development boundary, permanent basic farmland protection red line and ecological protection red line, are drawn respectively."Three zones" (three types of Spaces) refer to the urban space: the land space whose main function is the production and living of urban residents, including the urban construction space, the industrial and mining construction space and the development and construction space of some township governments; Agricultural space: the land space that takes agricultural production and rural residents' life as the main function and bears the functions of agricultural production and rural life, mainly including permanent basic farmland, general farmland and other agricultural production land and rural living land like villages. Ecological space: the land space with natural properties that provides ecological services or products as the main function, including forests, grasslands, wetlands, rivers, lakes, beaches, wasteland, desert, etc. The "third line" (three control lines) refers to the red line of ecological protection: it is an area with special important ecological functions within the scope of ecological space that must be strictly protected by force, and it is the bottom line and lifeline of safeguarding and maintaining national ecological security. Red line for protection of permanent basic farmland: refers to the space boundary of farmland that may not be occupied or developed and needs permanent protection according to the demand of population and social and economic development for agricultural products in a certain period of time. Urban development boundary: within a certain period of time, the regional spatial boundary that can be used for urban development and concentrated construction, including the existing urban built-up area, the optimized development area and the areas that must be planned and controlled due to the needs of urban construction and development.

3. Thirdly, the practice of special planning for local health and medical distribution facilities

Data can change lives, everyone believes. Buy goods on the Internet, use mobile phone SMS to quickly pick up goods; How far is the bus to wait, open the location prediction distance; Through the wireless hospital system, you can register for free...As part of smart cities, these once utopian visions are becoming reality. In April 2018, China successively promulgated the "about promoting the development of" health "Internet + opinions on the further" Internet + medical health "for the convenience of benefit the people activities notice and other documents, from the policy level vigorously promote the construction of" Internet + medical health ", promote the growth of the health care market, for the people provides the omni-directional, the whole cycle to reflect health service fairness of health services including health services, health services and utilization of fairness and equity of health resources distribution. For the elderly, vulnerable groups and patients with chronic diseases, we will

combine the layout of community health and medical facilities with the smart medical treatment with big data to facilitate the "last kilometer" of health and medical services.

Medical care is about every family, and nothing can stop people from yearning for intelligent medical care. In 2019, with the beginning of the first year of 5G, smart medicine gradually turns many "impossible" into "possible", and its coverage of universal benefits becomes broader, deeper and more possible. The layout of local health and medical facilities will be combined with smart medicine, including AI follow-up system for patients, Internet hospital, remote specialized medical service, "smart hospital", "cloud mastery" of medical data, 120 emergency command system, etc.

4. Finally, urban repair and ecological restoration design are carried out

From the perspective of people-oriented, on the basis of studying the comfortable construction of urban physical environment, human behavior and the characteristics of human needs, to tackle "urban diseases" and make up for "urban shortboard".

4.1 Urban Repair

Urban repair is to avoid demolition and construction as much as possible and promote organic renewal. We should not only protect the original texture, but also allow the construction to happen. Urban repair is a new thing in theory and practice, and its positive significance is mainly reflected in the following aspects: first, it is conducive to the gradual urban renewal and transformation; Second, it is conducive to sustainable urban development; Third, it is conducive to the protection and continuation of famous cities and ancient towns; Fourth, is advantageous to the environment renovation and the city image beautification. In a word, urban repair is a new concept of urban design and a renewal method of urban construction put forward during the period of urban development from extensional expansion to concentric development. City repair, is around the "let the people in the city life more convenient, more comfortable, more beautiful" goal, USES the good method for urban planning and design concept, system, progressive, targeted way, constantly improve the quality of urban public services, improve the condition of municipal infrastructure, the excavation and protect the city history and culture and the social network, make the space of city function system and its carrying a place of repair, make up and improve the comprehensive system, make cities more livable, more dynamic. The measures for improving the physical environment should adjust measures to local conditions, can include demolition of illegal construction, control and guide the urban space morphology and skyline, the color of city and architecture, city night view lighting, urban greening landscape, outdoor billboards and so on many measures, gradually make urban and landscape environment harmony, improve the inner quality of urban physical environment, show the features of city in the form of whole space.

4.2 Ecological Restoration

"Ecological restoration" refers to the restoration of the original ecological functions of the ecosystem, such as soil and water conservation, microclimate regulation, biodiversity

maintenance, and development and utilization, with the help of appropriate artificial measures, by making use of nature's self-healing ability. Ecological restoration is not to restore the ecosystem to its original state, but to restore and improve the function of the ecosystem through restoration. Ecological restoration, is "to create good living environment as the central goal", aims to make damage to the structure and function of urban ecosystem restoration to the front of the interference of the natural condition, on the one hand, the city development to minimize the interference of ecosystem, on the other hand, through a series of means to restore the self adjusting functions of urban ecological system, make its gradually have the ability to overcome and eliminate outside interference, especially when changes in the external conditions still have to build a new balanced ability, promoting the ecological system in the process of dynamic constantly adjust and balance. Due to the high self-regulation capacity of the ecosystem and a large number of feedback mechanisms, the complexity and long-term nature of ecological restoration are obvious. In the face of the destruction of the ecological environment, we should first stop on the urban ecological system in mountains, rivers, coast, destruction of wetlands, vegetation, soil, adjustment of urban land use pattern, start from the local ecological elements to repair, in a planned way step by step to promote the ecological elements of the occupied "reclamation", gradually recovery, reconstruction and improve urban ecosystem self-regulation function.

China is building healthy cities through the above four strategies. Committed to the realization of a constantly developing natural and social environment, and can continue to expand social resources, so that people can enjoy life and give full play to their potential to support each other in the city.

Case Study / Project

Building Indian Neighbourhoods to Thrive in:

Guidelines for Planning, Design & Policy for Infants, Toddlers plus Their Caregivers in India

Rushda MAJEED, Patrin WATANATADA

Abstract

Planning and designing a city to better meet the needs of babies, toddlers and the people who care for them is one of the best investments a city can make. Growing evidence from neuroscience, public health, education and economics makes it clear: experience shapes the developing brain. One of the best ways to ensure good experiences is to support the people who care for babies and toddlers, beginning in pregnancy. City planners have a big role to play. Clean air and water. Walkable neighbourhoods that cater for the basics a young family needs. Multi-generational public spaces close to home that allow small children to explore safely. Safe routes and reliable transport that make it easy for caregivers traveling with small children to get to healthcare, childcare and healthy food. Such urban amenities help lay a crucial foundation in the early years of life for good health and learning into adulthood. And they make cities better for people of all ages. Yet babies, toddlers and the people who care for them can be invisible to city leaders and planners as a group with specific needs. That's why the Bernard van Leer Foundation's Urban95 initiative supports cities worldwide to ask and answer a bold but simple question: if you could experience a city from 95cm - the height of a 3-year-old - what would you change? This workshop will take participants through India's Infant, Toddler & Caregiver planning, policy and design guidelines, developed for and at the request of India's Smart Cities Mission by a team convened by the Bernard van Leer Foundation's Urban95 initiative and BDP. It will be hosted by the Bernard van Leer Foundation.

Case Study / Project

Realising the potentials of a design-dividend

towards a lovable urban future

Gregor MEWS

Abstract

Australia is one of the most urbanised countries in the world. At the same time, it is one of the highest per capita emitters of global greenhouse gas emissions. Despite of its material wealth, evidence in relation to the state of children health indicate that growing up in cities is of deep concern to ensure long term prosperity on societal level. The present generation are the least fit and the fattest they have ever been. Spatial fragmentation, social marginalisation, mental health issues and serious cardio-metabolic disorders have been on the rise in adolescence and early adulthood. As it stands, future generations will be off for worse. The problem that Australia finds itself in is created in part by our own actions. Currently we are still operating either in institutional regulatory silos, within technological harsh market competition, ecological unsustainable development patterns, and under enormous fiscal constraints within academia and organisations operating in the civil/societal fields. In absence of a national urban policy and political resistance on cohesive climate change policy, the argument for change within an individualistic society require a reframing. For example, a design-dividend provides benefits to positive financial uplift for development interests resulting from human-centred urban design to ensure liveable and healthy urban future for all. Good design generates a range of public benefits. Capitalisation of a design-dividend starts by addressing the needs of children and young people in the design process. The contribution will introduce some of Urban Synergies Group global key initiatives and collaborative thought leadership with the University of Canberra, Health Research Institute in the nexus of improving health outcomes for children and young people in urban systems.

Critical reflection on the applied systems approach in relation to safe independent childhood mobility (walking and cycling), encounters with nature in public spaces and designing connected play spaces for all will open up space for an engaging discourse on the need for a paradigm shift in the way we continue to shape healthy communities. About Urban Synergies Group Urban Synergies Group to date have been working in the global arena, particularly in contributing to the New Urban Agenda and advocacy of the Sustainable Development Goals (SDG) 3- Good Health and Wellbeing, 11- Sustainable cities and Communities, SDG- 13 Climate action and SDG 17- Partnerships for the goals. We believe that now is the time for to engage in international goals and to realise the potential of a paradigm shift from urban liveability to urban lovability that leaves no one behind.

Case Study / Project

Livable and just public space

- Conceptual approach to urban walkability on the case of Ljubljana, Slovenia

Matej NIKSIC

Abstract

The research addresses the issue of urban livability through the (un)supportiveness of the built environments for walking. It claims that urban environments must be pedestrian-friendly if the community's quality of life is to be achieved. It goes further and relates urban walkability to the urban justice issues. It gives a comprehensive review of the literature on walkability and the different aspects of urban justice embedded within it in terms of social, environmental, health, transportation and economic conditions.

This review sets the scene for a case study of Ljubljana, the capital and biggest city of Slovenia, which has gone through a major socio-economic transformation from socialist to capitalist system in the last three decades. The case study shows how urban walkability was tackled by two distinctive urban planning approaches: the socialist in the 1945-1990 period and the contemporary neoliberal which started in 1991 and is ongoing. It discusses how the two different conceptual approaches to urban walkability affect the urban livability and urban justice on concrete examples in the city. It reveals how the walkability assets of the city have been (dis)encouraged in accordance with the respective socio-economic system and how this affected people's right to use the city, and how it changed the livability of the neighbourhoods. It gives special attention to the contemporary measures as they reflect the realities of a city traversing from a socialist to a capitalist model while more or less successfully retaining the ideals of a just city via investments into the walkable public spaces. This focus brings some lessons learnt for other similar contexts around the globe where the welfare state is decreasing and the accumulation of the capital is becoming the paramount ideology.

The research aims to point out the power and responsibility of urban planning as a discipline in providing the urban walkability conditions within the just city agendas. It points out the need for the planners in the transitional socio-economic contexts to develop new skills and competences to assure social and spatial cohesion as a precondition for the truly livable places.

Research(Paper((

RESEARCH ON THE BUILD OF A HEALTHY WALKING SYSTEM FOR URBAN CBD

A Case Study of Jiangbeizui CBD in Chongqing, China

Cheng!PENG,!Shanghai!Tongji!Urban!Planning!&!Design!Institute!Co.,!Ltd.;!China!
Jingsheng!LI,!Tongji!University;!China!
!

Abstract&

Jiangbeizui(CBD(in(Chongqing,(the(second(generation(of(urban(CBD(in(China,(where(construction(and(regeneration(run(in(parallel,(is(facing(sub=healthy(problems,!which(according(to(the(WHO(principle,(displaying(unsatisfying(perspectives:(people(lack(of(ways(to(promote(physical(and(mental(health,(and(it(leads(to(low(social(well=being.(Basing(on(the(urban(regeneration(project(entrusted(by(the(CBD(Management(Committee(of(Jiangbeizui,(the(research(has(been(done(to(help(propose(strategies.((

(

Trough(field(research,(interviews(and(meetings(with(different(groups(of(people,(together(with(comparison(case(study,(this(paper(reveals(problems(of(the(unhealthy(condition(in(Jiangbeizui(CBD:(the(urban(space(is(fragmented(in(mobility(system,(service(system(and(landscape(due(to(complex(topography,(which(leads(to(the(low(vitality(and(inconvenience(in(daily(work(and(life,(showing(low(equality(of(space(use(and(amenity.(So(initiatives(have(to(be(taken(to(help(Jiangbeizui(CBD(improve(the(living(quality.(The(point(is(Jiangbeizui(CBD(lacks(of(a(continuous(walking(system(to(form(efficient(circulation(of(people.(

(

Taking(healthy(city(development(and(design(theory(as(references,(this(article(proposed(three(hierarchies(of(healthy(demands(in(walking(system(design,(following(three(strategies(to(help(fulfil(these(demands,(going(through(the(basic(walkable(one,(to(physical(benefit(one(and(then(reach(the(goal(of(stimulating(communication.(In(Jiangbeizui(CBD's(case,(pedestrian(dedicated(walking(routes(are(designed:(shield(area(on(the(ground(to(link(transportation(stations(with(building(lobby(to(prevent(people(from(extreme(weather.(Underground(space(exploitation(to(provide(continuous(walking(space(with(commercial(services(and(amenities,(together(with(connected(sharing(parking(space(of(buildings.(And(overhead(corridors(are(aimed(at(creating(connection(between(the(inner(green(space(to(the(riverfront,(to(solve(altitude(problems(and(make(it(accessible(for(the(CBD(green(domain.((Besides,(attraction(nodes(and(equally(distributed(movable(facilities(are(equipped(along(the(walking(system.(

(

The(benign(development(of(the(CBD(environment(depends(on(the(healthy(circulation(of(its(internal(elements,(including(economic(flows,(material(flows(and(people(flows,(which(is(ensured(by(a(continuous(walking(system(to(open(the(access(of(CBD(areas(for(all.(And(in(urban(design(process,(public(participation(shall(be(adopted(by(different(means(to(obtain(specific(demands(for(urban(quality(improvement.(

Keywords&

Central(Business(District((CBD),(Healthy(city,(Regeneration,(Walking(system,(Planning(and(design(

!

1. Background&&

1.1. CBD&of&China&in&the&regeneration&period&

The!development!period!of!CBD!can!be!described!from!the!industrial!scope,!showing!the!upgrade!of!CBD!from!traditional!commercial!to!headquarters!economy!(Wu!&!Shan,2018),!which!also!displays!different!demand!for!urban!space,!gradually!enriching!its!functions.!In!China,!the!construction!of!urban!CBD!in!metropolitans!began!in!1990s,!starting!from!the!big!cities!along!the!coast,!under!the!background!of!the!reform!and!openingTup!policy.!As!for!the!large!volume!and!numerous!clients,!the!construction!of!the!CBD!is!not!a!oneTstep!process,!which!brings!pros!and!cons!to!the!city.!It!takes!10T15!years!for!a!CBD!to!preliminarily!form!the! spatial! structure,! and! then! goes! into! the! special! period,! showing! the! distinguishing! feature!that!the!construction!and!regeneration!run!in!parallel,!together!with!urban!vitality!problems!exposed.!!

Several! CBDs! in! China! have! taken! measures! to! promote! development! and! avoid! urban! problems.! For! the! first! generation! CBDs! in! the! firstTtier! megacities,! supporting! by! demographic! and! economic! forces,! they! are! relatively! mature! and! start! to! have! trials! in! regeneration,! being! committed! to! optimizing! the! functional! composite.! Taking! Lujiazui! in! Shanghai!for!example,!it!is!the!earliest!CBD!in!China,!introducing!the!international!design!concept.!In!2010,!the!CBD!construction!has!entered!the!stage!of!innovation!(Wu,!2018),!gradually! adopting! ideas! in! underground! space! utilization! (for! vehicle! mobility),! walking! environment!improvement!(the!construction!of!overpass!system!named”!Mingzhu!Circle”),!bringing! cultural! activities! (concerts/community! activities)! and! commercial! services! (breakfast!cart),!together!with!landmark!buildings!completing,!Lujiazui!now!presents!the!image!of!a!modern!central!business!district!with!high!vitality.!!

(Source: Drawing by the author.)

!

Figure&&The&CBD&unction&hanging&rend&

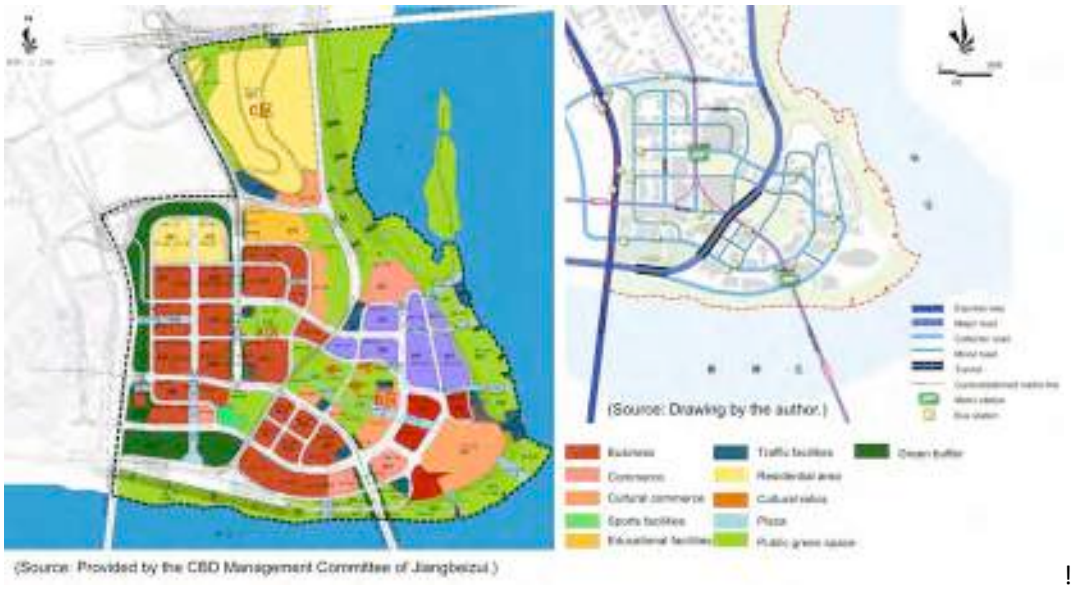
Zhang!et!al.!(2017)!conclude!that!today’s!CBD!in!China!has!the!development!trend!that,!following!the!international!references,!shows!features!of!cityTindustry!integration,!including!mixed!spatial!functions,!space!quality!improvement!and!diversity!of!activities.!The!CBD!is!no!longer!just!a!collection!of!business!activities!but!somewhere!for!all!of!the!citizens,!its!spatial!patterns! change! from! the! government! preinstalling! perspective! to! daily! life! perspective! (Figure!1).!Although!the!CBD!area!has!begun!to!upgrade!its!humanization,!due!to!its!large!construction!volume!and!complexity,!there!is,!in!China!for!now,!no!overall!and!systematic!attempt!to!analyze!problems!in!CBDs!and!propose!strategies.!

The!research!content!of!this!paper!is!originated!from!the!urban!quality!improvement!urban!design! project! of! Jiangbeizui! CBD.! The! CBD! Management! Committee! (the! government's! specialized! agency)! as! the! entrusting! party! invited! the! professional! team! to! conduct! systematic!research!on!the!urban!problems.!

!

1.2. Jiangbeizui&CBD:&facing&opportunities&and&challenges&

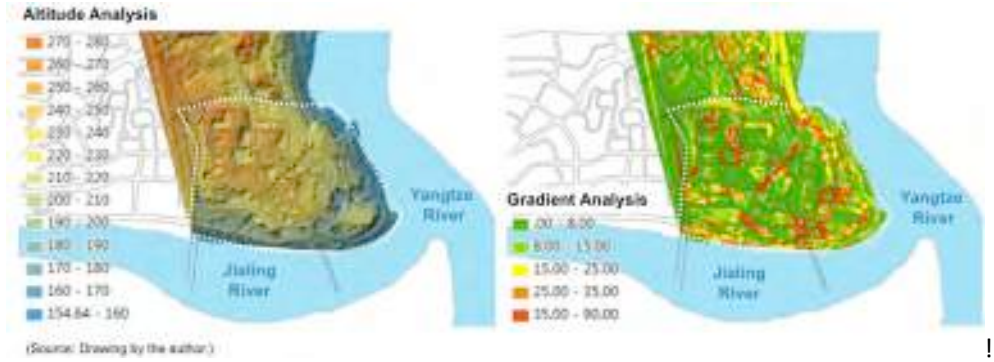
Jiangbeizui!CBD!is!located!in!the!core!of!Chongqing,!the!municipality!in!southwest!China.!As!the!upper!reaches!of!the!Yangtze!River,!for!hundreds!of!year,!it!bears!the!strategic!significant!duty!for!domestic!and!international!economic!communication!in!inland!of!China!on!the!strength!of!river!transportation.!In!history!Jiangbeizui!together!with!Jiefangbei!was!the!most!important!downtown!area!of!Chongqing,!which!once!had!been!the!capital!of!a!tiny!kingdom.!Jiangbeizui!CBD!is!the!second!generation!CBD!in!China.!As!a!brand!new!one,!we!can!see!from!its!regulatory!plan!in!2008(Figure!2),!it!is!designed!and!built!on!the!experience!of!previous!ones,!in!other!words,!many!advanced!design!concepts!have!been!adopted!in!the!first!version!urban!design!of!Jiangbeizui,!which!contributes!to!high!public!green!space!rate!(39%,!compared!with!18%!of!Lujiazui,!Shanghai),!high!density!of!road!network,!pedestrianTfriendly!block!scale,!and!the!idea!of!public!transit!oriented!system!support!by!two!metro!lines.!In!the!consideration!of!the!spatial!axis,!it!is!a!continuation!of!the!context!showing!the!historical!and!cultural!memories.!



!

Figure&2&The&land&use&map&of&Jiangbeizui&CBD&regulatory&planning&(2008)&&&oad&system&

Meanwhile,!Chongqing!is!also!a!city!that!hides!all!kinds!of!challenges.!The!first!and!foremost!is!the!advantages!and!disadvantages!of!complex!topography,!and!as!Jiangbeizui!CBD!is!at!the!intersection!of!two!rivers!(Yangtze!River!&!Jialing!River),!the!fluctuating!terrain!is!not!only!the!charm,!but!also!brings!challenges!to!urban!life.!!



!

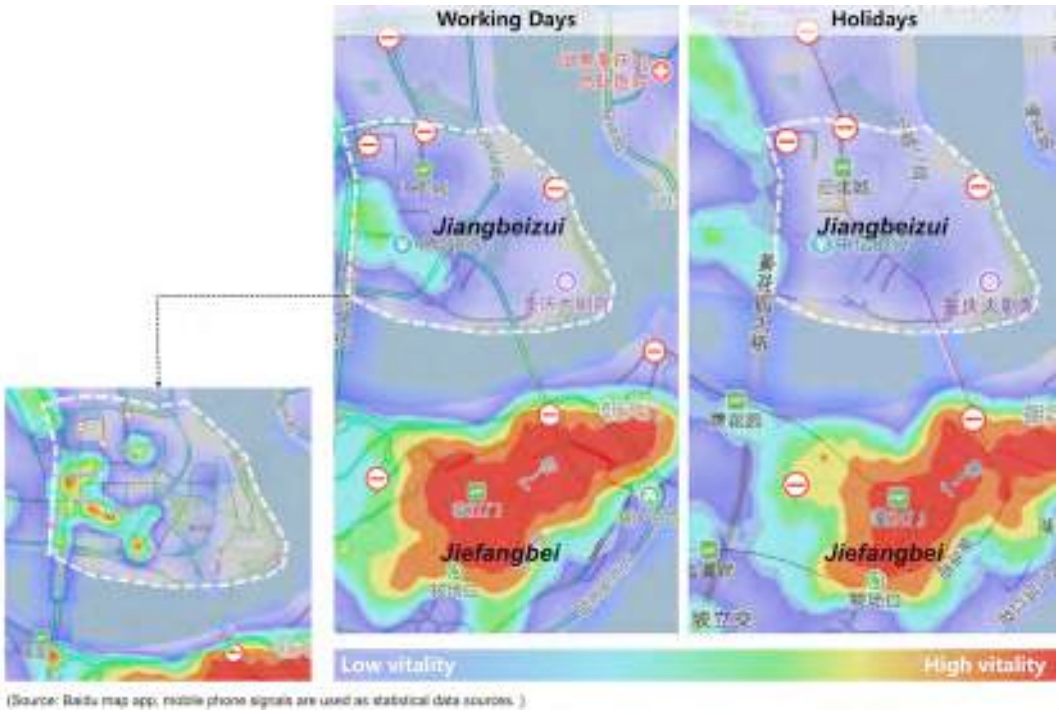
Figure&3&The&topography&of&Jiangbeizui&CBD&

!

The!normal!water!level!of!Jiangbeizui!area!is!175m,!the!onceTinT100Tyear!flood!level!is!191m,!and!the!highest!elevation!of!Jiangbeizui!area!is!about!260m,!so!its!main!construction!space!is!between!altitude!200m!to!260m.Terrain!changes!bring!advantages!to!the!development!and!utilization! of! underground! space,! but! also! leads! to! the! problem! of! low! connectivity! of! pedestrian!space!in!areas!with!different!altitudes,!and!low!efficiency!in!the!utilization!of!hydroTfluctuation!zone.!

1.3. Negative&situation&in&Jiangbeizui&CBD&

Jiangbeizui!now!is!facing!problem!of!low!vitality.!Although!it!has!been!the!central!area!of!Chongqing,!together!with!Jiefangbei!since!long!time!ago,!but!from!the!heat!map!of!urban!activities!(Figure!4),!as!the!city!centre!which!could!provide!140,000!employment!posts!and!have!50,000!inhabitants!(the!population!now!has!reached!about!40%!of!planning),!the!vigour!of!Jiangbeizui!is!much!lower!than!Jiefangbei!district,!while!suffering!from!severe!traffic!jam!and!other!urban!problems.!!



!

Figure&4&The&heat&map&or&urban&activities&of&Jiangbeizui&CBD&&&Jiefangbei&

The!activity!heat!map!reflects!that!Jiangbeizui!is!still!a!specialized!office!area,!and!has!not!become!a!comprehensive!service!centre!of!the!city!like!Jiefangbei:!there!are!more!obvious!activities!on!the!working!day!while!the!green!spaces!and!plaza!are!inefficiently!used.!

2. Working&frame&and&&esearch&&ethod&

2.1. Theory&study:&&ealthy&ity&&deas&n&&rban&&evelopment&n&China&

Jiangbeizui!CBD!is!faced!with!such!a!problem:!people!and!environment!are!out!of!touch,!which!can!be!described!as!a!state!of!sub!health!according!to!the!WHO!principle,!in!which!stressing!that!people!is!the!essential!factor!need!to!be!appreciated,!ensuring!access!for!all!in!common!goods!and!services.!!

!

In!recent!years,!with!the!rapid!development!of!China's!urbanization,!the!pursuit!of!urban!development!has!changed!from!quantity!to!quality,!and!the!concern!on!urban!issues!has!gradually!changed!from!the!perspective!of!space!to!the!perspective!of!human!beings,!caring!more! about! the! demands! of! citizens! to! help! form! urban! policies! and! strategies,! which! promote!many!cities!to!gradually!combine!the!concept!of!a!healthy!city!with!urban!planning,!and!start!to!propose!healthTOriented!strategy!at!specific!issues!such!as!urban!transportation,!slow!traffic!systems!and!residential!planning.!As!the!healthy!city!idea!has!been!put!forward!for!nearly!40!years,!the!main!research!area!is!public!health!policy.!With!the!deepening!of!international!exploration!of!healthy!cities,!China's!urban!planning!and!design!specialist!and!scholars!have!gradually!explored!the!application!of!the!concept!of!healthy!cities!in!space!and!urban!policies.!Its!development!can!be!divided!into!3!stages:!!

(1)! Urban! management! (1990T2006):! In! 1994,! China! participated! in! the! healthy! urban! planning!movement!carried!out!by!the!WHO!and!had!practises!in!cities!such!as!Beijing!and!Shanghai.!The!initiation!mainly!focused!on!the!strategic!considerations!at!the!macro!level,!dealing!with!aspects!of!environmental!quality,!food!supply,!and!health!concept!education.!After!2005,!the!concern!expanded!from!the!public!health!field!to!areas!related!to!urban!life,!such! as! housing,! education,! transportation,! environment,! etc.,! and! systematic! and! comprehensive! approaches! and! public! policies! to! ensure! health! of! urban! residents! have! formed!(Zhou!&!Zhu,!2006).!!

(2)!Healthy!urban!design!(2006T2014):!In!order!to!meet!the!needs!of!health,!scholars!began!to!have!study!on!special!strategies!of!urban!landscape!design!and!citizen!activity!guidance!(Jin!&!Zhang,!2008),!focusing!on!the!impact!which!the!open!space!environment!design!has!on! healthy! living.! Li! and! Zhu! (2013)! analysed! the! New! York! City! Public! Space! Design! Guidelines!and!proposed!that!its!main!value!of!reference!includes:!discovering!and!coping!with! the! chronic! diseases! that! are! highly! correlated! with! the! built! environment! through! spatial!design!strategies.!The!built!environment!has!been!improved,!and!at!the!same!time,!in!the!process!of!public!policy!formation,!a!multiTsectoral!and!multiTdisciplinary!mechanism!has!been!formed.!!

(3)!Connotation!expansion:!After!APA!(American!Planning!Association)!meeting!in!2014,!the!concern! of! healthy! city! has! been! extended! to! equality! and! help! resolve! the! nonT communicative!diseases!which!caused!by!unhealthy!lifestyle!that!may!have!reasons!of!urban!design!(Wang!&!Ross,!2016).!

To!sum!up,!in!the!process!of!interaction!between!the!needs!of!the!people!and!the!urban!space,!the!concept!of!a!healthy!city!is!gradually!enriched,!providing!more!clear!guidance!for!urban!space!design,!focusing!on!equality!and!vitality.!

2.2. Research&method&&problems&analysis&

The! study! of! healthy! city! has! two! important! perspectives,! which! should! be! considered! together!while!using!different!study!method.!One!of!the!perspective!is!the!function!of!urban!space,! the! other! is! human! beings.! As! an! objective! research! target,! urban! space! can! be! measured!by!certain!indicator,!so!case!comparison!is!adopted!for!the!initial!urban!space!study.! Meanwhile,! human! beings! take! the! satisfaction! of! their! subjective! needs! as! the! condition! for! choosing! activity! space,! which! is! another! important! factor! to! assess! urban! space,! so! we! have! conducted! social! investigation! on! various! groups! in! CBD! to! obtain! information! to! help! define! the! problem! in! Jiangbeizui.! Considering! the! scale! and! development!stage!of!CBD!which!could!be!used!as!reference!for!Jiangbeizui!CBD,!this!paper!

!

chooses! Shanghai! Lujiazui! CBD! and! Shinjuku! SubTCBD! as! comparison! objects.! The! index! analysis!includes!four!aspects:!traffic!condition,!land!use!function,!commercial!composition! and!pedestrian!system!(Table!1).!

(Source: Drawing by the author, statistic resource refers to the research of Li & Hou (2011) and official statistics launched by the government.)

!

Figure&&The&and&use&composition&of&CBDs&in&comparison&

Table&.&comparison&study&of&CBD&

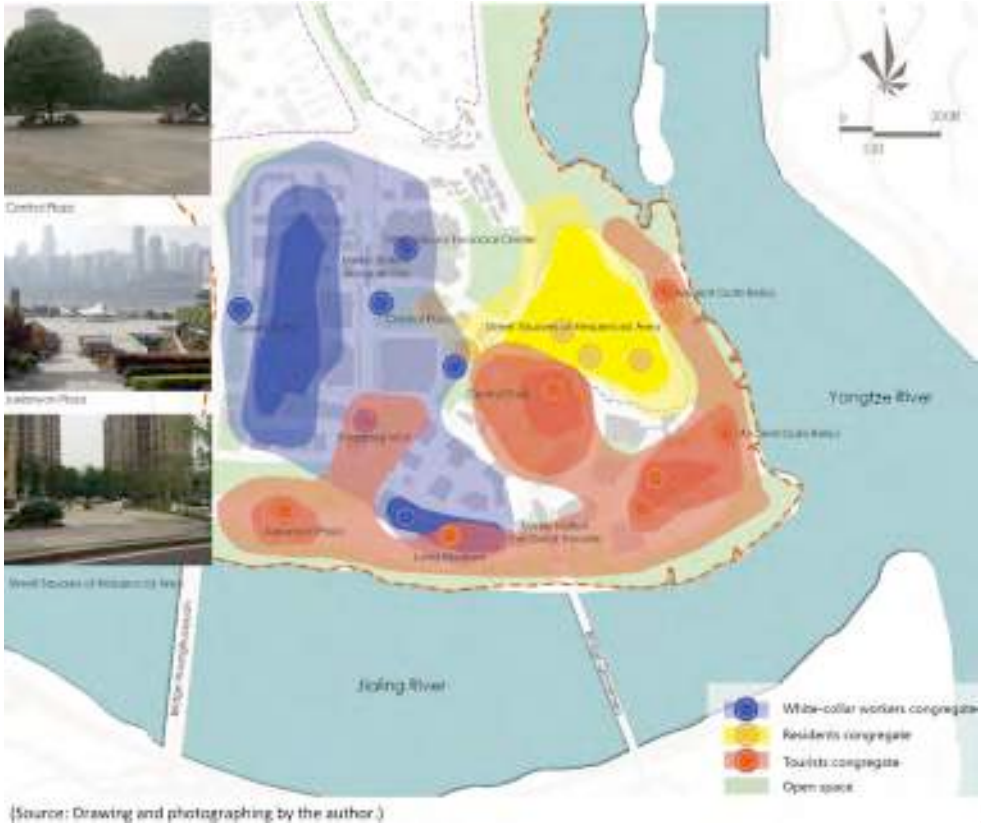
General!situation!			Public!transportation!		Commercial!composition!			pedestrian! system!!
CBD!	Size/! km^2!	Population!	Metro! line!	Public! transportation! sharing!rate!	HighT end! (m^2)!	Middling! (m^2)!	Community! (m^2)!	
Jiangbeizui!	2.2!	Employee:! 140,000!! Residents:! 50,000! !	2! (one!is!under! construction)!	30%!	110,000!	90,000!	2,000!	None!! Dedicated! pedestrian! system! !
Lujiazui!	1.7!	Employee:! 140,000!! Residents:! 50,000! !	2!	50%!	10,000!	280,000!	20,000!	Dedicated! pedestrian! system! !
Shinjuku!	2.7!	Employee:! 330,000!! Residents:! 320,000!	11!	> 60%!	100,000!	450,000!	50,000!	Dedicated! pedestrian! system!

!

The!comparative!study!(Figure!5)!shows!that!Jiangbeizui!has!significant!superiority!in!public! green!space,!which!reflects!the!characteristics!of!the!second!generation!of!CBD!in!China,!but! also! reveals! problems! (Table! 1)! in! the! other! three! aspects:! (1)! The! public! transportation! system!is!inadequate!and!its!sharing!rate!is!low,!relying!on!two!metro!lines!(currently!only! one!is!open)!as!the!main!support,!and!only!10!bus!routes!cooperate!with!the!service.!As!the! congenital!terrain!height!differences!make!it!difficult!to!cross!the!river,!excessive!car!traffic! caused!by!poor!bus!service!capacity!exacerbates!regional!congestion.!(2)!Compared!with!the! two!mature!CBDs,!Jiangbeizui's!overall!situation!in!commerce!composition!is!out!of!balance.! The!highTend!commerce!accounts!for!more!than!half!of!the!proportion,!while!the!middling! and!community!commercial!service!are!relatively!low.!In!the!commercial!business!of!Lujiazui! and!Shinjuku!CBD!(Li!&!Hou,!2011),!which!have!formed!after!decades!of!development!to! reach! today's! scale,! the! middling! commerce! is! the! core! component! together! with! a! considerable! amount! of! community! commerce,! which! explains! that! the! essential! daily! leisure! consumption! is! the! main! type! in! the! CBD.! The! proportion! of! Lujiazui's! early!

!

commercial!composition!is!similar!to!that!of!Jiangbeizui!today,!but!in!2010,!a!new!20,000!m^2!community! commerce! was! added! in! conjunction! with! the! construction! of! the! bridge! pedestrian!system.!(3)!Jiangbeizui!currently!has!no!dedicated!walking!passages,!except!for! pedestrian!roads!inside!the!Central!Park!and!the!hydroTfluctuation!zone!with!low!quality,! while!Lujiazui!and!Shinjuku!CBDs!have!separate!walking!spaces!overhead!and!underground,! and!are!equipped!with!commercial!and!public!service!facilities.!



(Source: Drawing and photographing by the author.)

Figure&&Gathering&area&of&people's&activity&&

The! evaluation! of! indicators! is! only! one! aspect,! in! fact,! whether! there! is! a! sureTenough! problem! or! not! needs! to! be! judged! by! users'! perception.! Through! the! investigation! and! interview,! we! analyse! the! daily! activity! patterns,! requirements! and! problems! of! different! groups:!The!functions!formed!by!the!layout!of!land!use!in!Jiangbeizui!are!connected!by!open! space,!but!due!to!the!lack!of!connection!and!walking!system!between!different!topographic! heights,! people's! activities! distributes! into! several! groups! separately! in! space! (Figure! 6),! which! is! hard! to! active! communication.! WhiteTcollar! workers! are! gathering! at! the! office! building!area!on!the!west!side!of!the!CBD,!with!the!main!activities!in!the!building,!including! working,! dining! and! leisure,! and! during! the! lunch! break,! some! of! them! have! postTmeal! activities!in!the!green!belt!on!the!west!side!of!office!building!area.!Residents!usually!stay!in! the!residential!area!on!the!east!side!of!the!CBD!and!the!central!park!area.!Tourists!generally! take!activities!along!the!riverside!to!have!a!visit!at!the!Grand!Theatre,!the!bridge!and!enjoy! the!riverside!scenery.!

In! the! interviews! for! the! specific! needs! of! various! groups! of! people,! we! summarized! the! feedbacks! collected! and! found! that! people! have! suggestions! and! opinions! on! traffic! commuting,! walking! environment,! daily! service,! urban! landscape! and! cultural! activities! (Table!2).!

!

Table&2.&Collation&of&Interview&Information&

Category!	Problems!!		
	Mobility!	Functions!&!Services!	Landscape!
WhiteEcollar& workers&	✧! Bus!lines!are!absent!so! commuters!rely!on!metros! ✧! Hard!to!find!parking!space! ✧! Lack!of!shuttle!bus!	✧! Lack!of! CVS/restaurants/gym/da ily!service! ✧! Current!restaurants!and! stores!are!expensive!to! afford!	✧! Pedestrian! environment!is!poor! ✧! Lack!of!dedicated! walking!path! ✧! Low!efficiency!in!open! space!use!
Residents&	✧! Pedestrian!environment!is! poor! ✧! Few!options!for!public! transportation!! ✧! Lack!of!shuttle!bus!	✧! Business!type!is! monotonous! ✧! Lack!of!urban!cultural! service!and!events!	✧! Low!quality!of!open! space!especially!the! riverfront!
Tourists&	✧! Pedestrian!environment!is! poor!	✧! Lack!of!tourism!business! ✧! the!riverside!lacks! walking!paths!	✧! Hard!to!reach!scenic! spots! ✧! Lack!of!instruction! system!
Property&company& administrators&	✧! Parking!space!vacant!in! some!office!buildings! while!they!are!not!shared!	✧! Shops!struggle!to!attract! investment! ✧! High!operating!costs! result!in!high!rents!	✧! Not!concerned!
Government& administrators&	✧! Lack!of!parking!space!	✧! Lacking!of!space!for! cultural!event!	✧! Low!quality! ✧! Lack!of!feature!
Commercial& tenants&	✧! Lack!of!parking!space! Consumers!cannot!conveniently! reach!at!stores!through!the! metro!station!	✧! Hard!to!sustain!due!to! the!high!rent!and!low! consumption!	✧! Lack!of!attractions!for! consumers!
Itinerant&traders&	Not!concerned!	✧! Good!earnings!in!the! open!space!while!not! much!people!come!here!	Not!concerned!

!

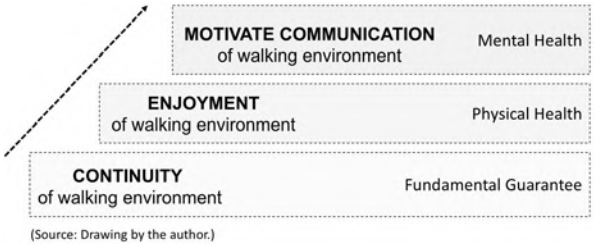
Combining!comparative!research!and!social!interviews,!it!is!found!that!the!urban!vitality! problem! of! Jiangbeizui! is! mainly! due! to! the! fragmentation! of! space! formed! by! poor! connectivity!in!walking!system.!On!one!hand!there!are!breaking!points!on!the!main!public! axis,! and! on! the! other! hand,! the! walking! system! has! no! connection! with! public! transportation!system.!As!a!result,!it!is!unenjoyable!to!walk!inside!Jiangbeizui!CBD,!which! leads!to!segregation!in!social!communication,!urban!management!and!also!causes!troubles! for!stores!to!attract!consumers.!That!forms!a!vicious!circle,!and!the!urban!vitality!is!difficult! to!form!due!to!the!inconvenience!in!daily!work!and!life,!showing!low!equality!of!space!use! and!amenity.!

2.3. Design&Principles:&to&provide&access&for&all&

Jiangbeizui!CBD,!a!place!intend!for!high!publicity!of!work,!service!and!tourism,!displays!the! unsatisfying!occasion:!people!lack!of!access!to!promote!physical!and!mental!health,!and!this! cause!low!social!wellTbeing!and!there's!few!chance!for!different!group!of!people!to!have! intercourse.!!

For!CBD!areas!in!a!city!with!highTintensity!built!space!and!high!population!density,!the!public! transportation!support!system!is!the!best!choice!for!its!development,!which!can!guarantee! the!external!accessibility.!And!inside!the!CBD,!it!is!necessary!to!form!a!pedestrian!system! connected! with! public! transportation! to! promote! the! effective! circulation! of! different! activities.!Our!working!frame!is!aimed!at!providing!a!healthy!walking!system!to!help!reduce! potential!physical!and!psychological!problems!in!a!positive!way!according!to!demands.!

!

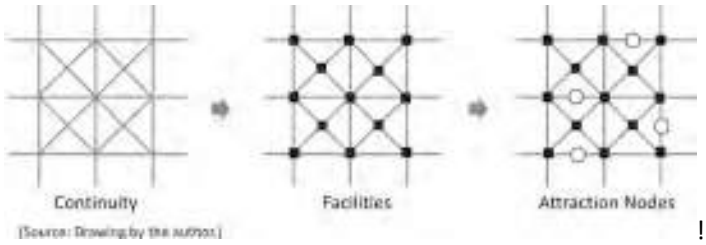


Figure&2&The&demand&healthy&hierarchies&of&daily&life&in&CBD&&

The!ideal!model!of!hierarchy!in!healthy!needs!at!CBD!area!composed!of!levels!going!through! the! basic! need! of! commute! to! the! physical! and! mental! health! promotion! (Figure! 7),! to! improve! the! accessibility! for! all! in! this! area.! The! target! of! the! first! level! is! to! have! a! continuous! walking! system.! And! the! second! level! is! to! ensure! people! have! enjoyable! experience!to!generate!urge!for!outdoor!activities!for!physical!health.!The!third!one!is!to! maintain!some!places!for!communication,!to!provide!space!with!facilities!to!rest!or!have! activities.!!

3. Planning&trategies&&

The! book! "Healthy! Cities:! Public! Health! through! Urban! Planning"! (Sarkar! et! al.,! 2014)! proposed!that!the!mediumTlevel!individual!healthy!niche!concerns!habits!and!lifestyles,!and! the!macroTlevel!concerns!the!householdTneighbourhoodTcity!system.!Basically,!there!are!two! aspects!to!promote!health!in!urban!planning:!one!is!to!keep!the!bottom!line!of!reducing! pollution! to! help! decrease! human! exposure! risk,! the! other! way! is! to! promote! exercise,! providing! a! relatively! separate! space! (reduce! the! risk! of! exposure)! for! human! activities,! encouraging!individuals!to!form!a!better!lifestyle.!



Figure&3&Strategy&pattern&diagram&&

A!healthy!walking!system!was!proposed!based!on!the!daily!life!route!of!different!group!of! people,!considering!the!space!quality!with!the!human!beings,!to!link!public!transportation! system,!service!nodes!and!landscape!nodes,!which!creating!intersection!to!inspire!vitality.! Corresponding! to! the! hierarchy! of! healthy! demand,! the! strategy! includes! three! aspects! (Figure!8),!basing!on!wellTestablished!continuity!of!walking!space,!equipping!relatively!equal! and!targeted!service!facilities,!while!at!the!same!time!implanting!new!functional!nodes!at! potential!space!to!enrich!the!urban!life.!

3.1. Strategy&:&Rebuild&connectivity&to&ensure&healthy&circulation&of&people&

The!connectivity!concerns!systems!on!the!ground,!underground!and!overhead,!reacting!at! the!complicated!topography!to!solve!the!accessibility!problem!of!blocks!in!different!height! (Figure!9).!The!ground!walk!system!design!is!to!make!alteration!and!addition,!constructing!a! shading!facility!on!one!side!of!the!sidewalk!to!cover!the!routes!that!link!metro!station,!bus!

stop,!and!the!building!lobby,!which!can!improve!the!walking!comfort!in!hot!climates!(the!maximum!highest!summer!temperature!in!Chongqing!is!more!than!40C^{o}).!This!is!an!urgent!recommendation!of!whiteTcollar!workers.!

(Source: The plan is drawing by the author, the sections and images are outcomes of the project " Quality Improvement Urban Design of Jiangbeizui CBD".)

Figure&8&Walking&system&design&plan&and&example&section&of&underground&space&design&

Underground! passages! and! overhead! pedestrian! corridors! are! necessary! measures! to! achieve! the! overall! connectivity! of! the! area.! The! topography! of! Jiangbeizui! CBD! is! characterized!by!high!altitude!in!the!centre!while!low!in!surroundings,!so!the!underground! space!of!the!buildings!can!be!5T6!floors.!In!this!project,!the!internal!space!within!the!red!line! of!the!urban!road!is!used!for!creating!underground!communication,!taking!the!basement! layer!to!connect!commercial!space!inside!the!buildings,!and!the!underground!2T4!layers!to! connect!parking!space,!which!makes!it!possible!to!share!the!parking!of!each!plot!(sections!in! Figure! 9).! The! design! of! overhead! walking! corridor! intends! to! solve! the! problem! of! connection!between!open!spaces.!It!connects!the!riverfront!(altitude!under!191m),!metro! stations!(altitude!218m!&!253m),!the!inner!green!space!of!the!CBD!(altitude!240m)!and!the! protective! green! belts! with! a! path! of! about! 6km.! The! route! selection! of! the! overhead! corridors!is!relatively!flexible!which!makes!it!possible!to!link!with!buildings!(at!the!second!or! third!floor)!if!necessary,!and!it!is!easy!to!form!an!attractive!landscape.!

3.2. Strategy&2&Facilities&supplement&to&improve&services&&

For! urban! activities,! accessibility! is! the! most! basic! guarantee,! and! along! the! pedestrian! mobility!system,!equipping!with!facilities!is!another!important!factor!to!stimulate!people's! desire!for!outdoor!activity.!As!the!basic!research!information!mentioned!above,!people!in! Jiangbeizui! CBD! demand! facilities! of! affordable! daily! commerce,! community! services,! tourism!and!culture!related!services.!In!consideration!of!daily!living!needs,!the!facilities!are! supplemented!in!a!more!homogeneous!layout.!Combined!with!the!new!underground!space! in!the!connectivity!design!(sections!in!Figure!9),!it!provides!about!10,000!m^{2}!of!commercial! space.! This! type! of! space! is! public! property! managed! by! government! departments.! Therefore,!it!can!cooperate!with!policy!conditions!to!introduce!communityTbased!businesses! with! lower! rents,! providing! a! more! affordable! consumption! environment! for! whiteTcollar! workers!and!residents.!Besides,!movable!smart!boxes!(approximately!20T50m^{2})!(Figure!10)!

are!placed!in!the!open!space!to!provide!WIFI,!reading,!business,!first!aid,!small!meeting!space!and!bathroom!services.!

(Source: The plan is drawing by the author, the images are outcomes of the project " Quality Improvement Urban Design of Jiangbeizui CBD").!

Figure&10&acilities&and&attractions&nodes&plan&

3.3. Strategy&3&Attraction&nodes&for&public&interco&rse

The!attraction!nodes!plan!directs!at!the!third!hierarchy!in!healthy!life!requirements,!taking!use!of!current!green!space.!The!space!between!the!hydroTfluctuation!zone!and!the!green!space!inside!CBD!is!the!intersection!of!different!groups.!These!nodes!not!only!have!good!sightseeing! conditions,! but! also! wider! green! space,! which! is! suitable! for! new! service! additions.!The!attraction!nodes!of!Jiangbeizui!CBD!are!tailored!to!local!conditions,!supplying!cultural,!commercial!and!sports!facilities!in!the!green!space!by!landscape!buildings!(images!in!Figure!10).!

4. Conclusion&&

4.1. Healthy&irculation&fo&uban&CBD&

The!benign!development!of!the!CBD!environment!depends!on!the!healthy!circulation!of!its!internal! elements,! including! economic! flows,! material! flows! and! people! flows.! A! healthy! walking!system!is!the!key!to!open!the!access!of!CBD!areas!for!all,!helping!bringing!diverse!groups!of!people!into!CBD!area!to!avoid!gentrification!and!simplification,!and!to!build!equal!and!convenient!mobility!system,!especially!the!internal!walking!system!which!will!ensure!the!healthy!circulation!of!people!and!activities!to!form!vitality.!The!walking!system!itself!can!also!be!a!potential!attraction!for!both!citizens!and!tourists.!!!

4.2. Healthy&Mechanism&in&urban&planning&

Public! participation! in! different! stage! of! urban! construction! especially! in! regeneration! is! essential!for!a!city!to!develop!healthily.!The!planning!process!from!design!to!implement!and!management! calls! for! participation! of! users! and! administrators.! In! this! process! urban! planners!and!designers!need!to!follow!up!the!whole!process!and!get!feedback,!playing!the!role!of!coordinator!and!professional!advisor,!to!give!policy!advises!and!propose!engineering!proposal,!solving!spatial!problems!while!promoting!social!development.!

!

5. References&

de!Leeuw,!Evelyne!(2013).!"Evaluating!WHO!Healthy!Cities!in!Europe:!issues!and!perspectives."!Journal!of!urban!health:!bulletin!of!the!New!York!Academy!of!Medicine,!Vol.!90!Suppl!1,!Suppl!1:!14T22.!Doi:!10.1007/s11524T012T9767T6.!

"HealthyTCitiesTpromotingThealthTandTequity."!http://www.euro.who.int/__data/assets/pdf_file/0007/262492/HealthyTCitiesTpromotingThealthTandTequity.pdf!

Jin,!Guangjun;!Zhang,!Changjuan!(2008)!"Urban!Design:!From!Design!Landscape!to!Design!Health",!City!Planning!Review,!Vol.!32!No.7!(July).!!

Liu,!Xiaoxing;!Chen,!Yi!(2012)!"From!State!Perspective!to!Everyday!Life——A!Research!on!Urban!Spatial!Transformation!of!Lujiazui!Central!Area!",!Urban!Planning!Forum,!Vol.201!No.3.!

Li,!Xiande;!Hou,!Jianna!(2011)!"Spatial!Organization!of!Industry!in!SubTCBD:!A!Case!Study!on!Shinjuku!District!in!Tokyo!Metropolitan",Modern!Urban!research,No.2.!

Li,!Yu;!Zhu,!Wenyi!(2013)!"An!Introduction!of!Active!Design!Guidelines:!Promoting!Physical!Activity!and!Health!in!Design!of!New!York!City!and!Thinking!of!Urban!Sapce!in!Beijing!City",!World!Architecture,!No.9.!

Sarkar,!Chinmoy;!Webster,!Chris;!Gallacher,!John!(2014).!"Healthy!cities:!Public!health!through!urban!planning".!10.4337/9781781955727.!

Sun,!Shiwen!(2006)!"City!Center!and!City!Public!Space:!A!Planning!Review!on!the!construction!of!Lujiazui!Area!of!Pudong!District,!Shangshai",!City!Planning!Review,!Vol.30!No.8!(August).!!

"The!regulatory!plan!of!Jiangbeizui,!Chongqing!(2008)",!provided!by!the!planning!bureau!of!Liangjiang!New!District,!Chongqing.!

Wang,!Lan;!Ross,!Catherine!(2016)!"Healthy!City!Planning!and!Assessment:!Initiation!and!Trend",!Urban!Planning!International,!Vol.!31!No.4.Wu,!Zhanyun!(2018)!"Development!Practice!and!Enlightenment!of!Shanghai!CBD",!Urban!Insight,!No.!3.!

Wu,!Zhanyun;!Shan,!Jingjing!(2018)!"Functional!Evolution!and!China's!Development!Practice!of!Central!Business!District",!Academic!Journal!of!Zhongzhou,!Vol.!2018!No.!8(August).!

Xia,!Zhenxiang!(2014)!"Research!on!Traffic!Organization!Optimization!of!CBD!Area!in!Shanghai!Lujiazui",!Traffic!&!Transportation,!No.2.!

Zhang,!XiaoTtong;!Xu,!Hao;!Huang,!Yun;!Zhang,!Gaochao!(2017),!"Characters!of!CityTIndustry!Integration!Development!in!CBD",!Journal!of!Shanghai!Jiaotong!University!(Agricultural!Science),!Vol.35!No.2!(April).!

Zhou,!Xianghong;!Zhu,!Dajian!(2006)!"The!Research!on!the!Method!and!Strategy!to!Healthy!City!in!China",!Shanghai!Urban!Planning!Review,!Vol.71!No.6.!

!

Case Study / Project

IAP's Indonesia Most Livable City Index (MLCI):

A Perception-Based Survey to Measure City Livability Index

Dayinta PINASTHIKA, Puteri Rizqi AMELIA, Elkana Catur HARDIANSAH

Abstract

In today's urbanizing world, where almost half of the world's population lives in cities, livable city is a necessity. City livability depends on how cities can provide safety and security for the peoples, fulfill their basic needs, provide easy access to public services and infrastructure, have a good quality of the environment, better economic, social and cultural conditions, assure citizen's participation, and others. Some parties measured city livability quantitatively using various criteria, such as OECD Better Life Index, Mercer Quality of Living Survey, Monocle Magazine's Most Livable City Index, The EIU Global Livability Survey, and Forbes Livable City Index, which then resulted in the list of most and worst livable cities in the world. These surveys have been globally trusted as a reliable, valid, and recognized index and have become global references. However, none of those surveys put citizen perception as the basis of measurement. They were based on secondary data, statistics, and were reviewed from the perspective of the researcher. None of the surveys had measured city livability based on citizen's perceptions. While perceptions are quite significant since it describes the real conditions perceived by the peoples.

The "Indonesia Most Livable City Index (MLCI)" developed by the Indonesian Association of Planners (IAP) surveys city livability based on citizen's perceptions. This survey had been carried out since 2009 and was last held in early 2017. The indexing measurement was carried out based on 28 assessment criteria developed by the research team. MLCI 2017 surveys 26 cities throughout Indonesia by involving the IAP Regional Office voluntarily as surveyors. The survey resulted that the average livability index of Indonesian Cities was 62 of 100, which indicates that there were still many citizens who feel uncomfortable living in their cities. The survey had also resulted in groups of cities including the top tier cities, average tier cities, and bottom tier cities. Surveys that are held regularly have also been able to show an increase and decrease in the livability index of the city from period to period. In addition, from the survey results, it was found that what aspects were satisfying and unsatisfying according to citizens in each city surveyed. It can be learned that perception can be used to measure the city livability index and is worth considering as one of the legitimate methods of measuring the livability of a city. It can then be used as inputs for government and other stakeholders in terms of providing the citizen's needs.

Research Paper

Analysing the perceptions of the elderly on space vitality and related environmental factors based on residential community

Hang SUI, Dalian University of Technology; China
Dongfeng YANG, Dalian University of Technology; China

Abstract

Environmental perception of the residential community has a non-negligible impact on a healthy lifestyle for the elderly. The perceived level- and actual satisfaction- of the elderly offered by the "space vitality" of the residential community is closely related to the physical and mental health for the elderly which also largely determines their quality of life. From the perspective of urban planning, it is a crucial measure to identify and effectively regulate the critical environmental impact factors of the residential community that affect the perception and experience of the elderly, to promote the construction of the age-friendly community. This paper took Dalian, China as the research range, and took the elderly as the object of research in relation to the perception of space vitality within the residential community and its associated environment-related factors. Correlation analysis was used to identify the potential environmental factors related to the perception of space vitality by the elderly. It found that the general level of the elderly's perception of space vitality has a positive correlation with many elements of the built environment e.g., the perception of the diversity, or the landscape of leisure places, which are both related to overall spatial quality. However, it does not show a significant correlation with the social environment. Therefore, useful suggestions are made on how to improve the elderly's perception of space vitality within the residential community, particularly in prior planning and design practice. The optimization of the spatial quality of the built environment should be the core point of concern. By optimizing the arrangement of the relevant elements of the site, the elderly's level of perception and satisfaction with the space vitality of the residential community should improve; furthermore, the physical and mental health of the elderly will be promoted in line with their quality of life.

Keywords

Healthy aging, Residential environment, Space vitality, Age-friendly community

1. Introduction

For the elderly, the perceived level- and actual satisfaction- offered by the "space vitality" of the residential environment has a non-negligible impact on subjective well-being and a

healthy lifestyle. In psychology, the concept of well-being is based on a combination of factors to do with personal quality of life and mental health (Wang et al., 2013). Subjective well-being often stems from an individual's subjective feelings about their daily life and their physical surroundings (Zhang, 2014). Research has shown that cultivating positive environmental perceptions is crucial for the promotion of healthy aging among the elderly. The person who actively participates in physical activities could be more likely to experience the well-being from the feelings of physical and psychological than those who access medical services passively (WHO, 2012). Moreover, a positive environmental perception not only contributes to mobilizing active participation in physical activities but also improving levels of physical health. It could offer significant mental health benefits generally, thus creating an interplay between participants and the environment. (Smith et al., 2002). Therefore, special attention on public spaces of residential community is necessary. It serves as the leading site for the daily activities of the elderly, and as a facilitator of social activities for communication and exchange among neighbours. The space vitality from the residential community often reflects the material and spiritual needs of the elderly.

Research by Chinese scholars on space vitality and its related factors mainly focuses on two aspects – the characteristics of urban space morphology and intensity of use for certain activities. Jiang developed a quantitative system for evaluating street vitality based on the vitality composition index including things like functional diversity and traffic accessibility. This system integrated the vitality characteristic factors such as the number of activists and their stopping time for the space area. (Jiang, 2013). Additionally, Long and Zhou discussed the impact of the population density on street vitality. Through a quantitative analysis of six indexes, including location, transportation accessibility, and mixed functions, Long and Zhou proposed the vitality factors from the different street types have the differentiated features. Its content has deepened the quantitative exploration of street vitality (Long et al., 2016). With increasing insights into urban space vitality in a cognitive context in recent years, attention has shifted to individual perception. Based on reviewing relevant international research, Ye highlighted the influence of street accessibility and the fitting degree of morphological elements on the role of urban vitality (Ye et al., 2017). He also conducted an empirical test of residents' activities, drawing connections between the strength of selected events and levels of space vitality (Ye et al., 2016). Similarly, Huang and Xu measured space vitality by looking at the intensity of quality street activities (Huang et al., 2017). In summary, the focus of existing research on urban space vitality has gradually shifted from focusing on the functional and social dimensions to the cognitive — the relevant research with individual behaviour and perception, attracting increased attention.

While the existing research has achieved fruitful results, deficiencies exist in the following aspects: The first is related to sample limitations. Previous research mainly aimed at ordinary urban residents, and despite the serious implications of an aging population, there has been a lack of discussion of the elderly as a specific research subject. The second deficiency is the fact that the definition of “space vitality” has failed to accurately interpret the essential characteristics of the concept of “vitality.” Can indicators such as the number of people, their stopping time, and population density adequately reflect space activity? Can “functional diversity” effectively express space vitality? The answer is no. Thirdly, although existing research has dealt with the idea of “perception,” it has not regarded individual behaviour as an area for focus. The essence of the current study still lies in measuring the

relevant elements of the built environment from the perspective of objective observation, making it impossible to examine the subjective experiences of individuals intuitively.

This paper takes the city of Dalian as its research range. Setting the individual perception, perceptions of space vitality for the elderly residents in their respective residential community was measured through the use of questionnaires. Utilizing methods of statistical analysis and considering the relevant elements of the built and social environment, this paper aimed to explore the complicated relationship between environmental factors and space vitality. The primary finding has been that the perceptions of space vitality among the elderly have a positive correlation with many elements of the built environment. However, a significant association with the social environment has not been shown to exist.

2. Concepts, Methods and Data

2.1. Concepts

The space vitality of the residential community is essentially the embodiment of the diversity of daily activity opportunities in the public space within and outside these communities. To a certain extent, space vitality depends on the environmental quality of the residential community and its surrounding area. Jane Jacobs brilliantly pointed out that the interweaving process between human activities and living places has created the concept of space vitality (Jacobs, 1961). Kevin Lynch further proposed that vitality, as an essential indicator of urban morphology, can provide a pleasant living environment for the continuation of living organisms. Therefore, "space vitality" is generally recognized as a measure of the quality of a space related to daily activities, and as the primary criterion for measuring the quality of urban morphology. Its external representation is closely related to the daily activities that people can pursue in a specific space (Tong, 2014), and its intrinsic motivation mainly stems from the combined effects of built environment characteristics and the underlying social environment factors (Ye et al., 2016). In existing studies of street vitality, the diversity of functions or activities inside and outside of the street interface often regarded as the main source of street vitality (Jacobs, 1961). Similarly, the diversity of functions and activities inside and outside of the residential community can be considered to be a representation of its space vitality. Diversity, as a concept closely related to space vitality, can be regarded as the scope of activity opportunities in a specific space. It reflected in people's daily lives, specifically in whether public spaces inside and outside of the residential community can provide residents with sufficient enriching activities.

The approach to developing residential community should consider both the built and social environment. When talking about the environment of the residential community, it is traditionally understood that we are referring to the “built environment.” Space vitality has not been regarded as “an isomorphism by spatial characteristics and social activities behind it.” (Ye, 2014) until the concept “duality” of urban space vitality has been put forward in recent years (Lees, 2010; Marcus, 2010). It is believed that the generation of urban space vitality originates from the joint action of the relevant factors of the residential environment, namely, the built and social environments. In this sense, the two factors above should be considered comprehensively in the analysis of the relationship between the residential community and space vitality.

2.2. Methods

➢ ***Data measurement***

Subjective evaluation methods are used to obtain the variables for space vitality and environmental factors. Firstly, the elderly's perception of space vitality divided into three categories: physical-training activity, leisure activity, and shopping activity. Combined with relevant literature and field investigation, it determined that 18 physical activity indicators are selected for measurement and become into the overall indicators and classification indicators on elderly perception for the activity opportunities (Figure 1). Among, the household activity excluded because it almost unconstrained by the objective condition. Secondly, this research the perception of environmental factors divided into two levels as the built environment and social environment, in order to identify the relationship between space vitality perception and residential environmental factors further. Thereinto, the built environmental perception includes places diversity, places accessibility, pedestrian facilities, and landscape environment, and the social environment perception include neighborhood livability, neighborhood security, and neighborhood-trip safety.

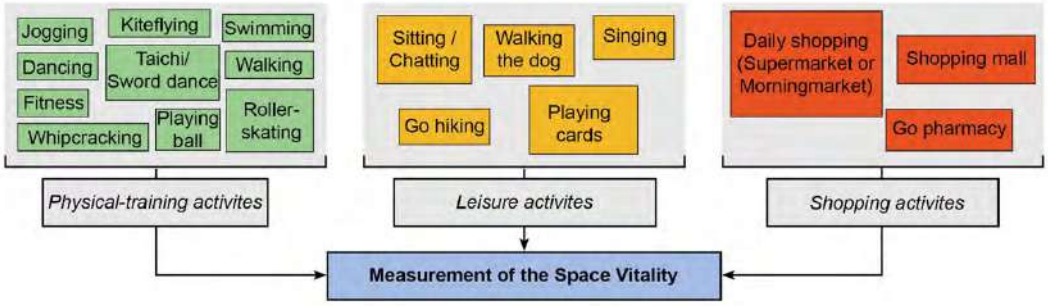


Figure 1 Physical Activities Classification (Source: drawn by the author, 2019)

➢ ***Data analysis***

This paper used the SPSS software is used to analyse the correlation between the environmental factors and activity opportunities by aggregated indicators and classification indicators, for exploring the relationship between various related factors and space vitality of the environment. Combining the value of Sig and the correlation coefficient of Kendall, the results of correlation analysis divided into four levels (strongest significant and high correlated, stronger significant and high correlated, strongest significant and medium correlated (no present in the result), stronger significant and medium correlated) with statistical significance. At the same time, through the on-site observation, big data, Google Earth, GIS, and other tools, the distribution characteristics of the variables mentioned above are visualized at the spatial level.

2.3. Data base

This paper took the main urban area of Dalian as the research range, the questionnaire interview conducted among the elderly residents. A total of 365 interview questionnaires were taken, and one invalid survey (exceeding the scope of the study) was excluded. Finally, the questionnaire information of 364 respondents was constructed to become the primary sample database of the study. The sample extraction during the interview comprehensively considered the equilibrium distribution of the proportions of the number of people, age, gender (Figure 2) and other factors in the spatial range, and is quite representative. The

results (Figure 3) show that the perceived level of activity opportunities of the elderly at the intermediate level (70%) in general. At the same time, the number of people at low level accounts for a certain proportion (26%) of the total sample size, while the ratio of high level is relatively very few (4%). Therefore, for identified effectively for the environmental impact factors of the spatial vitality, this paper divided the perception of environmental factors by the elderly into two parts: built environment perception and social environment perception (Figure 4).

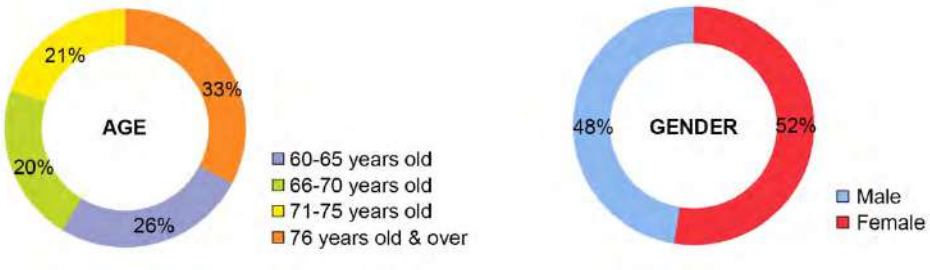


Figure 2 Age and Gender Proportion of Respondents (Source: drawn by the author, 2019)

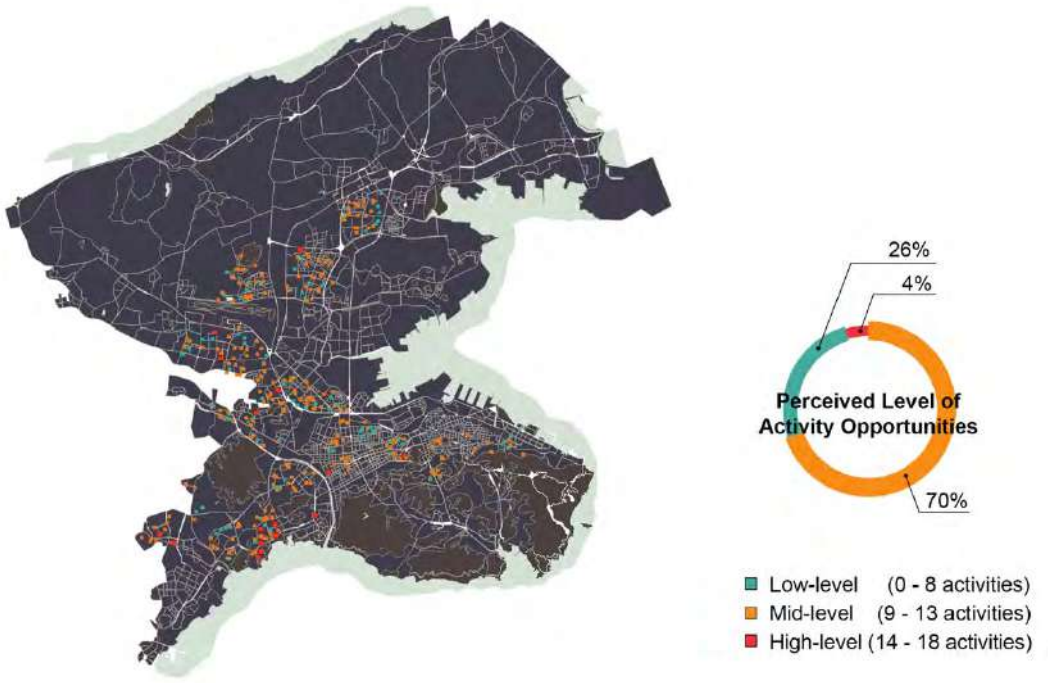


Figure 3 Distribution and Proportion of Activity Opportunity Perceived Level (Source: drawn by the author, 2019)

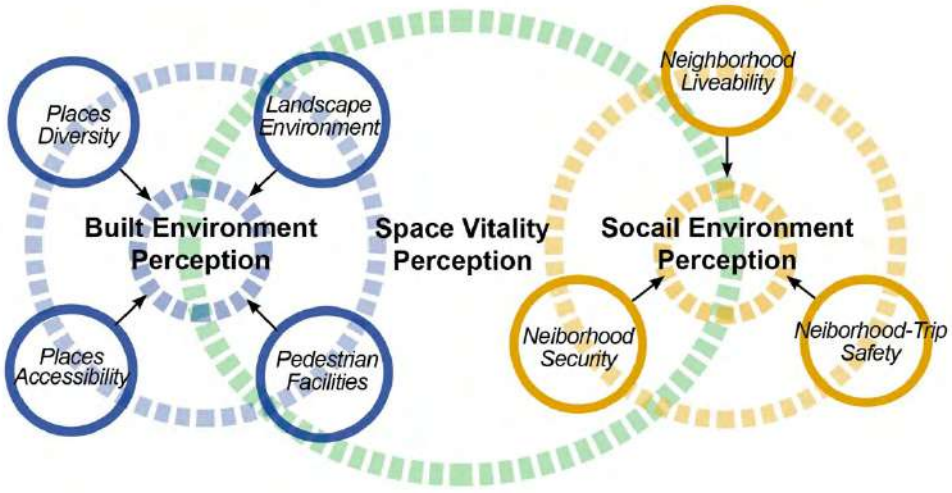


Figure 4 Classification of the Relevant Environment Factors (Source: drawn by the author, 2019)

3. Results

Given the complicated relationship between spatial vitality perception and related environmental factors, it divided the research process into two stages: firstly, the paper explored the statistical correlation between the space vitality perception on the overall level and environmental factors. Secondly, it separately observed the statistical correlation between activity opportunities on three dimensions of space vitality (physical-training activities, leisure activities, and shopping activities) and environmental factors (built environment and social environment). Among them, the places diversity, places accessibility, pedestrian facilities and landscape environment in related environmental factors regarded as the essential elements of built environment perception. The liveability, security and trip-safety of neighbourhoods are considered to be the essential elements of social environment perception. Through correlation analysis, it obtained the following main findings.

3.1. Space vitality and related environmental factors

There is a certain degree of the positive correlation between the built environment perception and overall-level of space vitality perception. Specifically, the Diversity of leisure places, landscape situation of leisure places, the landscape satisfaction of leisure places shown strongest significant and high correlated with the overall-level indicators of activity opportunities. There is a stronger significant and medium correlation between the accessibility of leisure places and the overall-level indicators of activity opportunities. However, there is no significant correlation between the perception elements of the social environment and space vitality.

From the results of correlation analysis (Table 1), three of the ten indicators for built environmental perception passed the double-tailed test with confidence of 0.01, and one passed the double-tailed test with confidence of 0.05. Combined with Kendall correlation coefficient R, according to its correlation significance and correlation degree, the order is diversity of leisure places (p=0.000, r=0.160), landscape situation of leisure places (p=0.003, r=0.126), landscape satisfaction of leisure places (p=0.004, r=0.120), and accessibility of leisure places (p=0.019, r=0.099). The above show that there is a relatively strong correlation

between the perception of the built environment and space vitality. The higher the satisfaction of the elderly to the built environment, the more activity opportunities they perceive, and the stronger the space vitality of the residential areas. The correlation analysis results mean that although there is an association among the indicators between the factors of social environment perception and space vitality, it is not statistically significant.

Table 1 Correlation Analysis between the Space Vitality Perception and Related Environment Factors (Source: drawn by the author, 2019)

			SPACE VITALITY PERCEPTION *Overall Level*	
			A.S.	S.S.
Built Environment	*Places Diversity*	*Leisure Places Diversity*	●	●
		Shopping Places Diversity	–	–
	Places Accessibility	*Leisure Places Accessibility*	○	○
		Shopping Places Accessibility	○	–
	Pedestrian Facilities	*Pedestrian Facilities Perception*	–	–
		Pedestrian Facilities Satisfaction	–	–
	Landscape Environment	*Communities Landscape Situation*	–	–
		Communities Landscape Satisfaction	–	–
		Leisure Places Landscape Situation	●	●
		Leisure Places Landscape Satisfaction	●	●
Social Environment	*Neighbourhood Liveability*	*Neighbourhood liveability satisfaction*	–	–
	Neibourhood Security	*Neighbourhood Security Situation*	–	–
		Neighbourhood Security Satisfaction	–	–
	Neibourhood-Trip Safety	*Neighbourhood-Trip Situation*	–	–
		Neighbourhood-Trip Satisfaction	○	–

Actual Significance (A.S.): ● : High (R≥0.15) ; ○ : Medium (0.05≤R<0.15); – : Low (R<0.05)

Statistical Significance (S.S.): ● : Stongest (p<0.01); ○ : Stronger (0.01≤p<0.05); – : General (p≥0.05)

** In this study, the range of R determined according to the actual sample size and statistical analysis results.*

This result shows the built environment factors are essential to the space vitality. High-level space vitality perception often with the high-intensity built environment perception. It also shows that although social environment perception can promote the perceived level of space vitality, it is not the leading factor. The phenomena may be due to the improvement of life quality, which changes the activity needs of the elderly. The requirements of individuals are gradually evolving from distance-oriented to function-oriented and quality-oriented. Therefore, in a certain of the range (depending on the health status of the elderly), the diversity of the choice of place functions and the superiority of landscape quality have a strong attraction to elderly, so that they break through the “proximity principle” shackles.

Another phenomenon that the correlation between the diversity of leisure places and the activity opportunities is higher compared with other indicators, which coincides with the view of Jane Jacobs. She said that the diversity and identity of urban spaces could enhance the cohesion of communities and the attraction of individual behaviour activities, thus stimulating the vitality of the area.

Table 2 Correlation Analysis between the Activity Opportunities Perception and Related Environment Factors (Source: drawn by the author)

			Activity Opportunities Perception (Classification Level)					
			Physical-training Activities		Leisure Activities		Shopping Activities	
			A.S.	S.S.	A.S.	S.S.	A.S.	S.S.
Built Environment	Places Diversity	Leisure Places Diversity	●	●	○	○	●	○
		Shopping Places Diversity	–	–	–	–	–	–
	Places Accessibility	Leisure Places Accessibility	○	○	–	–	–	–
		Shopping Places Accessibility	○	–	–	–	○	–
	Pedestrian Facilities	Pedestrian Facilities Situation	–	–	○	–	–	–
		Pedestrian Facilities Satisfaction	–	–	–	–	●	●
	Landscape Environment	Communities Landscape Situation	–	–	–	–	–	–
		Communities Landscape Satisfaction	–	–	–	–	●	●
		Leisure Places Landscape Situation	○	○	○	–	●	●
		Leisure Places Landscape Satisfaction	○	○	○	–	●	●
Social Environment	Neighbourhood Liveability	Neighbourhood Liveability Satisfaction	○	–	–	–	○	–
	Neibourhood Security	Neighbourhood Security Situation	–	–	–	–	–	–
		Neighbourhood Security Satisfaction	–	–	–	–	–	–
	Neibourhood-Trip Safety	Neighbourhood-Trip Situation	–	–	–	–	○	–
		Neighbourhood-Trip Satisfaction	○	○	–	–	–	–

Actual Significance (A.S.): ● : High (R≥0.15) ; ○ : Medium (0.05≤R<0.15); – : Low (R<0.05)

Statistical Significance (S.S.): ● : Stongest (p<0.01); ○ : Stronger (0.01≤p<0.05); – : General (p≥0.05)

** In this study, the range of R determined according to the actual sample size and statistical analysis results.*

3.2. Physical-training activity opportunities and related environmental factors

There is a positive correlation between the perception of built environment factors and the perception of the physical-training activity opportunities. Specifically, there is the strongest significant and high correlated relationship between the diversity of leisure places and physical-training activity opportunities. The accessibility of leisure places, landscape situation of leisure places, the landscape satisfaction of leisure places was stronger significant and medium correlated with the physical-training activity opportunities. The neighbourhood-trip satisfaction, as a factor of the social environment, also shows a stronger significant and medium correlation with this kind of activity opportunities.

From the results of correlation analysis (Table 2), one of the ten indicators for built environmental perception passed the double-tailed test with confidence of 0.01, and three passed the double-tailed test with confidence of 0.05. Combined with Kendall correlation coefficient R, according to its correlation significance and correlation degree, the order is diversity of leisure places (p=0.000, r=0.155), accessibility of leisure places (p=0.022, r=0.100), landscape situation of leisure places (p=0.024, r=0.097), and landscape satisfaction of leisure places (p=0.032, r=0. 920). Specifically, the positive correlation between the diversity of leisure places and physical-training activity opportunities shown that the variety of leisure places could provide participants with more choices for physical-training activities. The places diversity could improve the perceived level effectively of physical-training activity opportunities for the elderly. The correlation analysis results also show that the higher the landscape quality of leisure places and the stronger the satisfaction of the elderly on the inner needs provided, the more obvious the perception of the physical-training activity opportunities in the areas. In terms of the result, the neighbourhood-trip situation is the only social environment factor which passed the double-tail test with a confidence level of 0.05. It means that the built environment perception is more likely to have an impact on the perceived level of physical-training activity opportunities of the elderly than the social environment perception.

In conclusion, there is a positive correlation between the diversity of leisure places and the perception of physical-training activity opportunities. And then, the relationship between the accessibility of leisure places and the perception of physical-training of opportunities is slightly higher than the impact of landscape situation of leisure places and the landscape satisfaction of leisure places to the later. The reason could be that compared with other types of activities, the physical-training has more definite purpose and location. The elderly could a more easily perceive the area which has a higher degree of functional support and the more selectivity of the route. Furthermore, because walking, jogging, and other types of physical activities mostly occur in the residential area and the surrounding sidewalks, so the traffic conditions and parking of vehicles have an impact on them. It could explain why the satisfaction of neighbourhood-trip affects the perception of such opportunities.

3.3. Leisure activity opportunities and related environmental factors

There is almost no statistical correlation between the perception of leisure physical activity opportunities and the perception of the built environment and social environment. Only the diversity of leisure places shown stronger significant and medium correlated with the perception of leisure activity opportunities.

As shown in Table 2, only one index (p=0.022, r=0.102) of leisure place diversity in built environment related factors passed the confidence level test of 0.05, and the results of Kendall correlation coefficient R shown a low correlation between them. Besides, other related environmental factors did not pass the significance test of the correlation. The study finds that the association between the diversity of leisure places and perception of leisure activity opportunities is significantly lower than that between the diversity of leisure places and the opportunity perception of physical-training activities and shopping activities.

In summary, there is almost no statistical correlation between built environment perception, social environment perception, and leisure activity indicators. The reason is easy to explain that the most obvious difference among physical-training, shopping and leisure activities is that the occurrence of physical-training and shopping activities is more dependent on the

built environment, and many activities could be carried out without accompany. Compared with the first two items which care about the built environment, leisure activities pay more attention to the activity companion (e.g., family members, friends, pets).

3.4. Shopping activity opportunities and related environmental factors

There is a positive correlation between the perception of the built environmental factors and the perception of shopping activity opportunities. Among them, the landscape satisfaction of leisure places, landscape satisfaction of the communities, the pedestrian facilities satisfaction, the landscape situation of leisure places all shown the strongest significant and high correlated with the perception of shopping activity opportunities. And the diversity of leisure places and communities were the stronger significant and medium correlated with the perception of shopping activity opportunities. But with the analysis result, there is no statistically significant correlation on perception between social environment factors and the indicators of shopping activity opportunities of the elderly.

Table 2 shows that five of the ten indicators of the built environment have passed the significance test of the correlation, four of them passed the confidence level test of 0.01 and one passed the confidence level test of 0.05. Combined with Kendall correlation coefficient R, according to its correlation significance and correlation degree, the order is landscape satisfaction of leisure places (p=0.004, r=0.134), landscape satisfaction of communities (p=0.005, r=0.133), the satisfaction of pedestrian facilities (p=0.005, r=0.133), landscape situation of leisure places (p=0.008, r=0.126), and the diversity of leisure places (p=0.018, r=0.111). Among them, the correlation coefficient between landscape satisfaction of leisure places and the perception of shopping activity opportunities is the highest. The landscape satisfaction of leisure places is the most critical factor to the latter meant that the perception of shopping activity opportunities could be improved when the identity of the landscape quality strengthens.

In conclusion, the positive correlation between the landscape satisfaction of leisure environment and the perception of shopping opportunities is the most obvious, and other indicators followed by it. The above results could attribute to the fact that shopping activities of the elderly often accompanied by physical-training and leisure activities — most elderly accustomed to daily-shopping as a way of physical exercise. On the way back to home from shopping places, they commonly used to have a rest at the roadside, the square around the residential area, and the courtyard and achieves the purpose of participating in more than one activity at the same time. The landscape satisfaction of leisure places and the satisfaction of pedestrian facilities on the way also have a major impact on the perception of such activity opportunities. It should be the reason for the spatial quality indicators (landscape environment, pedestrian facilities, etc.) are positively correlated with the perception of shopping activity opportunities.

4. Conclusion and Revelation

Nowadays, awareness of healthy aging is the deepening of people. The importance of spatial vitality perception at the community level in the process of improving the quality of life and health level of elderly residents has gradually become prominent. Based on the analysis of the complicated relationship between environmental factors and spatial vitality perception, this paper draws the following three conclusions. Firstly, the overall level of elderly space

vitality perception positively correlated with many factors of the built environment (such as diversity of leisure places, landscape situation of leisure places, and landscape satisfaction of leisure places). But the correlation between the former and social environment was not significant. Secondly, the perception of the elderly on physical-training activity opportunities is closely related to the diversity of leisure places. The perception of the senior citizens on shopping activity opportunities is highly correlated with landscape satisfaction of leisure places and the residential community, the satisfaction of pedestrian facilities and landscape situation of leisure places. Thirdly, there is no statistical correlation between the perception of leisure activities opportunities and the built environment and social environment. In brief, there is a close relationship between the quality-related factors of the built environment and the perceived level of space vitality.

In order to improve the perceived level of space vitality, this paper puts forward suggestions from the following two aspects. On the one hand, the key point is to optimize the spatial quality of the built environment on the community level. Ensure the richness of the space in residential areas for outside activities. So as to enhance the type selectivity for activities of the elderly. At the same time, taking the "people-oriented" concept of ecological liveability to organize and optimize the landscape facilities to enhance the sensory experience of the elderly on neighbourhood activities (especially for the physical activities, shopping activities). On the other hand, the timely repair and maintenance of pedestrian facilities should be ensured, and the roaming interest and suitability of road space need to enhance. For example, the planner can base on maintaining the integrity and tidiness of road pavement, the feasibility of walking in streets to improve by optimizing the green vision rate of streets and other ways to promote the interest of walking activities. With planning strategies, the willingness to participate in outdoor activities should be mobilized to meet the health needs of the elderly.

5. References

Huang, S.Q. and Xu, L.Q. (2017). “Influencing Factors of Community Street Vitality and Evaluation of Street Vitality: A Case Study of Anshan Community in Shanghai”, Urbanism and Architecture, Vol.11, pp. 31-34.

Jacobs, J. (1961). The Death and Life of American Great Cities, Random House LLC.

Jiang, L. (2013). Quantitative Assessment and Shaping Strategy of Vitality of Urban Streets, Dalian: The Dissertation for Master Degree of Dalian University of Technology.

Lees, L. (2010). “Planning Urbanity? ”. Environment and Planning A, Vol. 42 No. 10, pp. 2302-2308 .

Long, Y. and Zhou, Y. (2016). “Quantitative Evaluation on Street Vibrancy and Its Impact Factors: A Case Study of Chengdu”, New Architecture, No. 1, pp. 52-57.

Marcus, L. (2010). “Spatial Capital”, The Journal of Space Syntax, Vol. 1 No. 1, pp. 30-40.

Smith, J., Borchelt, M., Maier, H. and Jopp, D. (2002). “Health and Well-Being in the Young Old and Oldest Old”, Journal of Social Issues, Vol. 58 No. 4, pp. 715-732.

Tong, M. (2014). “How Urban Fabric Can Help Sustain the Vitality of Cities”, Urban Planning Forum, Vol. 216 No. 3, pp. 85-96.

Wang, Y.H., Feng, Y.N. and Hou, W.W. (2013). "Analysis of Social Support and Influencing Factors for the Elderly in Pension Institutions", Chinese Journal of Gerontology, Vol. 33 No. 3, pp. 631-634.

WHO. (2012). Global Perspective of World Health Day 2012. Geneva: WHO Press.

Ye, Y. and Zhuang, Y. (2017). "A Hypothesis of Urban Morphogenesis and Urban Vitality in Newly Built-up Areas: Analyses Based on Street Accessibility, Building Density and Functional Mixture", Urban Planning International, Vol. 32 No. 2, pp. 43-49.

Ye, Y., Zhuang, Y., Zhang, L.Z. and Van Nes, A. (2016). "Designing Urban Spatial Vitality from Morphological Perspective – A Study Based on Quantified Urban Morphology and Activities' Testing", Urban Planning International, Vol. 31 No. 1, pp. 26-33.

Ye, Y. and Van Nes, A. (2014). "Quantitative Tools in Urban Morphology: Combining Space Syntax, Spacematrix, and Mixed-use Index in a GIS Framework". Urban Morphology, Vol.18 No. 2, pp. 97-118.

Zhang, W. (2014). "The Affective Factors Analysis of the Subjective Well-being of the Chinese Elderly", Population and Development, Vol. 20 No. 6, pp. 71-75.

Research Paper

SECONDARY CITIES AND FORCED MIGRATION

Accommodating refugees and asylum seeker in Indonesia

Akino TAHIR, Resilience Development Initiative; Indonesia
Risye DWIYANI, Bandung Disaster Study Group; Indonesia
Saut SAGALA, Bandung Institute of Technology; Indonesia
Nino VIARTASIWI, Resilience Development Initiative; Indonesia

Abstract

Forced migration trend around the world is increasing. UNHCR estimated that more than 65 million people are forcibly displaced in 2015, representing about 26% of all international migrants. In relation to forced migration, secondary cities are also impacted, with many of such cities attract forcibly displaced migrants who view them as more accessible and 'friendly' compared to primary cities. Many secondary cities support the needs of migrants as a first point of entry, shelter, asylum and informal employment. In Indonesia, UNHCR recorded almost 14,000 person-of-concerns in 2015. They are present in about 13 cities, with at least four is considered secondary cities. Although small, the number of forced migrants in Indonesia is expected to increase slowly along with the increasing trend of forced migration around the world. The study explores the capacity of secondary cities in Indonesia in accommodating the influx of refugees and asylum seeker, with Makassar as a case study, using a simplified City Resilience Framework developed by Arup International Development (2015) as a framework. By understanding the system and how it affects displaced people, it is expected that the focus for future improvement that contributes to the city resilience can be identified.

Keywords

Urban refugees, secondary cities, city resilience, Indonesia

1. Global Forced Migration and the Role of Cities

The influx of refugees into countries and cities is an emerging global issue. Doubled over the past two decades. In 2018, there are more than 70.8 million of possibly displaced people worldwide[1], making 1 in every 108 people worldwide forcibly displaced (UNHCR, 2019). Asia and the Pacific alone hosts some 4.2 million refugees mostly from Afghanistan and Myanmar, 2.7 million IDPs and 1.6 million stateless persons. Of this number, two thirds live in urban and suburban areas.

Traditionally, humanitarian actors provide essential services directly to affected population. Working through direct engagement, humanitarian actors often establish parallel structures to deliver their services. However, there is a growing recognition that such approach is no longer appropriate as it can disrupt or undermine existing channels, affect the roles and

responsibilities of local actors, and create tensions with local host communities (IRC, 2017). This needs a change in paradigm, in how humanitarian and development actors work together to support cities to extend their services to the displaced communities.

In 2015 and 2016, countries adopted the 2030 Agenda for Sustainable Development (SDG) and the New Urban Agenda. More than 40 targets across 15 of the 17 SDGs, including SDG 11 on making cities inclusive, safe, resilient and sustainable, have direct implications to migration. The New Urban Agenda adopts an inclusive urbanization model that considers population movements and promotes and protects the rights of all people, while building on their capacity and responds to humanitarian and development concerns. Meanwhile, in the Global Compact for Migration (GCM) and the Global Compact for Refugees (GCR) adopted by countries in 2018, UN General Assembly acknowledges the role that cities play in migration and refugee management.[2] This includes, for example, a recognition to the need of supporting local authorities, finding new mechanism for local engagement, and identifying new ways of working between humanitarian and development actors.

Cities are responding to these global agreements. Mayors and leaders from around the world gathered at the the 5th Mayoral Forum on Human Mobility, Migration and Development in Marrakech in 2018 to endorse GCM and GCR. Included in the statement is a reaffirmation that "*while acknowledging that immigration is a state prerogative, cities are at the forefront of managing the impact of migration. As first responders, cities constantly innovate and develop pragmatic solutions that can have a positive impact at the national and international levels, and therefore, a structured dialogue with local governments on migration issues at national and international levels is fundamental"* (Marrakech Mayors Declaration, 2018). The endorsement put an emphasis on enabling the economic, social and cultural inclusion of refugees, as well as a non-discriminatory access to services and livelihoods. In many countries, this role is taken on by secondary cities (Cities Alliance, 2017).

Secondary cities will account for the largest share of urban growth in developing Asia in the future (Storey, 2014). Already now, these cities are where 20% of the world's population live (UCLG, 2016). The term is mostly used to describe the second tier in the hierarchy of cities.[3] Countries have different ways in approaching their development, but greater levels of decentralisation, devolution, and autonomy will drive a more competitive, dynamic, and self-sufficient growth (Roberts, 2014). While state policy is important as an enabler, facilitator and competitor, secondary cities are on the frontlines of new urban agendas that drive innovations and new policy initiatives, and this requires a reorientation of research and policy attention (Storey, 2014). However, most are not well-prepared with outdated infrastructure, limited financial capability and institutional capacity posing major challenges. In dealing with the impact of global forced migration, they require support to access technical and financial instruments/assistance from global partners (Cities Alliance, 2018).

With all the aforementioned background, this study intends to understand how cities are responding to the global trend of forced migration. The goal is to explore the capacity of secondary cities in accommodating the influx of refugees[4], with Makassar in Indonesia as a case study. By understanding the urban system and how it affects displaced people, the study is expected to identify the focus for future improvement that contributes to city resilience. This rest of this paper is followed up with the explanation of methodology used, the case of urban refugees in Makassar and how the city provides an example of accommodating urban refugees.

2. Methodology

This study relies on mix-method approaches. We adopted the city resilience framework developed by ARUP (2015) as it is one of the most comprehensive available frameworks. Makassar was selected because it is a typical secondary city that functions as a major economy and transportation hub in eastern part of Indonesia. The city hosts almost 10% of total refugee population in Indonesia, making it the third biggest refugee-hosting city in Indonesia after Jakarta and Medan.

2.1. City Resilience Framework

Resilience in this study is used as a concept to understand how different part of the urban systems responds to the impact of forced displacement. Here, resilience refers to "*the ability of the urban system to anticipate, absorb and adapt to shocks and stresses and to respond in ways that preserve, restore or improve its essential functions, structures and identity, while also maintaining the capacity for adaptation and transformation*" (Kirbyshire, et al., 2017)). Urban resilience is a system thinking approach where city is seen as a system or a collection of components that are connected to one another, which may include Built environment, Supply chain and logistics, Basic infrastructure, Mobility, Municipal public services, Social inclusion and protection, Economy, and Ecology (UN Habitat, n.d.).

While several resilience frameworks exist, none explicitly designed for mass displacement, except for a modification of a City Resilience Framework (CRF) originally developed by Arup International Development (2015). CRF outlines 52 indicators under four dimensions of urban resilience: leadership & strategy, health & well-being, infrastructure & ecosystems, and economy & society (*Table 1*). This study is following Kirbyshire, et al. (2017)'s modification of the CRF that clusters the urban system most affected by a rapid influx of displaced people into: Adequate shelter, health care and protection; Basic service provision; Economic development and employment; and Social and political inclusion and community cohesion. As CRF comes with a ready-to-use rapid assessment tool and guideline, we took this advantage by not developing a new assessment tool but instead, making several adjustments that suit and reflect mass displacement context. The final product was used to see how the city fares in each indicator, by giving scores ranging from 1 (very low) to 5 (very high) based on the available data. The result is used to identify the strengths that the city has from resilience point of view and to examine the gaps in welcoming refugees to the city.

2.2. Data Collection

The study relies largely on qualitative analyses based on desk review, targeted informant interviews and field observations. Desk review and interviews were conducted to understand the implementation of global and national refugee management framework and the role of cities in managing refugees, especially in Makassar. Interviews were conducted to the Mayor of Makassar, Politics and National Unity office (*Bakesbangpol*), Social Affairs Office (*Dinas Sosial/Dinsos*), Education Office (*Dinas Pendidikan/Disdik*), and Health Office (*Dinas Kesehatan/Dinkes*), Local Planning Office (*Bappeda*), Housing Affairs Office, Women and Child Protection Office (*DP3A*), Immigration's Detention House Office (*Rudenim*), IOM Makassar, UNHCR Makassar, Subdistrict Offices, and local NGOs. Observation was conducted at several refugee community houses. At the same time, interviews were conducted to several refugees with different gender, country of origin and duration of stay. The open-ended interviews explore their experience of migration, refugee management and

Health and Wellbeing	Economy and Society
Goal 1. Minimal human vulnerability 1.1 Safe and accessible housing 1.2 Adequate energy supply 1.3 Inclusive access to safe drinking water 1.4 Effective sanitation 1.5 Sufficient food supply	**Goal 7. Reduced exposure and fragility** 7.1 Comprehensive hazard and exposure mapping 7.2 Appropriate codes, standards and enforcement 7.3 Effectively managed protective ecosystems 7.4 Robust protective infrastructure
Goal 2. Diverse livelihood and employment 2.1 Inclusive labour policies 2.2 Relevant skills and training 2.3 Dynamic local business development and innovation 2.4 Supportive financing mechanisms 2.5 Diverse protection of livelihoods following a shock	**Goal 8. Effective provision of critical services** 8.1 Effective stewardship of ecosystems 8.2 Flexible infrastructure 8.3 Retained redundant capacity 8.4 Diligent maintenance and continuity 8.5 Adequate continuity for critical assets and services
Goal 3. Effective safeguards to human life and health 3.1 Robust public health systems 3.2 Adequate access to quality healthcare 3.3 Well-resourced emergency medical facilities 3.4 Effective emergency response services	**Goal 9. Reliable mobility and communications** 9.1 Diverse and affordable transport networks 9.2 Effective transport operation and maintenance 9.3 Reliable communication technology 9.4 Secure technology networks
Economy and Society	**Leadership and strategy**
Goal 4. Collective identity and community support 4.1 Local community support 4.2 Cohesive communities 4.3 Strong identity and culture 4.4 Actively engaged citizens	**Goal 10. Effective leadership and management** 10.1 Appropriate government decision-making 10.2 Effective coordination with other government bodies 10.3 Proactive multi-stakeholder collaboration 10.4 Comprehensive hazard monitoring and risk assessment 10.5 Comprehensive emergency management
Goal 5. Comprehensive security and rule of law 5.1 Effective systems to deter crime 5.2 Proactive corruption prevention 5.3 Competent policing 5.4 Accessible criminal and civil justice	**Goal 11. Empowered stakeholders** 11.1 Adequate education for all 11.2 Widespread community awareness and preparedness 11.3 Effective mechanisms for communities to engage with the city government
Goal 6. Sustainable economy 6.1 Well-managed public finances 6.2 Comprehensive business continuity planning 6.3 Diverse economic base 6.4 Attractive business environment 6.5 Strong integration with regional and global economies	**Goal 12. Integrated development planning** 12.1 Comprehensive city monitoring and data management 12.2 Consultative planning process 12.3 Appropriate land use and zoning 12.4 Robust planning approval process

Source: Arup International Development, 2015

Table 1. Dimension, Goals, and Indicators of City Resilience Framework

arrangement (e.g. protection, living arrangement, etc), access and use of public and social facilities, economic and social participation, and experience of spaces in Makassar. Special care was given to interviews with minors to ensure consent are given by guardians.

2.3. Limitation of Study

Several limitations were identified during the study. *First*, although the City Resilience Framework by ARUP has been used in many cities around the world as a practical tool to assess city resilience (see for example works by 100 Resilient Cities pioneered by the

Rockefeller Foundation), its use to assess resilience in the context of mass displacement is limited. Kirbyshire, et al. (2017)'s attempt to 'translate' the tool for mass displacement context is limited to conceptual modification and this research is perhaps one of the first attempts to use the modified tool in practice, especially in the Asia and the Pacific region. As such, we acknowledge that the process of experimenting with the tool is still ongoing and there will be more discussions necessary before it can be used more appropriately to assess how cities can be better prepared in the future to deal with mass displacement. Moreover, due to limitation in resources, the assessment in the research was done by researchers, not through collaborative effort of relevant stakeholders as the tool was intended to.

Second, while there has been several papers, reports, and discussions available on urban refugees internationally, such literatures on Indonesia, and Makassar in specific, is very limited. It resulted in heavy reliance to interviews and observation results, and thus, affecting the quality of data triangulation. We acknowledge researcher bias during the study design, data collection, analysis and report writing. Moreover, confirmation bias may happen as the researchers form a hypothesis or belief and uses respondents' information to confirm that belief. To reduce such bias, researchers went through an iterative process of discussion and reflection throughout the research process. *Third*, while the government, international organisations and other relevant stakeholders in Makassar are open to discussion, several key information was not accessible at the time of the research. This includes for example demographic profile of the refugees, guideline for selection of community house or other guidelines related to refugee management by international organisations in-charge. Such information was obtained through interviews and triangulated only by iteration of the same information by different stakeholders and/or local news records.

3. Refugees in Makassar

Indonesia has been hosting refugees from overseas since 1975 with the arrival of Vietnam and Cambodia refugees. While it is a non-signatory of the 1951 Refugee Convention or the 1967 Refugee Protocol, the Government of Indonesia (GOI) cooperates with United Nations High Commissioner for Refugees (UNHCR) and various organizations to serve and find solutions for international refugees transiting in Indonesia. In 2016, GOI set its first legal framework on refugee protection, a Presidential Decree on Handling of Refugees from Overseas (Perpres No.125/2016). The regulation acknowledges the "refugee" status and stipulates the protection of refugees while they temporarily stay in Indonesia. The policy to separate refugee cases with human trafficking cases and to honour the principle of non-refoulment is regarded as a good approach in refugee management (Ansori, et al., 2017). The regulation also sets that the budget for handling refugee issues is from state budget through relevant ministries and other unbinding sources. The following section describes the current situation of refugees in Makassar and how the city elements responded to the situation, based on field interviews in April and June 2019.

3.1. General overview

Makassar is the capital city of South Sulawesi province with a population of 1,653,386 in 2015 and annual growth rate of 4.11% (Makassar Local Planning Agency, 2015). The city has been a hub since Gowa Kingdom opened its ports for international traders back in the 16-17th century and the port developed to be the main trading gate to eastern part of the

country (Marihandono, 2008). According to the Spatial Plan 2015-2034, the city envisions to be “A liveable world city for all”. Makassar was awarded the second most innovative city in Indonesia in 2018 by the Ministry of Home Affairs. Meanwhile, the governor of South Sulawesi was received an award in 2016 from the Minister of Law and Human Rights for superior efforts of the Makassar immigration authorities in “supervising foreigners”.

Since 2015, the city government has an annual MOU with International Organisation for Migration (IOM); the first city in Indonesia to do so. The legal framework allows IOM to work with relevant city offices, such as *Bakesbangpol, Dinsos, Disdik,* and *Dinkes*, for provision of services and protection to refugees in the city. The government opens the access to existing services for refugees, especially education and health care. The government also allow linkage to existing system for other public services and infrastructure such as energy, clean water, wastewater and waste management, transportation, public spaces, and others. However, with the absence of the operational guidelines of the Perpres No.125/2016 at the local level, the city is unable to allocate special budget for refugee management, and as such limits the government ability to be more actively involve. Currently, the budget is not separated from budget for pro-poor policy and programs (*Bappeda* Interview, 18 June 2019).

As of June 2019, there are 1,813 refugees living in Makassar (IOM Interview, 21 June 2019). Majority received allowance and assistance from IOM, which include provision of community housing and facilities, support to access health services, basic education for children, and skills building programmes for youth and adults. A small number of refugees (37 people in June 2019) do not receive IOM assistance because they arrived in Makassar after 15 March 2018, which as per IOM internal policy, are not eligible for assistance. They are living independently, with limited support from local organisations or individuals. Meanwhile, UNHCR provides protection-related support while processing their refugee application.

3.2. Shelter and basic services

There are 26 community houses or shelters in Makassar where refugees live. They were formerly functioned as rented rooms for college students or workers, spreading in 8 out of 15 districts in Makassar. Buildings are mostly two storeys or higher, located within settlements of local communities or small-scale business areas. Each shelter houses refugees from different country of origins. Based on observation, there are two types of community house according to the demography of the building occupants, i.e. female-only and mixed family-and-single male. All shelters are equipped with electricity, water and sanitation systems. Occupants received limited quota for electricity and paid for their excess bill, while other utility fees are paid by IOM through shelter management. Quality of the shelters vary, but all are accessible to local market, health care facilities, schools and. Some shelters are shown decreasing standard of quality services, such as deteriorated water and sanitation quality, bad air circulation, lack of common spaces and open spaces.

The room is usually designed for two people (or more if children), with beds, AC, cupboard and a bathroom. Family with children can have more than one room depending on the number of the children. Some shelters also provide TV in common areas, although some own TV in their room. Most shelters have kitchen for communal use. In the shelter with no communal kitchen, families cook inside their rooms. Washing machine is available in the common area, but some occupants buy their own machine and do laundry inside their room. It is common for refugees to have smartphones to communicate with their families or friends. Some shelter provides internet connection for free, some refugees pool resources to

provide it on their own, while some others use mobile connection. Refugees are not allowed to have a driving license and affordable public transportation in Makassar is lacking. Bicycles and walking are the common mode of transportation, although some reported a sense of insecurity due to accident or crime. Only male refugees use bicycles, female refugees walk or take public transportation. Pedestrian ways are only available in the city centre, so those living in areas with high volume of traffic are prone to accidents.

3.3. Healthcare and Education

On healthcare service, refugees under IOM protection receive service at the same standard of healthcare service as majority Indonesian, delivered by local community health centre (Puskesmas). Puskesmas also provides vaccines, pregnancy check-up, and regular educational session on health-related topics. Puskesmas will refer refugees with serious medical cases to appointed hospitals depending on the type and complexity of the case after obtaining IOM approval. Healthcare for refugees has not yet linked with public healthcare system under JKN (National Health Insurance) program because it is unclear who will pay for the monthly membership fee and which insurance plan's category the refugees will fall into. However, IOM Makassar created a program parallel to JKN membership scheme, where refugees are provided with basic health services at the same rate as JKN rate with IOM covering the fee. Inpatient treatment is covered under the basic coverage but can be upgraded at the patient's request and own funding. A medical team in IOM is assigned to oversee the overall healthcare activities.

In education sector, Makassar government and IOM now agreed to provide early childhood education and basic education for refugee children, allowing them to go to public school for free subject to available slots in the schools. Several refugees attend private high school with scholarship from the school. Currently there are 17 primary and secondary schools accepting refugees, although there is no accessible data on the number of refugee children attending school. Some students reported dropping out due to bullying, language barrier, or high transportation cost. Responding to the situation, some refugees organized informal classes for children in shelters, including a non-formal school in one shelter. IOM also engage Indonesian volunteers to teach informal classes at some shelters, both for children and adults. Meanwhile, UNHCR accommodates refugees through *Kejar Paket*, an existing non-formal public education system that follows the national curriculum. There is still no solution to the challenge of providing higher education, except through informal vocational trainings provided by *Disdik* and local NGOs who collaborate with UNHCR and IOM. While organized quite regularly, refugees reported that it is not sufficient.

3.4. Economy and employment

Pertaining to Indonesian regulation, working is strictly forbidden for refugees. All refugees under IOM care received monthly allowance of around $100 USD per adult and $40 USD per child. They use it for daily basic needs, such as food, drinking water, personal hygiene, transportation and communication fees. Some received support from family members abroad, some engaged in informal economic activities, some others utilize technological advance to engage in e-commerce activities. Those not under IOM care are relying on their family members who are already under IOM care, individual donations, or support from local NGOs. Meanwhile, the city government acknowledge that the allowance is below the local salary standard (UMR) and deemed insufficient. In an interview with the Mayor, he stated that Indonesia needs to explore an innovative policy to allow refugees to work as working is

a form of self-actualization and can contribute local economy and social development. However, the Mayor limited the possibility to certain professions such as blue-collar jobs (Mayor Interview, 29 June 2019).

3.5. Leisure and social life

Based on observation, refugees spent majority of their time at shelters, in their rooms. This is especially true for the elderly, children who are not at school or any other educational activities, and women with family. Interactions among occupants vary depending on the shelter design and homogeneity of country of origin in the shelter. We observed more interaction among occupants in shelters with common spaces and kitchen.

Field observation showed that compared to those living in business or mixed-use area, refugees living in shelters located in residential areas have more chance to interact with locals and generally have better impression of the host communities. Women have more motivation to interact with local housewives or sellers in the market, while children who go to public school made friends with Indonesians. Young, male refugees venture outside of the shelters more often than female refugees, for example to play football with their local friends, go to gym or other sports facilities, parks, malls or local markets. Female refugees usually go out to the local markets or shopping malls, rarely beyond that. Going out for outing, even to nearby beaches, is very rare and some reported negative experience with crime or accident.

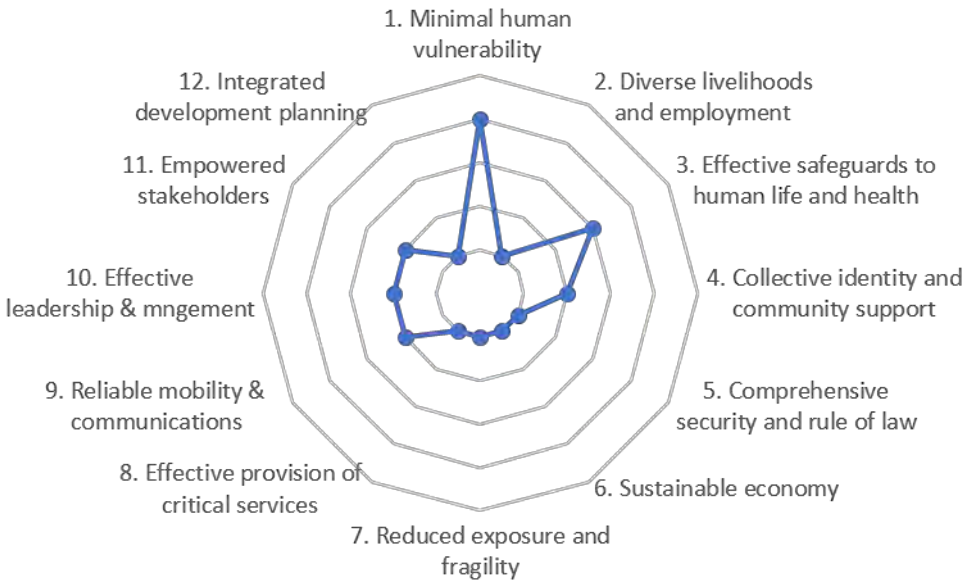
Refugees are bound to *Rudenim's* regulation on movement. They can leave the shelter from 5 or 6 am and should be back before 10 pm. Staying overnight requires permit that can only be obtained at the *Rudenim* office in Gowa Regency, about 45 minutes from Makassar city centre by car. Refugees must report once a month to *Rudenim*, which can be done through the shelter management or *Rudenim* staffs placed in several shelters. Political and social association are not allowed. Hence, refugees who staged protest at IOM or UNHCR offices to demand for faster resettlement processes or other demands are at risk of being detained in the Detention Center (IDC) managed by *Rudenim* in Gowa Regency. Moreover, refugees can be detained in the IDC if deemed as causing public disturbance, which can be interpreted in the broadest sense. The length of detention is at the discretionary of the *Rudenim* Head.

4. Discussion

This section provides the results of an assessment on Makassar city resilience in facing refugee issue as a new type of stress to its urban system (Figure 1). In general, the assessment showed that in managing the influx of mass displacement in Makassar, *minimizing human vulnerability* has the highest score among resilience goals. Meanwhile, the lowest score is the goals related to livelihood and employment, security and rule of law, economy, exposure and fragility, critical services, and integrated development planning. The following part provides explanation on these resilience goals within the clusters of urban system most affected by mass displacement as described in Section 2.1.

4.1. Adequate shelter, health care and protection

The highest scores for minimizing human vulnerability and safeguards to human life and health (Indicator 1.1, 1.5, 3.1-3.3, 5.1) showed that fulfilling basic needs is the first priority for the relevant stakeholders, including the city government, and our research showed that



Source: Analysis

Figure 1. Scoring of Makassar City Resilience in Refugee Management based on CRF Indicators

this priority has been met well. It is important to note that this is possible because the government received a high degree of support from IOM that enable the majority of refugees staying in Makassar to afford food, shelter and health care. Linking health care for refugees to existing public system also enables affordable services that will otherwise boost the healthcare cost for the refugees if they were to access private services. Problems are evident for those who are not under IOM care. If the number increases, the city government must find ways to support them.

Related to protection, there are three relevant city resilience indicators: effective systems to deter crime, competent policing, accessible criminal and civil justice (Indicator 5.1-5.3, and 5.4). The scores are lower as security and rule of law in Makassar is somehow understood as a responsibility of *Rudenim. Rudenim* is a part of the national government system, hence city government has no influence over their decision even though related city elements (police, *Bakesbangpol*) are involved. Missbach, et al. (2018) noted that treatment of refugees and asylum seekers in Makassar remains imbued with security and surveillance motives. In the absence of a clear and transparent mechanism to other city stakeholders, the approach to security and rule of law is prone to subjectivity of *Rudenim* officials. This increases the vulnerability of refugees who got caught up in the system. It is to note that one aspect of protection, that is protection to women and children rights is linked to the city's mechanism. The Integrated Service Centre for Women and Child Protection (P2TP2A) will handle cases of, for example, domestic violence, harassment, child abuse before *Rudenim* intervenes.[5]

4.2. Basic service provision

This cluster includes indicators on basic infrastructure and services, such as water supply, electricity, drainage and sanitation, other utilities, environment, transportation, communication, building codes, green ecosystem, and public finance. The scores are higher for indicators related to physical infrastructure and services (Indicator 1.2-1.4, 7.2-7.3, 8.2,

9.1-9.3), because they are basically provided by IOM who must conform to a certain internal standards and city regulation. Moreover, the infrastructure and services are connected to the city-wide system, with either IOM pays the fees directly to the utility providers or the refugees themselves pay for the cost of transportation and communication which are still affordable. The score is lower for public finance indicator (6.1) as the city do not have financial mechanism to provide budget for infrastructure and services for refugees. This is not a problem for now with IOM supporting the city government but may be a problem in the future should the number of refugees outside IOM care increases.

4.3. Economic development and employment

All relevant resilience indicators in this cluster (Indicator 2.1-2.4, 6.3-6.5) have the lowest scores because of the Indonesian policy that prohibits refugees to work. Higher scores were given to indicators related to informal economy considering the reality that some refugees are engaged in informal activities among themselves or with local community. This shows that Makassar has, to some degree, rather adaptable economy albeit informal and people can find alternative to engage in livelihood activities. The Mayor's personal view on possibility of work for refugees also showed a positive intention that can encourage economic integration in the future should the national policy direction changes.

4.4. Social and political inclusion and community cohesion

There are several topics covered under this cluster. Education indicator (11.1) has the highest score because refugees have the same access to basic education as Indonesians, albeit various limitation in practice. Our analysis showed that all stakeholders put education as one of the highest priority services to be made available, and this priority has been met well. Makassar became of the first cities to open its public schools to refugee children. Moreover, international and local organizations also worked to fill the gap through informal or non-formal education, including vocational skills building to those who cannot enter public education system. Indicators related to governance (10.1-3) scores higher considering the overall response of the local government in welcoming refugees in Makassar. The first key decision of the then-mayor to establish a working MOU with IOM and to take collaborative approach, both with internal and external stakeholders, are the main driver behind all the advances behind the city's refugee management approach.

On the other hand, indicators related to community support and social participation (Indicator 4.1-4.4, 11.3) score lower for several reasons. The ability of refugees to build community cohesiveness and social support among them is heavily influenced by shelter design and distribution of occupants in the shelters, as people are more likely to feel supported by others who come from similar background. Although refugees have access to public spaces, sports facilities, and other open spaces in the city and they regularly interact with host communities, their movement is relatively restricted and closely monitored by the authorities. This resulted in limited expression of identity, either individually or in group, and thus limited overall social participation. In this sense, while the city has 'control' over physical spaces in which refugees can utilize for social purposes such as leisure or interaction with others, it barely has influence over the social spaces in which the refugees can actively engage, express opinion and participate in the larger society.

There are several other indicators that are given the lowest score because they were hardly mentioned by any of the stakeholders during the interviews nor showed up in any documents discussing refugees in Makassar. They include indicators related to disaster management preparedness, response and contingency plan (2.5, 3.4, 6.2, 7.1, 7.4, 8.3-5, 9.4, 10.4, 10.5, 11.2) and integrated development planning (8.1, 12.1-4). This indicates that the topics are not considered relevant nor important for the stakeholders when discussing refugees. The current development planning process and output in Makassar has not seen refugees as potentially posing additional stress to the existing urban system.

5. Conclusion

In this study, we have shown how the framework of city resilience can be used to to measure the relevance of urban resilience framework with urban refugee case in Makassar.

The study found that in managing the influx of refugees, Makassar has several strengths that the city can leverage on: 1) the early decision to link public service provision to refugees with existing system in the city; 2) the decision to work with IOM and secure its support on shelter and assistance to refugees; and 3) collaborative approach, good internal coordination, and welcoming culture of the city leaders. These points hold the key to good refugee management in the city, which indicates the ability of the city to adapt and respond to stress. The study also identified gaps that the city can focus on to improve their urban resilience in the context of mass displacement: transparent and accountable mechanism in enforcing security and rule of law, exploring alternatives to livelihood activities for refugees within the boundary of national regulation, financing mechanism for refugee management outside of IOM support, encouraging the creation of social space where refugees can express themselves more freely and participate more in the society, and include refugee management discussion in the city development planning process and outcome. Addressing these gaps, however small, will reduce the vulnerabilities of refugees when transiting in Makassar and help the city to be more resilient in the future.

Furthermore, the exercise that we conducted on Makassar can be extended in other refugee-hosting cities with similar situation. This is especially considering that all around the world, cities are at the forefront of the global response to the increasing impact of forced migration. Thus, developing a methodology that integrates urban resilience framework that is adaptable to urban refugee phenomena will be essential.

6. References

Ansori, M. H., Efendi, J. & Adiwena, W., 2017. Managing Refugee Crisis in Southeast Asia: Policies, Practices and Challenges. 1st Edition ed. Jakarta: The Habibie Center.

Arup International Development, 2015. City Resilience Framework, London: Arup International Development; The Rockefeller Foundation.

Brandt, J. & Henderson, J., 2017. The Global Compact on Refugees: The Role of Cities. [Online] Available at: https://www.unhcr.org/5c18b5f44 [Accessed 29 May 2019].

Cities Alliance, 2017. The Cities Alliance in 2017: Positioning the Partnership for Development Impact, Brussels: Cities Alliance.

Cities Alliance, 2018. Policy Brief: Migration Management in Secondary Cities in Developing Regions and the Need for Financing Mechanisms. The 5th Mayoral Forum on Human Mobility, Migration and Development. [Online] Available at: http://www.migration4development.org [Accessed 26 May 2019]

IRC, 2017. Public Service Delivery in Contexts of Urban Displacement: A Discussion Paper on the Importance of Strengthening Public Service Delivery in Urban Humanitarian Context, London: International Rescue Committee.

Kirbyshire, A., Wilkinson, E., Le Masson, V. & Batra, P., 2017. Mass displacement and the challenge for urban resilience, London: ODI Overseas Development Institute.

Makassar Local Planning Agency, 2015. Spatial Plan 2015-2034, Makassar: Bappeda

Marihandono, D., 2008. Perubahan peran dan fungsi benteng dalam tata ruang kota. Wacana, Journal of the Humanities of Indonesia, 10(10), pp. 1-21.

Marrakech Mayors Declaration, 2018. The 5th Mayoral Forum on Human Mobility, Migration and Development. [Online] Available at: http://www.migration4development.org [Accessed 26 May 2019].

Missbach, A., Adiputera, Y. & Prabandari, A., 2018. Is Makassar a 'Sanctuary City'? Migration Governance in Indonesia After the 'Local Turn'. Austrian Journal of South-East Asian Studies, 11(2), pp. 199-216.

Roberts, B. H., 2014. Managing Systems of Secondary Cities: Policy Responses in International Development. s.l.:Cities Alliance/UNOPS.

Save the Children, 2018. Baseline Study for Families First Program in Indonesia, Jakarta: Save the Children.

Storey, D., 2014. Setting the Scene: The Rise of Secondary Cities. Presentation for the Asia Development Dialogue, Singapore: LKYSPP NUS.

UCLG, 2016. Intermediary cities in the world. [Online] Available at: www.gold.uclg.org [Accessed 26 May 2019].

UN Habitat, n.d. City Resilience Profiling Tool, s.l.: UN Habitat.

UNHCR, 2019. Global Trends Forced Displacement in 2018, Geneva: United Nations High Commissioner for Refugees.

[1] This includes refugees, asylum seekers, and Internally Displaced Persons (IDPs).

[2] While GCR recognizes the important role that cities play, it does not detail how it should work at the local level. For an analysis of key components in GCR that are relevant to cities, see Brandt & Henderson (2017)

[3] Roberts (2014) noted that there are three broad spatial categories of secondary cities: Sub-national cities that are centres of local government, industry, agriculture, tourism and mining; City clusters associated with expanded, satellite and new town cities surrounding large urban metropolitan areas; and Economic trade corridors that are growth centres planned or developing along major transport corridors. The characterization can also be based on its function and integration in a system of cities.

[4] Going forward, the term "refugee" in this research refers to refugees, asylum seekers and stateless persons, and excluding IDPs, illegal migrants, or other people of concern

[5] In Indonesia, Makassar is regarded as an advanced city in programming in child protection system although agencies working at the primary level (prevention) and secondary level (early detection) are still lacking (Save the Children, 2018)

Research Paper

Sustainable Urban Development: Building Healthy Cities in Indonesia

Linda DARMAJANTI, Urban Development Studies, Universitas Indonesia; Indonesia

Daniel Mambo TAMPI, Architecture Engineering, National Institute of Science and Technology; Indonesia

Irene Sondang FITRINITIA, Urban Development Studies, Universitas Indonesia; Indonesia

Abstract

The urban process or commonly called urbanization is a phenomenon that is occurring in several regions in Indonesia. In 2045, the projection results show 61.7% of Indonesia's population will live in urban areas. In the process, cities in Indonesia are facing several challenges related to Urban Infrastructure, decent and affordable housing, clean environment, local economic, slum, and urban poor (Social welfare). These indicators can have a positive impact on increasing the city index with healthy city categories, but also can have a negative impact with the increasing gap between the poor and the rich. The purposes of this study are to find out which cities in Indonesia fall into the category of healthy cities and to find out what factors and actors play a role in building healthy cities in Indonesia. The analytical method in this study is log frame analysis. The result is building healthy cities is closely related to the availability of aspects of life in urban areas: health services, environmental, and socioeconomic aspects. There are 3 cities in Indonesia: Palembang, Solo and Denpasar City. Building a healthy city is also an effort in improving health status, health facilities, cleanliness, garbage services, food availability, clean water, security, safety, park facilities, public transportation, art and culture facilities, housing, urban economics, religious facilities, and urban planning quality. Healthy cities in Indonesia will be achieved if efforts to improve not only physical health but also mental, social, economic and spiritual health are achieved. Finally, building a healthy city in Indonesia is an effort to contribute to sustainable urban development.

Keywords

Urbanization, Healthy City, Urban Development, Sustainable

1. Introduction

1.1. Subheading 1.1

Healthy cities are cities that continue to create and improve the quality of the physical and social environment and expand community resources that enable people to support one another. To carry out all functions of life and develop the maximum potential of society (Glouberman, 2014). To realize a healthy city, an approach that is in accordance with the urgency of the city's problems is needed. In the urban context, urbanization is an issue that cannot be released and will continue, especially in cities in developing countries. This phenomenon is related to increasing population and the extent of the city's physical

development. Rapid growth and development requires the city to prepare and organize various facilities that can support activities in urban areas.

Based on the projection results in Indonesia, in 2045, 67.1% of the population will live in urban areas (Ministry of National Development Planning, 2019). In the process, urbanization produces many impacts on the aspects of infrastructure, socio-economic and environment. The impact also adds to the long list of problems with the issue of the low quality of human life in urban areas. This is motivated by the unpreparedness of cities to provide basic needs of the community as a result of the process of urbanization. The basic needs includes in the form of inadequate housing prices, low quality of clean air and water, security, employment and other supporting facilities. The easiest thing to see regard the health issue in city is the pollution issue have been occurred in Jakarta for these past two weeks (Jakarta Post, July, 2019). Achieving a good quality air in Jakarta has been very challenging since the transportation mode in Jakarta less integrated. Even there is a "newcomer" MRT, but the effect still does not give a big effect to air status in Jakarta. Since the real time indexed and Greenpeace had announced that Jakarta being heavy polluted according the World Health Organization (WHO) standards which known as PM2.5. It was above the WHO's safe limit of 10 micrograms per cubic meter (µg/m3). This particle is very harmful if come into human respiratory system and the human body. Vehicle engines, industry, wood and coal burning becomes source that exacerbated the atmosphere. Therefore, city dwellers face a clear and present enemy called air pollution.

Another thing is the existence of contagious tropical disease while mosquito become vector of the dengue fever. Since the urbanization dense the area with the built up area, it eliminate the mosquitos habitant and could trigger the distribution of dengue fever. More than 2,000 people in Indonesia's capital Jakarta have been diagnosed with dengue fever in January this year, with one person confirmed killed by the mosquito-borne disease (Strait Times, March 2019)

Currently these challenges are faced by cities in Indonesia. If these things are not immediately corrected and their quality is improved, the consequence is that there is a gap /inequality development between the poor and the rich. This will also hamper efforts in realizing sustainable urban development. The following is a projection of the Indonesian population in metropolitan cities.

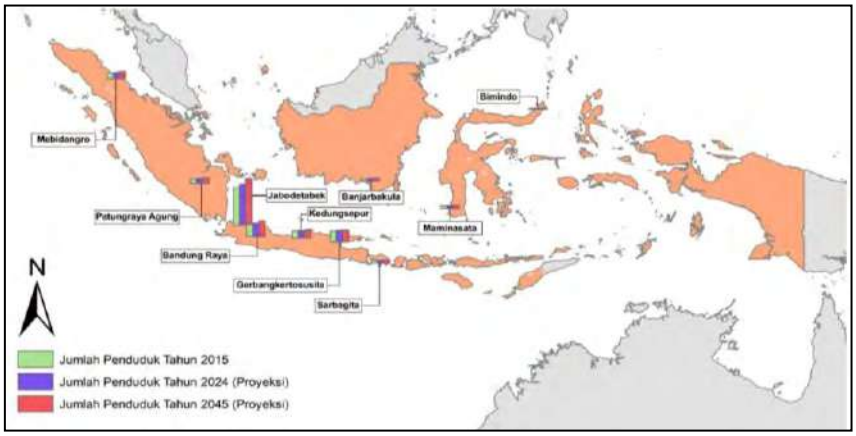


Figure 1. The Projection of The Indonesian Population in Metropolitan Cities (Source: Ministry of National Development Planning, 2019)

Figure 1. Indicates that there is an increase in the number of residents in 2 periods of 20 years between 2015-2024 and 2024-2045. The Jabodetabek area is an urban area that is superior in terms of population, followed by Bandung Raya, and Gerbangkertasusila. The metropolitan cities above need to pay attention to the challenges of urbanization by building a healthy city concept. In addition, it should be noted that aspects must be improved by looking at the city index based on aspects of security, safety, health, health facilities, cleanliness, solid waste, the city's economy, food sufficiency, quality of city parks, clean water services (IAP, 2017). These aspects are a support in building a healthy city.

The WHO measurement, until the Ministry of Health Index and Livability City Index. The concept of a healthy city involves two important aspects, namely place and people in addition to improving the quality of the physical environment, healthy cities also play a role to improve the quality of human life, ensure the welfare of the urban community, and access for all. The purpose of writing this article is to find important factors and actors in building healthy cities and any city that is ready to implement a healthy city. The concept of a healthy city is also part of efforts to realize sustainable city development.

2. Materials and Method

2.1. Materials

The Healthy cities concept focuses on the process, not just the outcome. It is obvious from the definition that a Healthy City requires a continuous development process that has no end point. lt is not necessarily one that has achieved a particular health status. It is conscious of health as an urban issue and is striving to improve it. Any city can be a Healthy City if it is committed to health and has a structure and process to work for its improvement (Department of Health, Hongkong, 2007)

The Healthy Cities approach emphasizes the way that the city environment (conceived very broadly) influences the health of residents. This approach explicitly acknowledges the diversity and interconnectedness of the many elements of urban living. It is a holistic approach that assumes that everything within a community is connected, and cities therefore need to get many sectors involved in developing public health policies. (Glouberman, 2014). In their approach to healthy cities, “health” includes not only physical health, but also mental, social, economic, political, and spiritual health. They list the following 11 features of a healthy city: 1) A clean, safe, high-quality physical environment (including housing quality). 2) An ecosystem that is stable now and sustainable in the long term. 3) A strong, mutually supportive, and non-exploitative community. 4) A high degree of public participation in and control over the decisions affecting one's life, health, and well-being. 5) The meeting of basic needs (food, water, shelter, income, safety, and work) for all the city's residents. 6) Access to a wide variety of experiences and resources with the possibility of multiple contacts, interaction, and communication. 7) A diverse, vital, and innovative city economy. 8) Encouragement of connectedness with the past, with the cultural and biological heritage, and with other groups and individuals. 9) A city form that is compatible with and enhances the above parameters and behaviours. 10) An optimum level of appropriate public health and sick care services accessible to all. 11) High health status (both high positive health status and low disease status). This list serves as a guideline for cities participating in the Healthy Cities movement, sponsored by the World Health Organization. Hancock and Duhl in Gloubermen (2014) also emphasized the importance of the involvement of local governments in health promotion.

In addition to the factors in building healthy cities in Indonesia, the previous factors are also related to Several Missions in Sustainable City Management in Indonesia, namely Mission 2 Livable and Inclusive, Mission 3 Advanced Cities, Green City Missions in order to Manage of metropolitan cities in Indonesia. Mission 2 Providing basic service access for every resident to basic services (a.l. settlement, transportation, drinking water, sanitation). Healthy city planning should be viewed as healthy urban planning and readily connect the two into a more holistic approach to improve the health and lives of communities. (Portney, 2017). Using planning to achieve healthier cities occurs at the intersection of two disciplines. Although having a history of collaboration, and having common roots, the two disciplines have built-up working practices that make joint working difficult (Arthurson, Lawless & Hammet in Grant, 2019). A simple caricature of the two disciplines would be:

- Public health: Population level interventions focused on people.
- Planning: Population level interventions focused on place.

Of course, in reality public health can be concerned with place and environment, but in other instances having just a narrow focus on the individual. An approach for using the physical planning and design of cities was specifically developed within the World Health Organization (WHO) European Network of Healthy Cities. This initiative began in 1988, and is still continuing today, with phase VII launched in 2018. Each phase lasts about five years, with cities across the WHO European region eligible to apply phase by phase (Grant, 2019).

Sustainable urban development seeks to create cities and towns that improve the long-term health of the planet's human and ecological systems. It assigns human and ecological systems equal importance, and implies that the health of both is interdependent. (Wheeler, 1996)

2.2. Method

The method of data collection in this article is a literature study of healthy city concepts, using livable city index IAP 2017 and the management mission of sustainable cities in Indonesia. The analysis in this article is to use the log-frame analysis method. To answer the first goal, namely modifying data based on city index that is feasible for 2017 IAP, selecting several indicators related to the concept of a healthy city then selecting 3 cities with the highest number of indexes. To answer the second goal in this study is to analyze what needs to be improved in developing healthy cities based on the concept of healthy cities in developing countries that are integrated with factors in the city index that is feasible for 2017 IAP, and analyze who the actors / stakeholders play a role in cities that are close to the criteria for healthy cities, namely Palembang, Solo and Denpasar City. At the end of the analysis, triangulation of data will be displayed to explain the purpose, theory, methodology, analysis, result and source of data.

3. Result and Discussion

3.1. Cities with Healthy City Index

The following is a healthy city index indicator table taken from the 2017 Livable city index IAP book, there are 16 indicators chosen in terms of building healthy city concepts namely security, safety, health, health facilities, cleanliness, garbage services, urban economics, food, housing, park facilities, clean water, transportation, art and cultural facilities, public participation, religious services and urban planning quality. The following is a healthy city index table in Indonesia.

Table 1.Indonesia Health City Index

No	Cities	Point	Average Point	Explanation
1. Security				
1	Banjarmasin	73	58	A security sense of city residents from crime
2	Pekalongan	69		
3	Denpasar	68		
2. Safety				
1	Palembang	63	55	A sense of security from disaster, and the quick response of disaster early warning
2	Solo	62		
3	Semarang	62		
4	Yogyakarta	61		
3. Health				
1	Solo	66	58	Living environment free from the threat of disease outbreaks
2	Semarang	65		
3	Depok	63		
4. Health Facilities				
1	Bandung	77	71	An easement of obtaining health services and quality of health services
2	Semarang	76		
3	Solo	75		
4	Balikpapan	75		
5. Cleanliness				
1	Palembang	70	58	The level of cleanliness of the air, the level of cleanliness of the river and the level of cleanliness of the city road
2	Samarinda	69		
3	Palangkaraya	63		
4	Banjarmasin	63		
6. Garbage Service				
1	Balikpapan	77	63	Quality of solid waste services in the city
2	Palangkaraya	69		
3	Semarang	69		
4	Makassar	69		
5	Bandung	68		
7. Urban Economics				
1	Palembang	66	57	An easement of getting a job, easy to develop business, and afforfability of living costs
2	Pekalongan	63		
3	Yogyakarta	62		
8. Food				
1	Denpasar	81		An easement of obtaining basic needs and the quality of
2	Bandar Lampung	81		

3	Mataram	80	76	nutrition of food consumed
4	Pontianak	79		
5	Balikpapan	79		
6	Palangkaraya	79		
9.	**Housing**			
1	Manado	66	58	An easement of owning a house and the physical quality of a residential house
2	Palembang	65		
3	Pontianak	64		
10.	**Park Facilities**			
1	Denpasar	77	65	How easily city residents access and use city parks, assess the quality of city parks, and how easily disabled people access and use city parks
2	Malang	75		
3	Bandung	74		
11.	**Clean Water**			
1	Malang	81	75	Access to clean water services
2	Surabaya	81		
3	Tangerang Selatan	80		
4	Manado	79		
12.	**Transportation**			
1	Bandung	65	56	City traffic conditions, traffic accident rates, road quality, availability of public transportation, quality of public transport services, and ease of reaching the destination
2	Palembang	63		
3	Palangkaraya	61		
13.	**Art and Culture Quality**			
1	Denpasar	68	60	Using arts & cultural facilities, then on the quality of the facility itself, and how much frequency the city residents enjoy the arts and culture festival in their city
2	Solo	62		
3	Palangkaraya	61		
4	Surabaya	61		
5	Malang	61		
6	Yogyakarta	61		
14.	**Public Participation**			
1	Banjarmasin	55	38	Citizen involvement in city development
2	Pekalongan	46		
3	Makassar	45		
4	Solo	45		
15.	**Religious Services**			
1	Banda Aceh	83		The level of quality of religious

2	Manado	82	56	services in the city
3	Pontianak	82		
4	Banjarmasin	81		
16.	**Urban Planning Quality**			
1	Makassar	76	76	General quality of the city
2	Palembang	74		
3	Bandung	71		

Source: Modified from IAP Livable City Index, 2017

Based on the 16 Indicators above, there are 3 cities with the top indices which can be categorized as cities that are ready to go to a healthy city. These cities are Palembang, Solo and Denpasar. The city of Palembang is superior to 7 indicators, namely Safety, Cleanliness, Solid Waste Service, City Economy, Housing, Transportation, and Quality of City Planning. The City of Solo excels at 5 Indicators, namely Safety, Health and City Health Facilities, Arts and Culture Facilities, and Public Participation, Denpasar City excels at 4 Indicators namely Security, Food, Garden Facilities, and Arts and Culture Facilities. The following is a list of the top 3 cities that have been processed based on 16 livable city index indicators for IAP 2017.

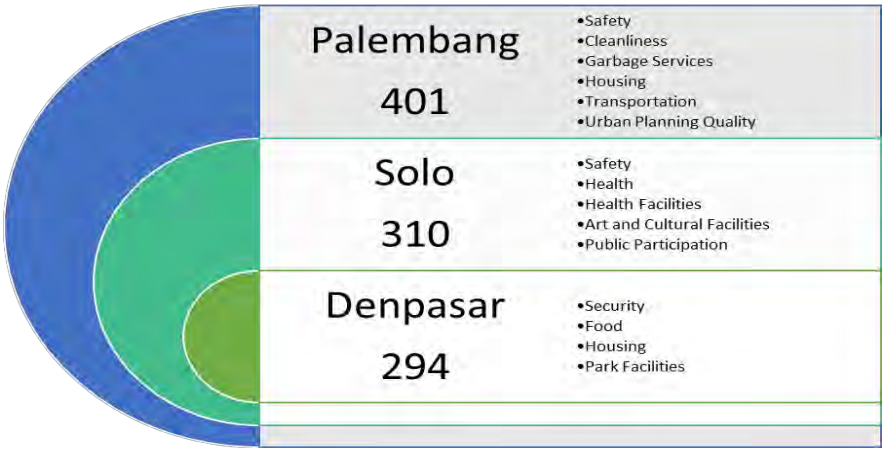


Figure 2. Top 3 Toward Healthy Cities in Indonesia (Source: Private Process, 2019)

Figure 2. describes the 3 cities in the top list of several healthy city concept criteria. Although it is still far from the concept of a healthy city, this is a good step to continue to improve the quality of the places and activities of people who live in the city. There is no maximum quality limit in building a healthy city. Building a healthy city is a process that must be sustainable because it will be related to the issue and dynamic. To continue the ongoing process, it is necessary for actors who play an important role in realizing a healthy city in Indonesia. The strategy in building healthy cities in Indonesia will be outlined in the log-frame analysis table which contains how to achieve nobel aim, goal and purpose.

3.2. Factor and Actor of Building Healthy City in Indonesia

The following is a log-frame analysis framework table that explains the description of nobel aim, goal and purpose in building healthy cities in Indonesia

Table 2. Log-frame Analysis Building Healthy Cities in Indonesia

No	Noble Aim			
	Building Healthy Cities in Indonesia			
	Goal	**Factor**		**Important Assumptions**
1	Increasing Place and Environment Quality	Health facilities, Cleanliness, Garbage Services, Housing, Park Facilities, Transportation, Art & Cultural Quality and Urban Planning Quality		By increasing the index on these factors it is assumed that it can improve the quality of the place and the city environment
2	People	Health, Security, Safety, Urban Economics, Food, Clean Water, Park Facilities, Transportation, Art and Cultural Quality, Religious Services, Public Participation		Increasing the index on these factors is assumed to increase people quality
	Purpose	**Measurement**	**Actor**	**Important Assumptions**
1	Health facilities	The ease of getting Health Services	City Health Agency	Assumed to reach goal 1
2	Cleanliness, Garbage Services, Park Facilities	The level of cleanliness of the air, the level of cleanliness of the river, and the level of cleanliness of the city road	City Sanitation and Landscaping Office and Environmental Agency	Assumed to reach goal 1
3	Housing	The ease of owning a house and the physical quality of a residential house	Public Housing Agency and Settlement Area	Assumed to reach goal 1

4	Transportation	City traffic conditions, traffic accident rates, road quality, availability of public transport.	Department of Transportation	Assumed to reach goal 1
5	Art & Cultural Quality	Use arts & cultural facilities, then towards the quality of the facility itself	Culture and Tourism Agency	Assumed to reach goal 1
6	Urban Planning Quality	General city quality in the city	Cipta Karya, Spatial Planning and Land Agency	Assumed to reach goal 1
7	Health	The living environment is free from the threat of disease outbreaks	Health and Environmental Agency	Assumed to reach goal 2
8	Security	The security of the city residents from crime or crime	Regional Police	Assumed to reach goal 2
9	Safety	A sense of security from disasters, and the speed of disaster early warning	Regional Disaster Management Agency, Meteorology and Geophysics Agency	Assumed to reach goal 2
10	Urban Economics	Ease of getting a job, ease of business development, and affordability of living costs	People's Economic Agency	Assumed to reach goal 2
11	Food	The ease of getting basic food and the nutritional quality of food consumed	Agriculture and Health Agency	Assumed to reach goal 2
12	Clean Water	Access to clean water services	Environment and Public Works Agency	Assumed to reach goal 2
13	Park Facilities	How easily disabled people access and use city parks	Agency of Sanitation and City Parks and Social Service	Assumed to reach goal 2

14	Transportation	The quality of public transport services, and the ease of reaching the destination	Department of Transportation	Assumed to reach goal 2
15	Art & Cultural Quality	How much frequency do city residents enjoy art and culture festivals in the city	Cultural and tourism agency	Assumed to reach goal 2
16	Religious Services	The level of quality of religious services in the city	Religious Service	Assumed to reach goal 2
17	Public Participation	Citizen involvement in city development	All Services and All Elements of the Citizen	Assumed to reach goal 2

Source: Personal and Modified from IAP Livable City Index 2017

Table 2. Describes the description of log-frame analysis on how to build healthy cities in Indonesia. The nobel aim of the log-frame analysis is to build healthy cities in Indonesia. To achieve the nobel aim, there are two goals, namely place and people. To achieve the goal place, The index is needed on 8 factors, assuming to increase the index of those factors, the quality of the place and the environment of the city will improved. To achieve the goal of people, The index is needed on 11 factors, assuming that increasing the index on those factors is assumed to increase people quality.

Each goal has actors who play a role in building a healthy city for the first goal, the actors who play a role are the City Health Agency, City Sanitation and Parks Service as well as the Environment Service, Public Housing and Settlement Services, Transportation and Transportation Agency, Cultural and Tourism, Cipta Karya, Spatial Planning and Land Agency. Then, the actors who play a role in the two people 's Goal, namely the Health Service and the Environmental Service, Regional Police, Regional Disaster Management Agency, Meteorology and Geophysics Agency, People's Economy Service, Agriculture Service and Health Service, Environmental Service and Public Works Service, Sanitation Service and City Parks as well as the Social Service, Transportation and Transportation Agency, Culture and Tourism Agency, Religious Services and all Services and All Elements of the City Community.

Finally Building a healthy city is also in line with the sustainable city development mission carried out by the ministry of planning and national development in Mission 2 Livable and Inclusive, Mission 3 Advanced Cities, Green Cities in Management of metropolitan cities in Indonesia. Sustainable city development will continue to run in accordance with the concept of sustainable city development that has been conveyed earlier that Sustainable urban development is like that to improve the long-term health of the planet's human and ecological systems. It assigns human and ecological systems equal importance, and implies that the health of both is interdependent. The following is a table of triangulation in writing this article

Table 3. Triangulation

No	Tujuan	Theory	Methodology & Analysis	Result	Source of Data
1	Cities with High Index (Healthy Cities Criteria)	Hancock and Duhl, Glouberman	Choosing 3 Cities by calculating index on each factor, Descriptive Analysis	• Palembang 401 points • Solo 310 points • Denpasar 294 points	IAP Livable City Index 2017, Personal Statement, Personal Modification
2	Factor and Actor	United Nation, WHO, Ministry of National Development Planning, Grant, Portney	The factors are divided into 2 goals, the actors based on their responsibility to deal with and using Log-frame analysis	Factors: Place, Environment and People Actor, Government and Citizen	IAP Livable City Index 2017, Personal Statement, Personal Modification

Source: Personal Modified, 2019

Table 3. Shows triangulation of data on the objectives achieved, namely top 3 with high index, factor and actor. This discussion uses the theory of Hancock and Duhl, United Nation, WHO, Ministry of National Development Planning, Grant and Portney. The analytical method used is Choosing 3 Cities by calculating the index on each factor, Descriptive Analysis. The factors are divided into 2 goals, the actors based on their responsibility to deal with and use Log-frame analysis. The results of the first goal obtained were that there were 3 cities with the highest index in relation to the concepts of healthy cities namely Palembang, Solo and Denpasar. The second result is factors that are divided into two goals, namely place and people. The source of data comes from IAP Livable City Index 2017, Personal Statement and Personal Modification.

4. Conclusion

To deal with various urban challenges in Indonesia, various innovations and quality improvements are needed, especially in building healthy cities. Based on the analysis, it was concluded that building healthy cities in Indonesia requires 16 factors, namely safety, health, health facilities, cleanliness, garbage services, urban economics, food, housing, park facilities, clean water, transportation, art and cultural facilities, public participation, religious services and urban planning quality. The importance of the role of actors is also needed. Such actors are like the relevant government agencies and the community as beneficiaries as well as those responsible for maintaining the quality of the factors. Furthermore, based on the results of the analysis, there are 3 cities with the highest indexed that can be categorized as cities that are ready to go to healthy cities, namely Palembang, Solo and Denpasar City.

Each of these cities still needs to increase the index on factors that have not reached the average index.

To develop the concept of a healthy city, it is not only focused on human (individuals) but also concerns people who live in cities or public health. Healthy city is not only physical health but also mental, social, economic and spiritual health are achieved. In addition to people, the concept of a healthy city also focuses on place, namely improving the ecological system and quality of the city. Finally, building a healthy city in Indonesia is a continuous and interdependent process through cross actors and cross factors to realizing Sustainable Urban Development.

5. Acknowledgment

The Congress and Young Planning Professional Workshop fee was funded by Citilink Urban Asia Ltd, 100 Jervois Street, Sheu Wang, Central District, Hongkong. Special Thanks for Sebastian Goethals, Vice President of ISOCARP who has supported me in order to participate in The Congress and YPP Workshop in Jakarta and Bogor 2019.

6. References

Department of Health (2007) Building Healthy Cities: Guidelines for Implementing A Healthy Cities Project in Hongkong, Hongkong

Glouberman, Sholom. Newman Chaylm (2014) A Framework For Improving Health in Cities: A Discussion Paper. Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 83, No. 2. New York, United States.

Grant, Marcus (2019) Planning for Healthy Cities, https://www.researchgate.net/publication/326399922, Springer, Accessed on 30 July 2019

Indonesian Association of Planners. 2017. Indonesia Livable City Index. Jakarta: Indonesia

Jakarta Post (2019) New Study Links Exposure to Air Pollution with Lung Aging and Increased Risk of Chronic Lung Disease Risk, https://www.thejakartapost.com/life/2019/07/10/new-study-links-exposure-to-air-pollution-with-lung-aging-and-increased-risk-of-chronic-lung-disease-risk.html, accessed on 9 July 2019.

Ministry of National Development Planning (2019) Sustainable Metropolitan Management. PPT National Seminar on Urban Sustainable and Regional Development, Jakarta, Indonesia.

Portney, Kent. Sansom, Garret Thomas (2017) Sustainable Cities and Healthy Cities: Are They the Same?, Urban Planning (ISSN: 2183–7635) 2017, Volume 2, Issue 3, Pages 45–55. Lisbon, Portugal.

Strait Times (2019) Dengue Fever Infects More Than 2,000 People in Jakarta, kills one, https://www.straitstimes.com/asia/se-asia/dengue-fever-infects-more-than-2,000-people-in-jakarta-kills-one, accessed on 9 July 2019

Wheeler, Stephen (1996) Sustainable Urban Development: A Literature Review and Analysis. IURD Monograph Series: UC Barkeley

Research Paper

The Pedestrians' Stories: Towards Walkable Cities in Indonesia

Sustainability in Transportation

Natalia TANAN, Ministry of Public Works and Housing; Indonesia

Laksmi Tungga Dewi Jaya WISNU WARDANI, Reka Urban-Perubahan Iklim; Indonesia

Abstract

The paper discusses the process of providing walkable pedestrian facilities in cities in Indonesia which is considered lacking due to the limited number and poor quality. In the past few years, the government has been improving and developing the walkable pedestrian through policy and regulation, as well as physical development. This action is also linked to the green city program, in particular, sustainable transportation. However, the physical development and implementation of policy and green city program are not as smooth as expected due to the limitation of urban space, human resources, and finance. The study focuses on identifying problems and introduces arrangements that could improve the quality of pedestrian facilities. It applies interviews, questionnaires, and design competition to gather input from the public. Two cities in Indonesia are selected as the case studies, namely, Bogor and Banjarmasin. In each city, the study selects a location to elaborate for the design competition. The study analyses the walkability condition in each zone using nine parameters that emphasise on pedestrian conflict with other modes, availability of pedestrian path, availability of crossing, the safety of crossing, the behaviour of the motorcyclist, amenities, disable facility, buffer, and security. The finding points general problems such as poor amenities and lack of disabling facility, as well as the problem of motorcyclist behaviour. Besides problems, the study also identifies local potentials that could support the improvement of walkable pedestrian facilities. Those findings are important to improve the pedestrian facilities and develop an understanding of local condition since each city has different characteristics. The study applies those findings as an input to develop policy on the pedestrian facility of the green city for the Ministry of Public Works and Housing. The policy links to the green city program that addresses eight attributes, namely the green planning and design, open green space, green community, green waste, green energy, green transportation, green building, and green water. Further, the policy also emphasises five components of walkability, accessibility and connectivity, attractiveness, comfort and equality, safety, and security. Combination of green city attributes and walkability components are used for the planning-design and development of walkable pedestrian facilities in the urban area in Indonesia.

Keywords

Walkability, Pedestrian Facilities, Green Transportation, Green City

1. Introduction

In Indonesia, the walkability concept is being used to improve the quality of pedestrian facilities in urban areas. The implementation of this concept is expected could improve the accessibility and connectivity, upgrade the attraction or beauty, increase comfort and equality, safety and security. In short, the walkability concept should encourage walking activities that beneficial to the sustainable development of transportation in the green city to provide life balance in ecological, economic, and social aspects.

In Indonesia, the national government introduced the concept of green cities to improve environmental quality. Under the ministry of Public Works and Housing, the green city program, which called *Program Pengembangan Kota Hijau (P2KH)* was launched in 2011 that involves collaboration between cross-sectors. One of the points that address in the P2KH program is green transportation that links to the non-motorized vehicle and walking activity. This paper discusses walking experiences in a few cities in Indonesia and the national government efforts to implement the walkability concept that involves local governments and public engagements.

2. Methodology

This study focuses on analyzing the walkability index in two cities in Indonesia. The study combines the concept of walkability and green city. Therefore, it applies a mixed-method that combine qualitative and quantitative methods. The qualitative method is focused on the interviews and design competition, while the quantitative method is based on the walkability index. It is expected that finding from this study could help to identify potential and problems in walking, as well as deliver design criteria that could support walking and green transportation.

2.1. The Walkability Index

The walkability index focuses on identifying and assessing the quality of walking (Arup, 2016; Qingnan, Claudia, Sarmiento, & Obelheiro, 2013; Jeff, 2012; Leather, Fabian, Gota, & Mejia, 2011; Krambek & Shah, 2006). This study applies two methods to assess the walkability index, the first is the Global Walkability Index and the second is the walkability approach from ADB. The Global Walkability index is an approach that uses to evaluate the quality and performance of walking using three components, (1) safety and security, (2) convenience and attractiveness, and (3) policy support (Krambek & Shah, 2006). On the other hand, the walkability approach from ADB also applies the concept from GWI with some adjustments on Asia context (Tanan & Darmoyono, 2017). The study considered that the ADB approach could help to identify the priority areas that need for improvement (e.g. areas with high pedestrian traffic but with low walkability assessments) (ibid).

Table 1 Comparison of GWI and ABD Walkability Approach

Comparison Factors		GWI	ADB
Component	Comfort	√	√
	Safety	√	√
	Security	√	-
	Attractiveness	√	-
Assessment method	Qualitative	√	√
	Quantitative	√	√
Implementation	Cities in Developed Country	√	√
	Cities in Developing country	√	√

2.2. The Green City

The green city concept was implemented in some countries in the world to create a friendly living environment (The Economist Intelligence Unit, 2012; Matthew, 2006; Shandu et al., 2014). In Asia, the ADB introduced the green city index that has eight indicators, namely energy and CO2, transport, land use and buildings, waste, water, air quality, sanitation, and environmental governance (The Economist Intelligence Unit, 2012). This index was adapted to the Green City policy in Indonesia and used to assess the green city index in some cities. This study also uses the green city index to analyze the correlation between mobility and land use planning system in Indonesia, in particular, to support non-motorized transportation and encourage walking activity.

3. Walking Experiences in Indonesia

In urban areas in Indonesia, walking activities are still not an option. However, Indonesia is considered as the lowest rank in walking activities with an average of 3,513 steps per day (Althoff et al., 2017 in BBC, 2017). Compare to other cities or countries such as Hong Kong with the average citizen walks 6,880 steps per day and Ukraine with an average of 6,107 steps per day (ibid). The study of pedestrian facilities in urban areas in Indonesia aims to find out the walkability index in pedestrian facilities as well as identify why walking is less favourable in this country.

In Indonesia, the concept of green transportation was introduced in 2011 under the government program of Green City policy in order to support the Law no 26/2007 on Spatial Planning. The Green City policy focuses on bringing balance between ecological, economic, and social factors (Ministry of Public Works and Housing, 2011; Darmoyono & Tanan, 2015). The program was called Green City Development Program (*Program Pengembangan Kota Hijau* or P2KH), the Ministry of Public House and Housing is responsible for managing this program. This program has four attributes, namely (1) water resources and energy, (2) waste management, (3) integrated transport systems, and (4) healthy environment between nature and built environment using the principles of sustainable development (Ministry of Public House and Housing, 2011). The green transportation concept is linked to the attribute ecological. The concept encourages walking activity as a significant activity to reduce the use of the motor vehicle. It is expected that the provision of pedestrian facilities could improve the physical condition, as well as economic and social activities in the urban area.

Table 2 Green City Attributes P2KH in Indonesia

Attribute	Description
Green planning and design	Planning for city and region that focuses on the capacity to manage resources efficiently and create balance between nature and built environment.
Green open space	Green open space that provides safety, comfort and aesthetic quality for urban and regional area.
Green community	Communities that concern with environmental issues and socio-cultural.
Green waste	Government, private sector, and community manage and prevent waste problem.
Green energy	Renewal energy that balance development activity in city or region.
Green transportation	Transportation system that could reduce negative impact on the environment.
Green building	Building design and construction that environmentally friendly.
Green water	Water management: water absorption management and reduce peak of runoff for natural resources.

3.1. City of Bogor

The city of Bogor close to DKI Jakarta and it is known as a destination for tourism (Botanical Garden, the Palace of Bogor, etc.) and education (Bogor Agricultural Institute or IPB). As a one of the cities that has significant history, Bogor has a historical street, the corridor of Sudirman street. The Sudirman street is know as the heritage axis that connected the Palace of Bogor. This street is a secondary arterial street that has two ways and four lanes, which each of them has a width approximately four meters. This street also has a wide sidewalk with width around 2.5 meters to 3.5 meters. Although the sidewalk quite wide, nevertheless, it has limited trees shade, limited facilities for disabilities, and used as parking are for motor vehicle at some parts. Those conditions challenge this corridor as a heritage axis. Improvement is needed to upgrade the quality of pedestrian facilities as well as strengthen the historical character.

Figure 1 Corridor of Sudirman Street, Bogor City (adapted from the Municipality of Bogor, 2014)

3.2. City of Banjarmasin

Banjarmasin is the capital city of the South Kalimantan Province. The city accommodates various activities such as trade, government administration, education, social services, and so on. The Martapura river through this city and used as a route for water transportation, while the waterfront is a public open space for the local people. This waterfront area is flanked by two major streets, the Jendral Sudirman street and Pierre Tendean street. Along these streets are commercial areas, offices, residential, and education facilities. Because of its scenic view, this area becomes one of the tourist destinations in Banjarmasin. Both locals and tourists enjoy the landscape of the waterfront as well as for sports and culinary destinations. Aware of the potential, the city government improves the open space along the waterfront area. Even though the improvement is being carried out, efforts are still needed to escalate the quality of pedestrian facilities. The provision of disabled facilities, growth shade trees, upgrade the signage system, develop vehicle parking area, and others.

Figure 2 Corridor of Martapura Promenade, Banjarmasin City

4. Achieving Walkable City in Indonesia

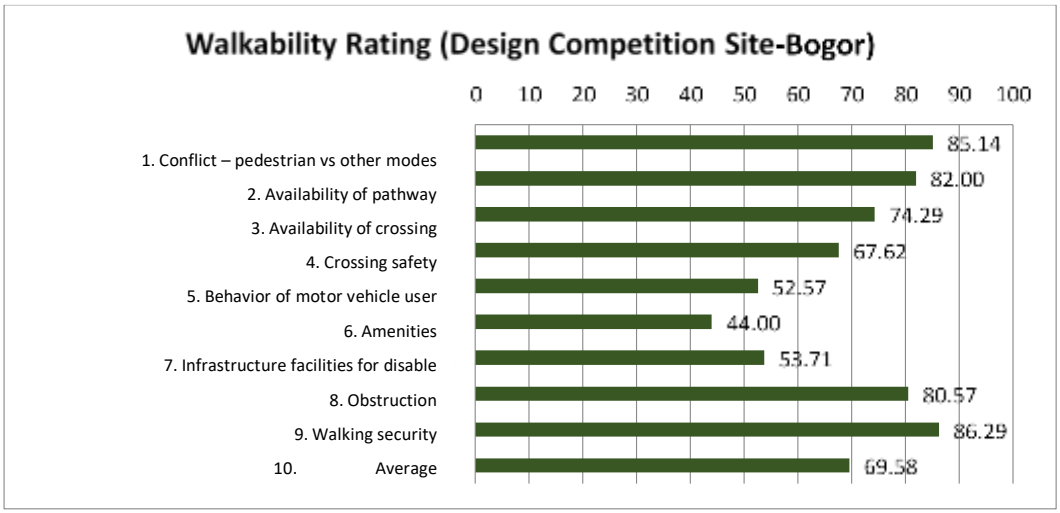
Achieving a walkable city is a challenge for most cities in Indonesia. However, to support the green city concept, in particular, the green transportation concept, those cities have to accommodate this demand and improve the quality of pedestrian facilities. Therefore, to identify the quality of pedestrian facilities, the Ministry of Public Works and Housing conducted a survey and later followed by a design competition to gain innovative idea from the public. Then, this input will be used to planning and design pedestrian facilities in a guideline for Indonesian cities.

4.1. Walkability Survey in Bogor

The walkability survey in Bogor is conducted along the corridor of Sudirman street. It applies two methods, (1) inventory of pedestrian facility and (2) interview to the pedestrian. The survey of inventory pedestrian facilities uses the Global Walkability Index to identify some factors related to the current condition of the pedestrian facilities at the site. While, the pedestrian interview is about getting information on pedestrian perceptions and preferences, as well as characteristics of pedestrian and the trip. Input from the survey helps to identify the condition of pedestrian facilities based on the types of activities and trip purposes.

Apparently, the pedestrian inventory survey is a site-specific that focuses on the segments on the right and left along the corridor of Sudirman street. The survey identifies problems and potentials of the pedestrian facilities along the corridor. It also points the type of pathways and the intersection, green open space (parks), location with limited interaction with to the motorized vehicle. The results of the assessment of this corridor are as follows (see figure 3):

Based on the survey result, the sidewalk has three different characteristics, (1) sidewalk close to the Palace of Bogor has the best quality due to the wide dimension, the low conflict between pedestrian and other modes of transportation and equipped with a barrier. The second (2) is the corridor with green shade trees that provide shade and create a comfortable walking environment. The third (3) is the commercial segment, which has the lowest score of the walkability index. Most of the sidewalk space was used as parking areas for motor vehicles, which limited the access for the pedestrian. Another problem that identifies from the survey is the speed of the motor vehicle, which could danger the pedestrian crossing the street.



This zone has 3 clusters, (1) the segment next to the Bogor Palace (the best condition); (2) the green open space area that is clean, calm and comfortable to walk; and (3) a commercial area where most of the space on the sidewalks is for motor vehicle parking area.

From the survey, the commercial area has limited amenities and narrow sidewalks at some segments. The corridor also has limited number of pedestrian-crossing and no pedestrian bridge to support mobility. A few parts of the sidewalk are under construction, which close the pedestrian accessibility.

Figure 3 Walkability Rating at the Design Competition Site, Bogor City

The walkability rating at corridor of Sudirman Street is as follows:

Table 3 Rating of walkability at corridor of Sudirman Street

Parameter	Walkability Rating
Conflict – pedestrian and other mode of transportations.	85.14
Availability of pathway	82.00
Availability of crossing	74.29
Crossing safety	67.62
Behavior of motor vehicle user	52.57
Amenities	44.00
Infrastructure facilities for disable	53.71
Obstruction	80.57
Walking security	86.29
Total Average	69.58
Results	Average

The interview survey focuses to gain information about perception and preference on pedestrian facilities and characteristics. the study uses two formulas to determine number of samples, (1) Population unpredictable/known – population is the city inhabitant and (2) population unpredictable/known to achieve accuracy of 95%. Bogor City has population approximately 1,013,019 people (BPS City of Bogor, 2014). The calculation is as follows:

$$n = \frac{1{,}013{,}019}{1+(1{,}013{,}019 \times 5\%^2)} \quad (1)$$

Result, n = 399.84 ≈ 400 sample

$$n \geq \frac{1}{5\%^2} \quad (2)$$

Result, $n \geq$ 400 sampel

The calculation shows that the study needs at least 400 samples to gain 95% accuracy, while the survey manages to collect data from 480 respondents, which is more than the minimum requirements.

The survey reveals that in general, most of the respondents are agree that facilities for pedestrian are available and accessible (with some notes). Nevertheless, they point out the condition of sidewalk that not friendly to the special need people, in particular people with disability, elderly, children, and pregnant woman (see Figure 4). The survey also requests the participants to make a list of priorities three times to see what is considered necessary to pedestrians (see Figure 5). In the first round, the respondents demand to improve the infrastructure for disabilities (16.5%). The second round shows that the participants demand a pedestrian-crossing to cross the street (19.8%). The third round, the respondents' concern with the motorists' behavior that less interest in pedestrian safety (15.8%). These findings help the study to identify the problems and potentials of this corridor and seek a creative solution.

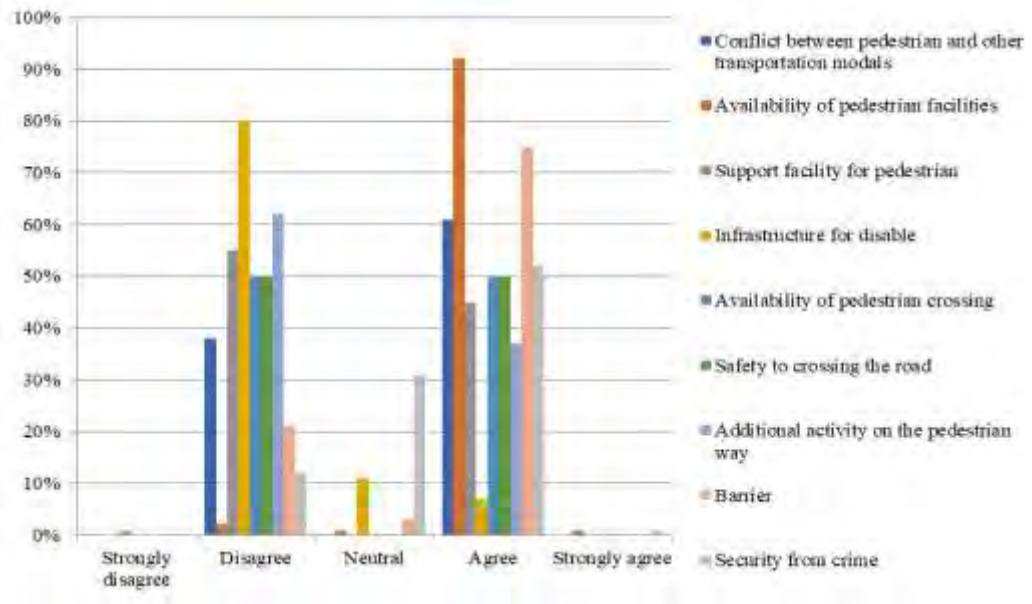


Figure 4 Ranking of the Pedestrian Facilities Condition at the Competition Site, Bogor

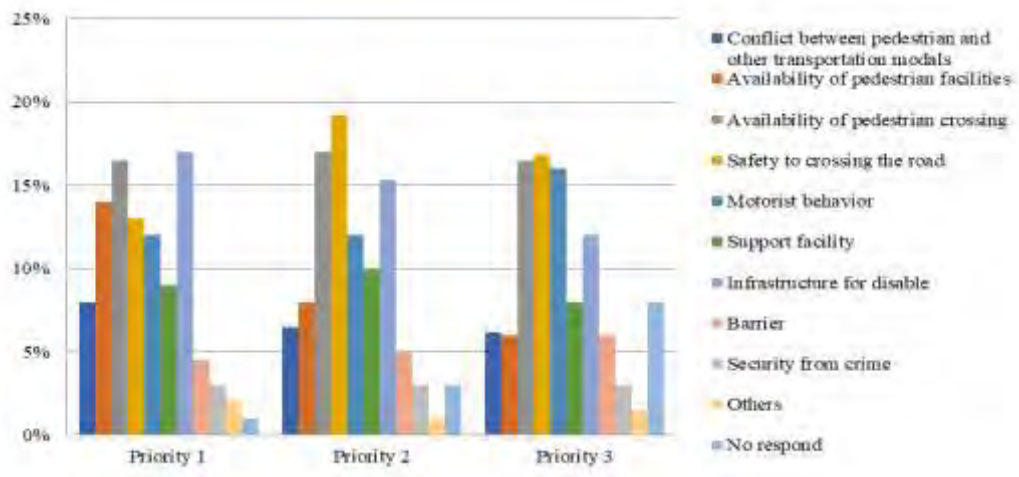
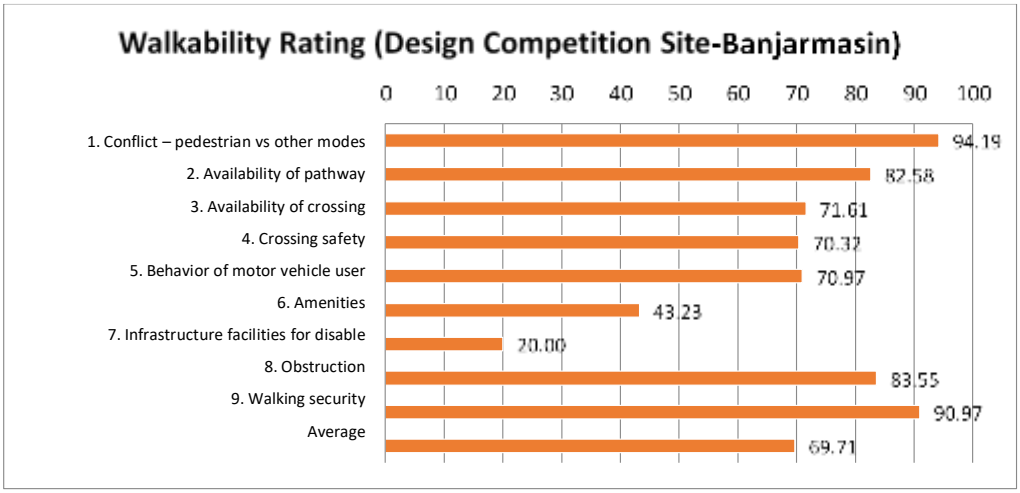


Figure 5 Respondents' Priority for the Facility Improvement, Bogor

4.2. Walkability Survey in Banjarmasin

In Banjarmasin, the walkability study also conducts through the inventory of pedestrian facilities and interview with the pedestrians. The study applies the Global Walkability Index to collect data and analyze the condition of pedestrian facilities along the Martapura promenade. In order to get information and understand pedestrians' perception and preference, characteristic of the walkers and journeys, this study conducts interviews. In general, the walkability survey provides information about the condition of pedestrian facilities in Martapura promenade based on types of activities and trip purposes.

The pedestrian inventory survey along the Martapura promenade focuses on two corridors of Sudirman street and Pierre Tendean Street between segments Merdeka bridge and Old Market bridge (Jembatan Pasar Lama). The survey identifies potentials and problems as follows:



The pedestrian facilities along the Martapura promenade has a good quality; however, there are few infrastructures that need to be improved such as steering tiles for disable, signage system, ramps, and others. The pedestrian facilities have attractive design due to the requirement as a tourist destination. In general, the available facilities are lighting, shade trees, safety fences, police posts, and others.

Figure 6 Walkability Rating at the Design Competition Site, Banjarmasin

Sudirman street is one of the major streets in Banjarmasin city that has many of government offices. As a major street the vehicle speed on this street is quite high. Nevertheless, during peak hours this street deals with traffic congestion. Almost similar, the Pierre Tendean street is in an area that dominated by residential, educational, and mixed functions. Despite the vehicle speed is moderate, during peak hours the street also deals with congestion problems. In order to provide pedestrian safety, improvement on pedestrian facilities is needed. Based on the survey, the pedestrian facilities along at this segment have characteristics: (1) main access to the Martapura river and water transportation, (2) each street has a different tone; Sudirman street (domination of government offices) and Pierre Tendean Street (housing area, education facility, and mixed-use area), (3) limited green corridor – shade trees, (4) high speed vehicle on Sudirman street, (5) limited parking space at Sudirman street and Pierre Tendean street, and (6) traffic congestion during peak hours on both streets. In order to provide safety to pedestrian, improvement on pedestrian facilities is needed.

The walkability rating at corridor of Sudirman Street is as follows:

Table 4 Rating of walkability at the Design Competition Site

Parameter	Walkability Rating
Conflict – pedestrian and other mode of transportations.	94.19
Availability of pathway	82.58
Availability of crossing	71.61
Crossing safety	70.32
Behavior of motor vehicle user	70.97
Amenities	43.23
Infrastructure facilities for disable	20.00
Obstruction	83.55
Walking security	90.97
Total Average	69.71
Results	Average

From the interviews, the study gathers information about perception and preference on pedestrian facilities and characteristics. The Banjarmasin case also wants to achieve accuracy of 95%, therefore it applies two formulas which are, (1) Population unpredictable/known – population is the city inhabitant and (2) population unpredictable/known - assuming Banjarmasin is a destination city for tourism; therefore, some of the pedestrians could be tourists from other cities. Banjarmasin City has population approximately 666,223 people (BPS City of Banjarmasin, 2015). The calculation is as follows:

$$n = \frac{666223}{1 + (666223 \times 5\%^2)} \quad (1)$$

Result, n = 399,759 ≈ 400 sampel

$$n \geq \frac{1}{5\%^2} \quad (2)$$

Result, $n \geq$ 400 sampel

From the calculation of formula 1 and 2, the study needs at least 400 samples in order to get 95% accuracy. The survey only collected data from 300 respondents, nevertheless, if the calculation is reversed, the error level of 6.4% is still acceptable.

The interviews results show that most of the respondents consider that the conflict with the motor vehicle is minimum, as well as pedestrian facilities, are provided along the promenade (see Figure 7). However, many of them argue that the facility for disable, security, and pedestrian-crossing facility are limited and need to be improved (see Figure 8). Therefore, the study asks the pedestrians (respondents) to make a list of priorities regarding improvement on pedestrian facilities. The list has nine-parameters of priorities that related to the pedestrian facilities improvement and respondents must make the list of priority three times. Accordingly, these lists will help the study to understand the respondents' preferences and their rank of priorities development. Still, some of the respondents have difficulties in setting priorities. Because of this condition, the study only selects the top three

over the nine-parameters. The three stages of respondents' preferences are: (1) reduce the speed of motor vehicle for pedestrian safety (motorists' behaviour) (15.3%), (2) provision of pedestrian-crossing facilities (currently this segment does not have any pedestrian bridge) (16.7%); (3) improve the amenities (12.7%). The ranking of the three stages priority can be seen in the following Figure 8.

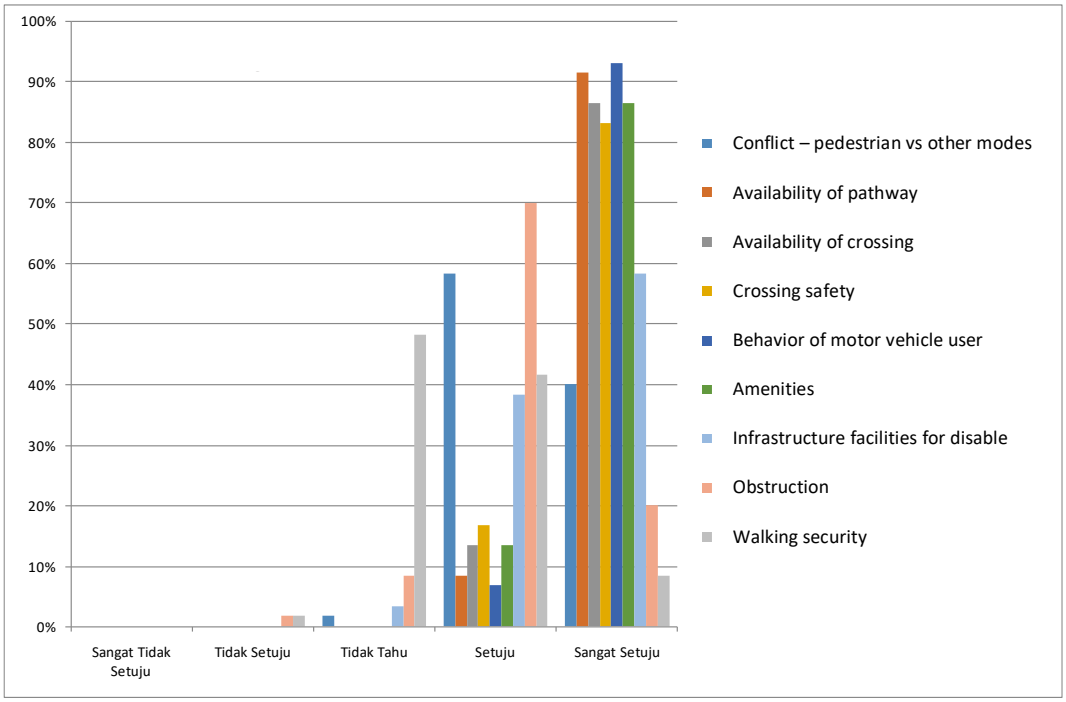


Figure 7 Ranking of the Pedestrian Facilities Condition at the Competition Site, Banjarmasin

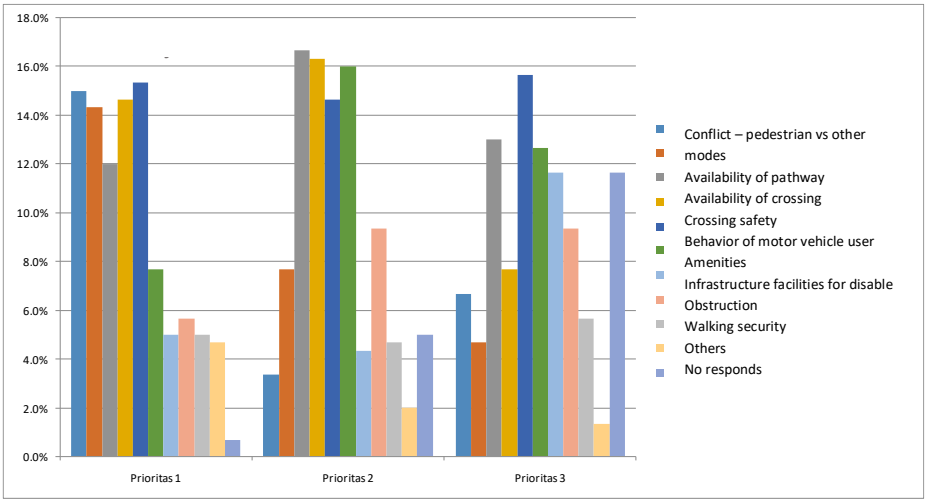


Figure 8 Respondents' Priority for the Facility Improvement, Banjarmasin

5. The Design Competition

The Ministry of Public House and Housing would like to gather more ideas from the public; therefore, they initiate a design competition in those cities, Bogor and Banjarmasin. The design competition was held in 2015 and aims to gets smart, innovative and realistic ideas for improving the quality of pedestrian facilities based on green city concept in Bogor and Banjarmasin. The competition introduced three design criteria based on the green city concept, namely: (1) green transportation, (2) green building, and (3) green open space. Besides that, participants have to meet the requirements in each city. In Banjarmasin, the participants have to design a pedestrian path along the riverbank. At present, the pedestrian lines at the edge of the water are cut off by the bridge. The continuous pedestrian path at that time was not yet possible because the bridge height was too low. In the future, Banjarmasin city government has a plan to increase the height of the bridge so that it is possible to make continuous access under the bridge. The design of pedestrian paths under the bridge must prioritize aspects of safety and security for the user, mainly because this river is the circulation path of freight and passenger ships. Besides, participants must also consider the use of space under the bridge at night. User safety and security are essential aspects of design. While in Bogor, the participants have to manage limited space of pedestrian because of trade and service activities that forced the pedestrian walking on the street at specific locations. With this condition, Sudirman street corridor has not been able to provide an image as a heritage axis that has historical value. The design competition is expected to improve the quality of pedestrian facilities along the Sudirman street corridor that encourage walking activities. The design competition got positive responds and received twenty-two design proposals.

5.1. Bogor City

The “Dialogue between Spaces” was the second winner of the design competition. It has the meaning of collaboration between nature, economic, and cultural factors as a representation of a public space in the city of Bogor. According to the team of jury, this concept had original idea and focused on utilize the local characteristic. Using the tag-line of Dialogue between Space, the designers would like to introduce the 3K zone label-attributes: Contemplating Space-Contemporary Space-Colonial Space-and the nodes connecting and set the axis of Sudirman Street. Other interesting points from the design are:

1. Integrated the walkability principle (improve pedestrian facilities, provide comfort and equality, and safety).
2. Build a sky walk to connect areas such as residential, commercial, office and recreation, and landmarks.
3. Improve green open space through develop buffers, multipurpose pathways, natural furniture, and connected green canopy.
4. Encourage integration of eco-friendly transportation with the Pedestrian path.
5. Innovative design of pedestrian facilities and amenities (book shelter, story frame, Skywalk, swing chair, pedestrian path with Batik motif, etc.).

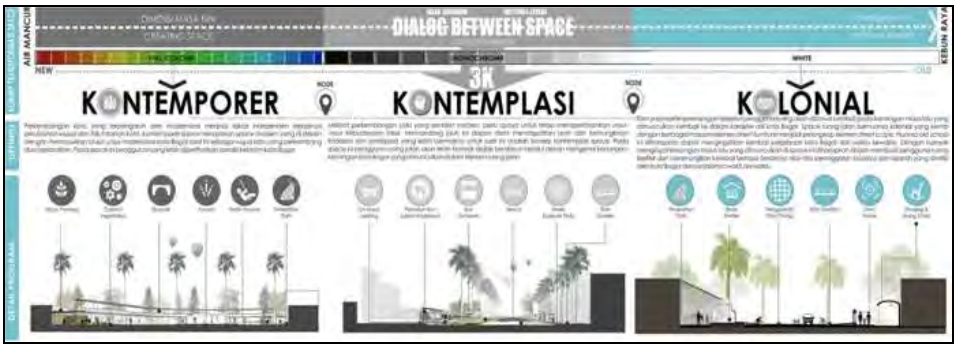


Figure 9 The 3K Zones of the Sidewalk at the Sudirman Street, Bogor

5.2. Banjarmasin City

The "Great City Walk: Banjarmasin – Martapura Green Movement" was the winner of the design competition. The designer translated the local dialect of Baugal (Banjar dialect), which means 'moving'. Moving defined the urban citizens activities, able to walk, run, and move freely. This made the idea of this design original and rooted locally. Besides that, the designer also able to combine the components of the city of Banjarmasin that are integrated with the elements of the Martapura River. The designer creatively associates with the network system approach, based on strengthening the urban infrastructure network system as well as the river infrastructure network system. The designer succeeded in describing future infrastructure ideas, including:

1. River traffic with waterways and interchanges.
2. Integrated the street network system with the river terminals.
3. Drainage system integrated with river revitalization.
4. Demonstrating energy traffic intersection and stop APU stops.
5. Develop social infrastructure in pedestrian and community infrastructure designs.
6. Ecological integration in complementary infrastructure and street equipment.

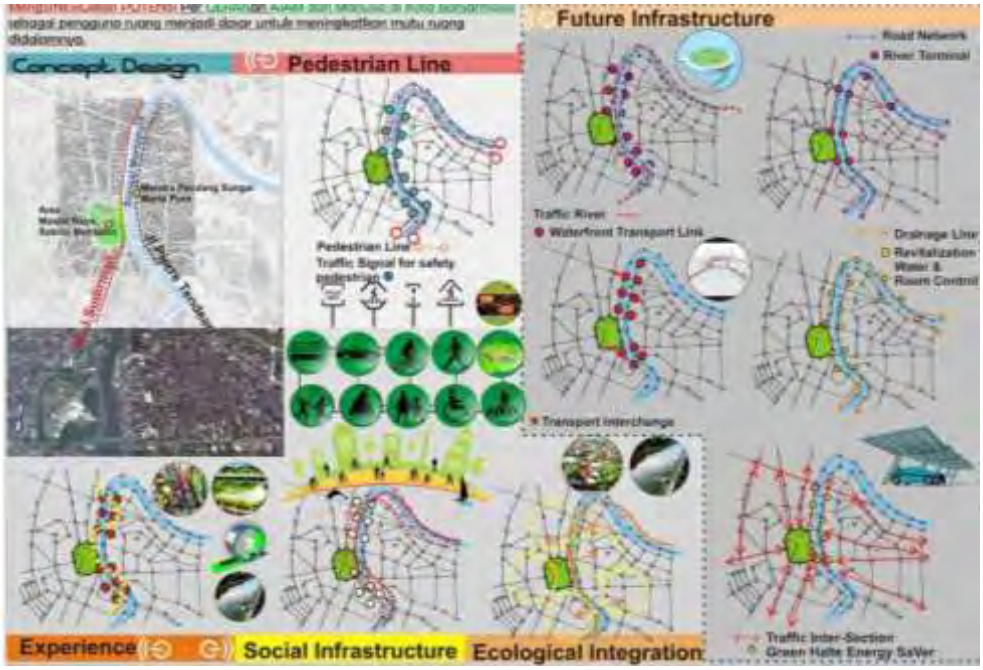


Figure 10 The Concept of Great City Walk: Banjarmasin – Martapura Green Movement

6. Conclusions

The study concludes some findings:

1. In general, the local governments have provided pedestrian facilities; however, some facilities still need to build and improve to encourage walking activity.
2. Study on the walkability index helps to identify potentials and problems regarding the walking activity.
3. Further study regarding the walkability index needs to be carried out after the improvement of pedestrian facilities to identify the potential increase of walking activity.
4. The design competition brings some innovative ideas to improve the quality of pedestrian facilities. Nevertheless, a few of the ideas must be adjusted to the real condition.
5. The public participation through the survey interviews and design competition is useful to gather information and understanding regarding the idea of pedestrian facilities from the public.

7. Acknowledgments

The authors would like to thank the design team "Great City Walks: Banjarmasin – Martapura Green Movement": Jimmi Roy Tampubolon and design team "Dialogue between Spaces": Ardhyasa Fabrian Gusma ST, Eka Pradhistya Prasidhanta, and Anisa Yulia Rakhmanita.

8. References

Arup (2016) Cities Alive: Towards a Walking World, Arup, London

Althoff, T., Sosic, R., Hicks, Jennifer L., King, Abby C., Delp, Scott L. (2017) "Large-scale Physical Activity Data Reveal Worldwide Activity Inequality", Nature, Vol. 547 pp. 336-339 (July)

BBC (2017, July 12) Data Ponsel Dunia: Orang Indonesia Paling Malas Berjalan Kaki, retrieved from https://www.bbc.com/indonesia/majalah-40577906

Bull, A. (2003) Traffic Congestion: The Problem and How to Deal with It, United Nation Eclac – GTZ

Darmoyono, L., and Tanan, N. (2015) *8th IFOU Conference Proceeding*, Incheon, Korea, C014, doi:10.3390/ifou-C014

Edwards, P., and Tsouros, A. (2006) Promoting Physical Activity and Active Living in Urban Environments, WHO, Europe

Glaser, M., Hoff, M., Hans, K., Laven, J., Teeffelen, J. (2016) The City at Eye Level: Lessons for Street Plints, Eburon Academic Publisher, Delft

Jeff, S. (2012) Walkable City, North Point Press

Krambek, H., and Shah, J. (2006) The Global Walkability Index: Talk the Walk and Walk the Talk

Leather, J., Fabian, H., Gota, S., and Mejia, A. (2011) ADB Report 2011-17

Lindfield, M., Steinberg, F. (2012) Urban Development Series: Green Cities, Asian Development Bank

Matthew, E. K. (2006) Green City: Urban Growth and the Environment, Brookings Institute Press

Ministry of Public Works and Housing (2011) Program Pengembangan Kota Hijau (P2KH): Panduan Pelaksanaan (Kementerian PUPR, Jakarta, Indonesia

Municipality of Bogor (2014) Rencana Penataan Kawasan Pusaka Kota Bogor, Bogor, Indonesia

Shandu, S. C., Singru, R. N., Bachmann, J., Sankaran, V., Arnoux, P. (2014) Green Solution for Livable Cities, ADB

Tanan, N. and Darmoyono, L. (2017) Achieving Walkable City in Indonesia: Policy and Responsive Design through Public Participation, ICONBUILD Conference Proceeding, Palembang, Indonesia

The Economist Intelligence Unit (2012) Asian Green City Index: Assessing the Environmental Performance of Asia's Major Cities, Siemens

Trancik, R. (1998) Finding Lost Space: Theoris of Urban Design, John Wiley, US

Welle . B., Qingnan , L., Claudia, A. S., Sarmiento, C., Obelheiro, M. (2013) Cities Safer by Design, Embarq

Case Study / Project

Importance of air quality management

for public health and development progress in Jakarta, Indonesia

Lynn TANG, Vivian PUN, Ririn RADIAWATI

Abstract

Air pollution levels in metropolitan Jakarta, capital city region of Indonesia, are high and rising, posing a serious public health threat to 32 million residents. it was estimated that over 5.5 million people in DKI Jakarta (58% of the population) suffered from various air pollution-related illnesses (e.g., asthmatic bronchiale, coronary artery diseases) in 2016, and the associated direct medical cost could go as high as IDR 51.2 trillions (or USD 3.9 billions). Experts also reported that the total economic cost of health problems associated with air pollution in Jakarta would increase to 2.5% of Jakarta's expected GDP in 2015 (or 4.3 trillion rupiah or USD403 million) as opposed to 1% in 1998, if no action to control air pollution is taken. In 2017, the annual average concentration for particulate matter with aerodynamic diameter of less than 2.5 micron (PM2.5) was 41 ug/m3; daily concentrations rarely meet the World Health Organization's health-based air quality standard of 25 ug/m3. The current official air pollution monitoring conducted in Jakarta is inadequate: PM2.5 is not monitored nor have there been recent assessments of particle composition to inform source apportionment.

These limitations and a lack of reliable emissions inventories and regional air pollution data are barriers to planning and implementing greater control of air pollution in DKI Jakarta. In 2018, the Governor's office announced äóìGrand Design: Air Pollution for a Healthy Livable Cityäó to carry out a multi-stakeholder assessment and planning process to produce recommendations for air quality improvement in Jakarta.

This talk highlights approaches to combining strategic use of innovations in air pollution monitoring, emissions estimation and source apportionment modeling to inform near-term control measures for priority sources at a local and regional level in Jakarta. Topics to be addressed will include: multi-stakeholder collaborative approach for complex issues like air pollution, the importance of strategic communications and public awareness of air pollution health effects, emerging results from source apportionment work underway to identify leading PM2.5 sources in the metropolitan area, the policy implications of emerging local data on air pollution and stunting, and the challenges of addressing both local pollution sources within direct control of DKI Jakarta and transported pollution from sources such as episodic haze from peatland fires.

Research Paper

BETTER PLACES FOR A LIVABLE – AND LIVELY – CITY

A method of Post-Occupancy Evaluation of public spaces

Gabriela de Souza TENORIO, University of Brasilia, Brazil

Abstract

Public spaces that attract and retain diverse people are crucial to foster urbanity and tolerance, and build stronger and livelier communities, especially in big cities. The simple coexistence of similarities and differences in public spaces can, to say the least, validate our own essence and offer us a possibility of growth. Sharing the same space with other people – even without interacting with them – favors social learning. Theory suggests that thought, feeling and behavior can be altered by observation. The search for public spaces that make urbanity viable is desirable in any society (especially in more unequal societies, as one can find in developing countries). However, inspired by ideas built on the critique of great urban agglomerations after the Industrial Revolution, cities around the world have undergone transformations that did exactly the opposite. As a series of lifeless places began to emerge, several researchers tried to figure out why this was happening. These researchers found that just wanting to create a lively place was not enough. It was necessary to scrutinize the behavior of people in public spaces in order to understand the relationship between their configuration and use. The knowledge they have built has been largely responsible for the increasing concern with public spaces and their relation to public life since the 1960s. Cities around the world are realizing that empty places could be full of people, and that not only a place full of people is something positive, but an empty place is not. They are learning to see underused public spaces as social, cultural, environmental, and financial waste. However, even with so much information available, it is still possible to find, in any contemporary city, public spaces that fail to support public life. Frequently, little or nothing is done to make them safer or more attractive, diverse and pleasant. It is even more worrying to realize that such places continue to be created. This is the focus of this paper. It brings together available knowledge and experiences in the area of public space design. It also complements, structures and translates such experiences and knowledge into a Public Space Post-Occupancy Evaluation Method, which stresses the importance of observing people and their activities. As a result, one can better understand, observe, assess and, thus, manipulate the main attributes of a public space that may influence its capacity to attract and retain diverse people on a daily basis. The method is offered as a tool to support those who deal with public spaces at different levels – from academic studies to municipal management. It has been used in Brasilia, Brazil, for the past 7 years, with positive results in governmental decision-making processes. A case study is briefly presented to illustrate its use.

Keywords

Public spaces, public life, urbanity, Post-Occupancy Evaluation, method

1. Introduction

As a concept, livability – just like quality of life – can be controversial in terms of its meaning from the point of view of individuals. According to Ruth & Franklin (2013), urban life expectations may vary according to several factors, such as the stage of life people are in, or their preference for using individual transportation. However, in the context of city planning it is important to acknowledge that our attempt to distribute urban onuses and bonuses in a fair manner among the entire population – without undue privileges – leads us toward considering the collective good, focusing on points in common, rather than individual or group preferences and desires.

As urban components, public spaces are capable of favoring collectivity. When addressing the concept of livability, Jacobs & Appleyard (1988), Young & Hermanson (2012) and Herrman & Lewis (2017), among others, often consider public spaces as streets or parks (and less so in the form of squares). There is a clear concern with securing a good mix and distribution of housing and other activities, so as to create walkable areas and favor public and non-motorized transport, and thus avoid road traffic and pollution. In addition, from the perspective of preventive medicine and promotion of physical well-being, parks and walking/recreation areas are an important tool against health conditions caused or aggravated by urban life, such as obesity, heart and respiratory problems, etc. The terms "community" and "neighborhood" are widely used in the context of public spaces. Coexistence and social interaction, on the other hand, are not as common, since they can also take place in enclosed spaces, such as gyms or community centers.

However, it is important to point out that public spaces are not only leisure and exercise areas, nor links between different urban activities: they connect human beings, as they offer us an opportunity to see other people (co-science) and share the same space with them (co-presence). They are not only a means for us to meet individual needs, but rather a tool that enables us to perceive ourselves as part of a whole. Public spaces welcome and reveal differences, while allowing us to choose between isolation and interaction. It is in them that individuals find collective life, and are able to exercise their urbanity.

The dictionary definition of urbanity points us towards important social values: “Courteousness and refinement of manner" (Lexico, 2019). According to Holanda (2002), it represents one of "democracy's dearest universal values.” It is present in the exercise of tolerance, in the negotiation of interests, in empathy, collaboration, and participation in temporal life. As a concept, urbanity includes the idea of face-to-face interactions, which can only take place among individuals who share the same space. Yet, for this to happen, such spaces must be able to attract and retain individuals.

The search for urbanity – and for public spaces that make it viable – is established as something desirable in any society. However, inspired by ideas built on criticism of how post-Industrial Revolution cities led to great human agglomerations, many cities around the world underwent transformations that gave rise to a number of lifeless areas – despite their early claims that such places were meant to be used by people. Several scholars, then, began to try to understand why this was happening, and found that the mere intention to create a living space was not enough. It was necessary to conduct an unbiased observation of people's behavior in such places so as to understand the relationship between their

configuration and use. The knowledge built by them was largely responsible for the increased concern with public spaces that favor urbanity observed since the 1960s.

However, even with so much information available, it is still possible to find lifeless public spaces in cities. In many of them, little or nothing is done to make them more attractive, safe, adequate, diverse, or pleasant to the population. The worst of all is that such places are still being created! It is in this context that a method has been developed to help change this reality. It helps us to understand, learn how to observe, evaluate and, consequently, manipulate the main attributes of a public space that may impact on a place's ability to favor co-presence, so that our cities may be not only livable, but also lively.

2. The method

The method was first presented by Tenorio (2012) in her doctoral dissertation. Since then, it has been improved, building on reflections arising from its application in practical activities developed at the Faculty of Architecture and Urbanism of the University of Brasília (Tenorio, 2014); collaborative actions performed with the Government of the Federal District to improve the central areas of Brasilia (Tenorio & Kronenberger, 2017); and MA theses that focused on the topic of public spaces (Menezes & Reis, 2015; Cardoso, 2019).

The work is based on the Space Syntax Theory, as it highlights the inextricable relationship between the form of human settlements and the society that produces, uses and reproduces them. According to this theory, "Spatial order is one of the most striking means by which we recognize the existence of cultural differences between one social formation and another, that is, differences in the ways in which members of those societies live out and reproduce their social existence." (Hillier & Hanson, 2003)

Form attributes harmonize with social expectations that are based on peoples' cultural patterns, from which Holanda (2011) draws two major socio-spatial paradigms: formality and urbanity. While the first considers cities according to spatial patterns that contemplate segregation, border control, high hierarchy, and separate functions, the other favors integration, elimination of borders, proximity, low hierarchy, and diversity of uses. The paradigm of urbanity has been the foundation for our knowledge about public spaces.

With these expectations in mind, the method brought together available knowledge and experiences on the design of public spaces, and translated, complemented and structured them. It built on research developed by the following authors: Jane Jacobs (1961); Jan Gehl (2006, 2010); Jan Gehl & Lars Gemzo (1996); Christopher Alexander et al., (1977); William Whyte (1980); Bill Hillier & Julienne Hanson (1984); Allan Jacobs & Donald Appleyard (1987); Frederico de Holanda (2011); Project for Public Spaces (2005) and (2008); and Congress for the New Urbanism (1993). The parameters found in the evaluation part of the method come from this literature review.

The method includes 5 steps: 1) knowledge of the place; 2) public life survey; 3) public life evaluation; 4) public space evaluation; and 5) recommendations.

2.1. Knowledge of the place

The method starts with selecting and visiting the place to learn about it, or to see it with different eyes (if you already know it). Researchers should try to access it in different ways, on different days and times, to walk, explore, experience and register it. These field trips will

also allow researchers to produce or update a detailed plan of the place and its borders, as well as define survey spots for the next stage. In addition, it is essential to know the area of the city where it is located, to study it in its urban context with the support of texts, maps, drawings, aerial photos, statistical data, legislation, etc.

2.2. Public life survey

This step presupposes systematic field trips to perform pedestrian flow counts and a survey of stationary activities. The greatest benefit of going to the field is the fact that researchers can remain on site for enough time to absorb the dynamics of how the place is used. We are interested in finding out who is doing what, where and with whom. The procedures suggested by Gehl & Svarre (2013) and by Project for Public Spaces (2005) are applied at this stage. Pedestrian flow counting spots are selected, from where passers-by are counted, usually in 10-minute slots. The results are subsequently multiplied by 6 to obtain an hourly average. For stationary activities, which will later be transformed into behavioral maps, records are taken every two hours at a fixed spot. Informal interviews, photographs, questionnaires, and other techniques (such as image research) may and should be incorporated into this step. The collected data are then processed and presented as charts.

2.3. Public life evaluation

This step is based on checklists linked to subjects and activities. All these items are used to create a spreadsheet to be filled after the field trips.

For subject evaluation, a key requirement is for the place to have people – diverse people, all the time, and every day (i.e., excluding previously scheduled events, parties, demonstrations, etc.). Thus, the evaluation items are:

1. **People**. Although this may seem obvious, it reminds us of how important it is to focus on people, not on the place. A place may be considered beautiful, but if it is always empty, it is considered inefficient as a support for public life, and would therefore not do well under this criterion.

2. **Diverse people**. The place should allow for the co-presence of diverse people, in terms of gender, generation, race, ethnicity, etc. This diversity should reflect the society where the place is inserted, and include local residents. The existence of diverse people should contemplate individuals as well as couples and groups. Researchers should observe whether they can identify any prevailing groups, and whether such groups might inhibit the presence of other groups or individuals. An important point highlighted in the literature is the strong presence of women. In public spaces, women are more vulnerable and more subject to unwanted approaches, and therefore they tend to be more selective about where to linger. A gender-imbalanced location is considered problematic.

3. **People, all the time.** The selected place should have people most of the time and throughout the week, and their presence should be evenly distributed. If the place is crowded only during lunchtime on weekdays, it probably has some issues. This assessment should consider aspects related to the place and its people, such as climate and culture, which might influence the daily life and the use of public spaces.

   There are some public spaces that do not attract people every day. However, when they do, they receive a number of people that hardly any other place in the city might contain. They are usually very large, and are meant for symbolic rather than temporal

use. Such symbolic places are important, though they carry the burden of being empty most of the time.

Regarding **activities**, public spaces should have:

4. **People passing by.** Passing by is a very common activity in any public space. The expected number of people will depend on the characteristics of each place. Some public spaces are central, close to activities that attract the public, and therefore one might expect to find a large number of passers-by. On the other hand, some spaces are more local, and the daily flow of people is less significant.
5. **People lingering.** Whether they were passing by and decided to stop, or they meant to go to that public space to stay there, the presence of people lingering at one place is evidence that such place offers reasons for that choice. There is no set parameter to establish an optimal lingering time: it can be influenced by various factors, including climate, for example. But in fact, the more people linger at one place, the more successful it can be considered as a public space.
6. **People meeting, either voluntarily or by chance.** Public spaces should enable random encounters involving people that know each other and also complete strangers, as this is the very basis of urbanity. However, they should also provide a place for people to arrange meetings with friends, acquaintances or strangers, with a clear indication that they chose to do that.
7. **People keeping and watching the place, either formally or informally**. Public spaces require people to maintain them, either formally or informally. The same can be said of those responsible for their surveillance. Informal surveillance – Jane Jacobs's "eyes on the street" – is always welcome.
8. **People performing various activities.** The more diverse and simultaneous activities are identified, the better the place will perform as a support for public life. Such activities may: (a) take place within a public space, through the support of its constituent elements (people playing on a sports court, children climbing trees, young people talking in the shade); (b) take place near its borders, whether they stay there (in shops or cafés) or move towards the public space (someone buying an ice cream near the border and eating it on a bench in a square); and (c) be motivated by the presence of people in the place (people distributing fliers, street vendors, street musicians). If, in addition to their daily use, the spaces still host, sporadically or frequently, scheduled activities, this means that they are managed well and are valued by the community. These activities may be passive or active.

2.4. Public space evaluation

After getting a picture of public life in your space, it will be possible to determine whether it favors it, and to what extent. It will also be possible to tell if such life is consistent with the place's characteristics and its role in the city. For this assessment, one should bear in mind that there may always be more people in the place, that they can always be more diverse, and that they can always perform more activities, for longer, in a better way.

If a place is successful in public life, it is important to understand why, so as to use it as part of your repertoire, or as an example of good practice (it is also interesting to find out if there is anything else that can be done to make it even better). If it is not successful, it is important

to understand the reasons for its poor performance. Thus, the evaluation of public life does not dispense with the evaluation of how that specific public space is configured.

Several authors focus their studies only on the physical characteristics of the **place** (flooring, furniture, shading) and fail to observe the elements that define it, that is, its **interface** (surrounding buildings and their public/private relationship, their doors and windows, the activities they offer), as well as the wider **context** of the area (location in the city, zoning, accessibility, population density). Often the main reasons for a place's limited use are not linked to its local attributes, but rather to its location away from the main flows of people, or their belonging to a monofunctional zone.

For this step, we use two spreadsheets with the same characteristics of the previous ones to deal with public space configuration elements: global attributes, or **urban context;** and local attributes, i.e., **interface** and **place**.

Regarding global attributes – **urban context –** one must analyze the configuration of the area in the city where the place is. In general, in order to favor the presence of people:

9. **Areas should be compact.** Their open space/total area ratio should not be very high. They cannot have idle and residual areas, and their buildings should occupy the ground efficiently, thus increasing the use of infrastructure and favoring the implementation of public transportation.
10. **Areas should be integrated.** The presence of the following elements should be minimal: cul-de-sacs, places with few access points, and very large blocks. With more connections, route alternatives are expanded, which not only promotes a better distribution of activities and people through the urban fabric, but also favors the implementation of public transportation systems and decreases travel times.
11. **Areas should provide a mix of diverse uses.** Except for very specific situations involving health and safety issues or risks, they should offer a variety of activities. They should be well distributed, be complementary, and function beyond business hours.
12. **Areas should offer different types of housing – well distributed and with a certain degree of density**. Housing should be one of their main uses. The areas should envisage different types of housing so as to accommodate diverse people. This avoids the development of zones with very homogeneous population, which would result in low diversity levels in public spaces. The density may vary within the area, which also favors diversity, but cannot be very low.
13. **Areas should favor the mobility of pedestrians, cyclists and public transportation, rather than cars.** Using private cars on a daily basis should be a less enticing option than other means of transportation. Parking spaces should be limited, and should not be free. These areas should be able to offer an integrated public transport system and a cycling system. Walking, cycling and using public transportation should be easy and enjoyable experiences.

Regarding local attributes (**interface and place**):

14. **Places should act as passages to other places**. They should be favorably located in relation to their area in the city, and preferably be connected to other places. This would favor the constant flow of passers-by.
15. **Places should have clear boundaries, and their size should be consistent with their characteristics**. Interfaces should be clear, as well as the distinction between public and private. The size of the place should be proportionate to its role in the urban context.

16. **Buildings should be of different types and present different characteristics** so as to accommodate diverse people and activities.

18. **The boundaries of the place should have many doors and windows opening towards it.** There should be no blind spots (out of sight for doors or windows). The boundaries should have "eyes on the street" (Jacobs, 2007), which provides informal vigilance and, consequently, a sense of security.

19. **Places should be at ground level** (Whyte, 1980), in line with the natural relief. This allows greater accessibility to the whole area and favors the visualization of its activities from surrounding private spaces.

20. **Places should be accessible by public and non-motorized transport, and should offer pedestrians good access and circulation options**. The connections between places and their boundaries should prioritize pedestrians, be frequent, open, safe and at ground level, and avoid underground passages or elevated walkways. These places should present no obstacles to pedestrian circulation, and should be accessible.

21. **Interfaces between places and their surrounding areas should support diverse activities.** It is essential to have a mix of housing and activities that run day and night, such as establishments that sell food – bars, restaurants, outdoor cafes, etc.

22. **Public spaces should contain places and elements that enable diverse activities, so that they can be seen as a destination.** They should be passive and active, available on weekdays and weekends, and appeal to a variety of people. Places should adequately support the activities identified in the public life survey.

23. **Places should be pleasant and comfortable in terms of temperature, light, sound and air quality** (including odors). They should be well lit at night.

24. **Building and maintenance costs should be compatible with governmental reality**.

25. **Places should have their own identity, and act as an element that favors the orientation of people in the surrounding area and within the place itself.**

26. **Places should have elements that symbolize their history, population and characteristics and, ideally, they should be a symbol of their surrounding area, including elements that make them memorable.**

27. **Places should avoid causing negative affects and should provide a sense of security, so that pedestrians can feel that they control the place, and that someone is watching over them**. In addition, they should make everyone feel that they also belong there, that they are entitled to be there, and to do something positive for them.

28. **Places and their components should be beautiful and well cared for.**

2.5. Recommendations

After assessing the elements of public space configuration, one should try to understand their relationship with the public life observed there, so as to identify correspondences and discrepancies, and eventually conclude whether or not there is a need for intervention. A summary of the tables will point out any negative and positive aspects.

If a public space is assessed as good, one should consider how to make it even better. If not, it will be necessary to study the variables that performed poorly, and consider how to reverse this. The interventions that will be recommended as a result of the study can be listed from the simplest, cheapest and/or shorter term (which can even be applied on an experimental basis) to the most complex, expensive and/or longer term.

In general, not all variables can be manipulated. In some cases, it is not desirable that they should be, since this would mean disregarding what such public space represents. Having clarity on the place's role in the city is therefore the first step towards filtering the variables that should be manipulated, the degree of manipulation to which they can be subjected, or what agents may be involved in their transformation process.

This is consistent with the guidance we find in PPS (2005) on the need to develop a collectively built vision for the public space under scrutiny. That is why one cannot interfere in a public space without considering the people that have a direct link with it: who they are, what they think and how they act.

3. Method application

A brief case study seeks to exemplify the post-occupation evaluation of public spaces in Brasilia's Bus Station Platform, located in the heart of the city. It is a UNESCO World Heritage Site of modernist DNA and a design based on the paradigm of formality. In other words, it has negative characteristics for public daily life. Below the platform we will find Brasilia's urban bus terminal and its central subway station (figure 1).

Figure 1. City Center, Brasilia, Brazil. In the foreground, the Bus Station Platform, with clear spaces for private cars, and its two squares, one on the left and the other on the right. In the background, we can see the Esplanade of Ministries. Photo by Joana França.

In order to gain knowledge on the place, we analyzed the documents that originated the city layout, data on urban and metropolitan contexts, and cultural heritage legislation. We also carried out an image survey, which relied on mental maps made by interviewees. The public life survey was done on a Tuesday and a Saturday. The flow count took into account the access points to the area, as well as internal flows originating from the bus station. There is a significant presence of street vendors. The data collected in steps 1 and 2 are shown in figure 2.

Figure 2 Step 1 (Knowledge of the Place), and Step 2 (Public Life Survey)

The public life evaluation identified an intense flow of passers-by, together with a very low number of people lingering in the squares, with strong male presence (uneven population). The diversity of activities performed by the subjects were considered poor: the place is just a passageway. The public space evaluation shows that it scores high in terms of location, symbolism, identity and beauty. Its results were poor for the vast majority of global attributes (rigid separation of functions, absence of housing, mobility favoring individual transportation); and particularly poor for local attributes, such as comfort and the offer of support equipment for different activities (figure 3).

Variáveis			
nº	nome	nº	categoria
SUJEITOS			
1	número de pessoas		
2	variedade de pessoas	2.1	gênero
		2.2	faixas etárias
		2.3	classes sociais
		2.4	grupos
3	distribuição das pessoas no tempo		
ATIVIDADES			
4	passagem		
5	permanência	5.1	número
		5.2	duração
6	encontros	6.1	ocorrência
		6.2	tipo
7	manutenção e vigilância	7.1	ocorrência
		7.2	tipo
8	demais atividades	8.1	número
		8.2	origem
		8.3	tipo

ATRIBUTOS GLOBAIS			
9	espaço livre público	9.1	quantidade
		9.2	dimensões
10	integração global		
11	atividades	11.1	variedade
		11.2	distribuição
		11.3	complementar.
		11.4	distr. temporal
12	habitação	12.1	variedade
		12.2	distribuição
		12.3	densidade
13	mobilidade	13.1	pedestres
		13.2	ciclistas
		13.3	transp. público
		13.4	transp. privado

ATRIBUTOS LOCAIS			
14	localização	14.1	integrac. global
		14.2	integração local
15	limites e dimensões	15.1	clareza limites
		15.2	contig. limites
		15.3	público/privado
		15.4	dimensões
16	tipos edifícios		
17	portas e janelas	17.1	espaços cegos
		17.2	núm. de portas
		17.3	rel. públ/priv.
		17.4	front. suaves
		17.5	janelas
18	piso		
19	acesso e circulação	19.1	transp público
		19.2	pedestres cicl.
		19.3	conexões
		19.4	circulação

20	atividades na interface e arredores do lugar	20.1	variedade
		20.2	distr. espacial
		20.3	complementar.
		20.4	distr. temporal
21	atividades no lugar	21.1	variedade
		21.2	distr. espacial
		21.3	complementar.
		21.4	distr. temporal
22	conforto	21.1	higrotérmico
		21.2	luminoso
		21.3	sonoro
		21.4	qualidade do ar
23	custos	23.1	implantação
		23.2	manutenção
24	orientabilidade identificabilid.	24.1	orientabilidade
		24.2	identificabilid.
25	significado e simbolização	25.1	significado
		25.2	simbolização
26	afetos		
27	beleza e conservação/ manutenção	27.1	lugar
		27.2	elementos
		27.3	Conserv./manut.

Figure 3 Step 3 (Public Life Evaluation), and Step 4 (Public Space Evaluation). The tables summarize the assessment. The results range from red (very bad), orange (bad), yellow (reasonable), light green (good) and dark green (very good). This image represents just the conclusive summary; each of the assessed categories must be justified according to the data collected, supported by the literature and illustrated with images or graphs.

Our recommended vision for the Bus Station Platform is that it should fulfill its role as the most privileged point in the city, revealing elements that are meaningful for the population and which, therefore, should be appreciated at leisure. It should assume its role as a key element in the city center, favoring the connection to other neighboring sectors. It should be the core of urban life and a comfortable, safe, diverse place, widely used on several days and times, favoring pedestrians and public transportation users.

Based on this assessment, with no prejudice to the attributes of a World Heritage Site, we recommend minor interventions that do not interfere in the macro structure of the landscape, but that make a great difference for pedestrians: adjusting the road traffic system; reducing the area meant for cars; offering priority, safety and comfort to passers-by; providing shading on routes and squares; enhancing the place with street furniture; organizing the presence and activity of street vendors; and revisiting original ideas from the time when Brasilia was created, such as back-lit advertising panels.

4. Final considerations

Our method seeks to show that we can learn more about the places we are studying. Interventions need to be informed, context-appropriate and effective if they want to fulfill their purpose of attracting more people to public spaces, and keeping them there. It highlights features that can eventually be developed, according to their need or feasibility, within the field of knowledge of each of the items present in it. It favors breadth rather than depth – two potential research strands.

So far, its application has shown that it can be useful for its intended purpose, including corrections, adaptations and extensions. Evidence of potential benefits and problems in existing places helps us to create new public spaces that do not reproduce unfavorable realities for social appropriation, and that can be useful to the community in the construction of a living and livable city.

5. References

Alexander, Christopher; Ishikawa, Sara; Silverstein, Murray (1977) A pattern language, New York: Oxford University Press.

Congress for the New Urbanism (1993) "Charter for the New Urbanism" Availabel at: https://www.cnu.org/who-we-are/charter-new-urbanism [Accessed 10 Jul. 2019]

Cardoso, Alice (2019) "A Praça Maior da Universidade de Brasília: arquitetura paisagística e cotidiano", MA thesis, University of Brasilia, Brasilia.

Gehl, Jan (2006) Life between buildings: using public space, Copenhagen: The Danish Architectural Press.

Gehl, Jan (2010) Cities for people, Washington: Island Press.

Gehl, Jan; Gemzoe, Lars (1996) Public spaces, public life – Copenhagen, Copenhagen: The Danish Architectural Press.

Gehl, Jan; Svarre, Birgitte (2013) How to study public life, New York: Island Press.

Herman, Tyce; Lewis, Rebecca (2017) What is livability? [online] Available at: https://sci.uoregon.edu/sites/sci1.uoregon.edu/files/sub_1_-_what_is_livability_lit_review.pdf [Accessed 10 Jul. 2019]

Hillier, Bill & Hanson, Julienne (2003) The social logic of space, Cambridge: Cambridge University Press.

Holanda, Frederico (2011) Exceptional Space, Brasília: FRBH.

Jacobs, Allan; Appleyard, Donald (1987) "Toward an Urban Desing Manifesto". Journal of the American Planning Association, pp. 112-120.

Jacobs, Jane (2007) Morte e vida de grandes cidades, São Paulo: Martins Fontes.

Lexico (2019) [online] Available at: https://www.lexico.com/en/definition/urbanity [Accessed 10 Jul. 2019]

Menezes, Fernanda; Reis, Almir (2015) "Projeto Urbano e criação de espaços públicos: cidade Pedra Branca na grande Florianópolis" Anais do XVI ENANPUR, Belo Horizonte.

Project for Public Spaces (2005) How to turn a place around – A handbook for creating successful public spaces, Nova York: Project for Public Spaces.

Project for Public Spaces (2008) Streets as Places. Nova York: AARP.

Ruth, Matthias; Franklin, Rachel (2013) Livability for all? Conceptual limits and practical implications [online] Available at https://www.sciencedirect.com/science/article/abs/pii/S0143622813002324 [Accessed 10 Jul. 2019]

Tenorio, Gabriela (2012). "Ao desocupado em cima da ponte. Brasília, arquitetura e vida pública", PhD thesis, University of Brasília, Brasilia.

Tenorio, Gabriela; Kronenberger Bruna (2017) "Studies for a precise intervention – public spaces in a central area in Brasilia, Brazil" Proceedings of the International Conference on Changing Cities, Syros-Delos-Mykonos Islands.

Whyte, William (2001) The social life of small urban spaces, New York: Project for Public Spaces.

Young, Erika; Hermanson, Valerie (2012) Livability Literature Review: a synthesis of current practice, Washington: National Association of Regional Councils.

Research Paper

Study on Community Planning Strategy of Demolition and Resettlement Amid Urbanization

——Taking the constructive detailed planning of Longhai South District of Shandong Province as an example

Fujun XIA, Shanghai Tongji Urban Planning & Design Institute, China

Abstract

Along with the rapid growth of urbanization, a large number of villages in China are converted into demolition and resettlement communities due to government land replacement or village relocation and so on. However, most of the demolition and resettlement communities are different from ordinary commercial housing communities in terms of spatial characteristics, governance models, and social relationships, and currently some plans have many problems such as neglecting the livelihood of the residents and the public participation in the form, so the research on the relevant planning strategies is significantly important. In light of the problems existing in the existing demolition and resettlement community planning, combined with the construction detailed planning practice case of Longhai South District, a four-point planning strategy is proposed through the combination of theoretical research and actual cases: First, strengthening public participation can assist planning and design, the electronic questionnaire combined with the on-site discussion are recommended to public participation in the demolition and resettlement community. At the same time, public participation can guide the planning and design to make it more rational and pertinent, and to some extent, to revise the planning and design conditions. Second, innovative organization management system is beneficial to the promotion of the conversion process of farmers to the citizenship. Third, planning should not only consider the space but ignore the future livelihood of the residents, and it is of great importance to increase the employment opportunities and income sources of the residents. Fourth, the fairness and homogeneity of the demolition and resettlement community planning is particularly important, much attention should be paid to the continuation of the traditional context.

Keywords

demolition and resettlement community, constructive detailed planning, planning strategy, urbanization

1. Introduction

With the rapid advancement of China's urbanization process, the number of villages has also decreased drastically. The statistics show that China's administrative villages decreased from 629,100 to 580,900 in the 10 years from 2005 to 2015.1 Each year, a large number of villages are converted into demolition and resettlement communities due to government land replacement and relocation of villages, and most of them are resettled. However, most of the demolition and resettlement communities are different from ordinary commercial housing communities in terms of spatial characteristics, governance models, and social relationships. Therefore, the planning strategy needs to be matched in the relevant planning and design.

Wu Ying and Wang Lan (2018) analyzed the spatial characteristics and residents' evaluation of 31 communities (village committee is changed to community committee) in Dezhou City of Shandong Province, Nantong City of Jiangsu Province, and Chongqing City, and found that there are production difficulties and some inappropriate public facilities allocation problems in the villages, it is proposed that the residents in the villages should consider the employment of the residents in the site selection. We should further strengthen the public space allocation in the public space, and carefully consider the design of the room type with a flexible manner according to the needs of the residents. Li Qin (2013) pointed out that public participation in the planning and construction of European and American settlements pointed out that public participation should improve legislative and institutional guarantees, increase residents' awareness of participation, increase public participation, establish mass organizations, and set up a sound public participation system. Sheng Dong (2016) analyzed the problems and causes in the process of demolition and resettlement community in urban and rural areas, and proposed countermeasures to strengthen the management of demolition and resettlement community from the aspects of pre-planning, institutional setting, system innovation, service improvement and propaganda guidance. Chen Ming (2018) pointed out that in order to eliminate the defects of governance mode and the problem of governance difficulties in the demolition and resettlement communities, it is necessary to establish a unified urban and rural social governance system, rationally select the governance model according to local conditions, and adopt the community shareholding cooperation system as a starting point to promote the collective economic management reform.

2. Status quo of demolition and resettlement community planning

2.1. Community planning methods for demolition and resettlement are basically the same as that of ordinary commercial houses

There is no market-based bidding mechanism in the resettlement and resettlement communities to regulate the distribution, so the requirement for fairness and uniformity is very high. However, the planning method of many demolition and resettlement areas is still the same as that of ordinary commercial houses in that “grand green land” and “king building”(buildings in high quality and with high price) are designed in order to pursue space

quality and economic benefits. Social conflicts are easy to be created due to disputes during the housing phase.

2.2. Focus simply on space while ignore the employment and livelihood of farmers

The community service object of demolition and resettlement is of great difference from the general residential area. The villagers moving into the resettlement community means they will leave the cultivated land on which they depend for their survival and lose their main source of livelihood. At present, however, the domestic rural demolition and resettlement community often focuses on the promotion of living space and the improvement of the living environment, and lacks consideration of the livelihood of the rehousing residents, resulting in the population urbanization work being formalized so that resettlement residents can not integrate into urban life smoothly, and their quality of life has declined, making the process of urbanization of rural population lag behind.

2.3. Public participation is formalized

The demolition and resettlement housing is the residence provided by the government for the resettlement residents so the government and development units play a decisive role in the land use and spatial layout and the degree of public participation is weak. Besides, most public participation is mainly based on ex post participation and passive participation, which means public participation stays in superficial publicity and symbolically listening to opinions, and the actual users of the settlements are difficult to play a role in planning decisions.

2.4. The lack of heritage in traditional culture

The demolition and resettlement community has its determined main body of residence, mainly farmers who once lived in the countryside. They used to gather and communicate in public spaces in front of the courtyard, in the lanes, under the trees, next to the wells. However, in the community planning for demolition and resettlement, it often lacks the inheritance of traditional cultural context and lacks the traditional public space for community interaction, which seriously weakens the sense of belonging and belonging of community residents.

2.5. The corresponding organizational management mechanism is not perfect

Since the conversion of farmers to the public is extremely complicated and the corresponding management mechanism is not perfect, some problems have arisen. First of all, the management subject is chaotic, the village committee and the neighborhood committee exist at the same time, and the daily management might be in a mess. Secondly, the management power is not clear, and the intersection of multi-agent management power leads to the vacuum of some transaction management.

3. Demolition and resettlement community planning strategy

3.1. Strengthening public participation in assisted planning and design

3.1.1. Strengthening public participation is extremely important for community planning for demolition and resettlement

Ordinary commercial housing is difficult to be publicly involved in the planning stage in that the main body of the housing is not clear. However, the construction of the demolition and resettlement community is mostly government-led and the residents are often clearly resettled at the planning stage. Therefore, public participation in the planning stage is feasible. Strengthening public participation can directly influence the planning plan at different design stages, and at the same time improve the rationality and pertinence of the program and enhance the sense of belonging of residents.

1) Community construction is more reasonable

Conventional community planning gives the government design indicators and requirements. And then the planners make plans and apply for approval. However, the in-depth and extensive public participation enables planners to understand the tangible benefits and needs of the government and residents more comprehensively and deeply. With comprehensive consideration of the demands of the government and residents, decision-making bias caused by unilateral voice can be avoided, thus making community construction more rational.

2) Planning solutions are more targeted

Extensive and in-depth public participation can truly understand the living habits and living needs of the actual residents, thus making the planning scheme more local and targeted.

3) Enhance residents' sense of belonging

Public participation provides residents with an opportunity to express their needs and participate in planning and design, so that they can participate in planning and decision-making. The community can better meet the residents' residential and emotional needs and enhance residents' sense of identity and belonging.

3.1.2. Public participation recommendation method

Most of the residents in the demolition and resettlement community are farmers, and the main body of the residents is the elderly and children. In addition, many young children are working outside the home. Therefore, the traditional paper questionnaire is difficult to cover all the people. In contrast, the e-questionnaire is not limited by the geographical factors of the survey population, and has the advantages of rapid feedback, convenient sending and receiving, and convenient statistics. At the same time, with the deepening of planning and design, different problems will arise in different stages needed to be understood. It also has the advantage of multiple rounds of distribution, which can guide planning and design in all aspects of different stages. However, the electronic questionnaire has certain limitations in some issues that require subjective expression, and needs to be supplemented by on-site discussions.

3.2. Innovative organization management system

As for the residents living in the resettlement community, they not only face an identity transformation from farmers into citizens, an change of living environment, but also the change of lifestyle habits, economic income and housing demand. The original rural management system has been unable to meet the requirements, so the organization management system is an important part of the process of demolition and resettlement community construction. How to break through the original system and mechanism and explore the new system of resettlement community management is of great significance for promoting urban and rural planning and maintaining the rights and interests of residents.

3.2.1. Identify the main body of management responsibility and standardize the management system

The demolition and resettlement community often has the problem of overlapping management organizations. It not only retains the village committee, but also resets the neighborhood committee. There are problems such as overlapping management powers and responsibilities, and there are two sets of management methods in some affairs. Some of the affairs management is left unattended, resulting in the timely and effective protection of residents' needs. The author proposes that the demolition and resettlement community can attempt to merge the village committees, establish a community neighborhood committee with unified powers and responsibilities, take the community neighborhood committee as the main body of management, and carry out vertical management of the resettlement community. At the same time, they can guide the residents to set up the owners committee who can directly participate in the community management, forming a management system in which community residents' committees and resettlement residents work together.

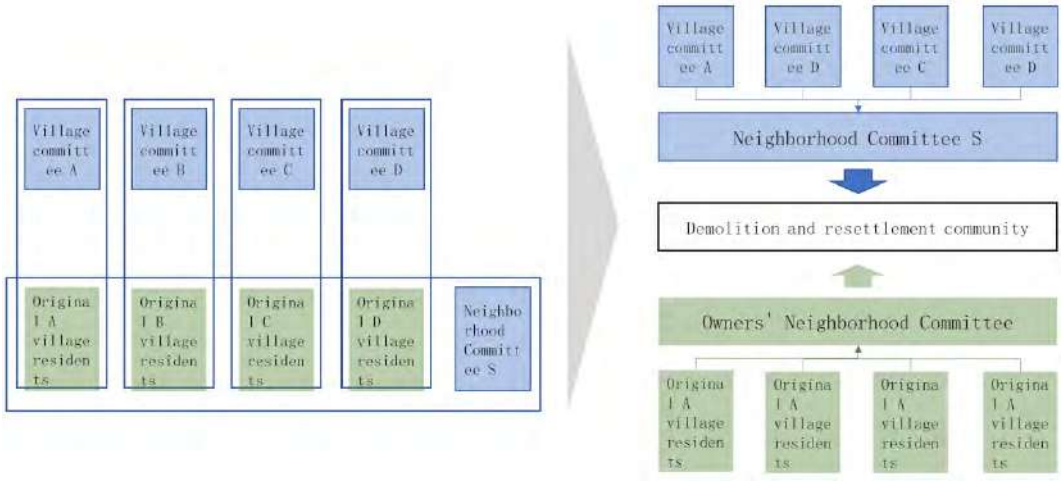


Figure 1. Transformation of the community management system for demolition and resettlement

Image source: painting by the author

3.2.2. Innovative collective economic organization model

The rural collective economic assets are an important material basis for ensuring the livelihood of the villagers. Since the demolition and resettlement community residents have lost the land cultivated in the past, how to protect the villagers' lives through the collective

economy is particularly important. However, in the past, collective assets were generally directly managed by the government and its market economy could not be effectively played. The author proposes that the modern enterprise system can be integrated into the administrative management system through the reform of the collective economic system, the separation of government and enterprise, and the use of the form of community shareholding cooperation, through inventory checking, quantification of stocks, and clarification of property rights. On the one hand, collective assets are managed through professional managers. On the other hand, the one-person-one-vote system of shareholders is implemented based on the participation of shares, fairly maintaining villagers' voting rights. In the distribution system, the income of the residents is increased by dividends.

3.3. Increase employment opportunities and income sources for residents

To solve the livelihood problems of the residents in the resettlement community, it is necessary to carry out the employment and income distribution. On the one hand, increase the employment opportunities of the community residents, increase the income of the labor, and on the other hand, enrich the income sources of the community residents and protect the interests of the residents.

3.3.1. Increase employment opportunities for community residents

The driving force of villagers moving into the demolition and resettlement community mainly comes from the support of policies, which is a passive urbanization behavior. Although the living environment of the resettlement community residents is improved, they lose the necessary source of life, mainly due to the levy of cultivated land, low literacy, lack of work skills, etc, which makes it impossible for residents to afford the cost of living and community management funds, which in turn has led to a decline in the quality of life. In order to solve this dilemma employment opportunities for the villagers in the planning and construction of the demolition and resettlement community must be considered. First of all, the strategy of function mixing is adopted in the space to ensure that the living area meets the demand, and the commercial space such as catering and retail, or the industrial space such as hand workshops are laid out. Secondly, the community coordinating department, enterprise resources, and the organization of specialized personnel to carry out targeted skills training for the relocated villagers according to the needs of the post. Finally, the community cooperates with enterprises to create employment opportunities. On the one hand, the community provides employment opportunities in service centers such as service centers and sanitation, and on the other hand, it signs a targeted employment agreement with enterprises to increase employment.

3.3.2. Enriching the income of community residents

The author proposes that the plan should change the form of one-time compensation for the demolition and resettlement community in the past, and construct a distribution system that combines labor distribution, capital allocation and welfare security. Among them, the distribution according to work mainly relies on the protection of residents' employment and the distribution according to the number of residents' labor. The allocation of capital is mainly based on the shareholding system of the community, and dividends are based on the number of shares of the residents. The welfare guarantee is to provide basic living for the poor. Through the combination of the three methods, the residents in the resettlement community will be steadily increased, the rural people will make a smooth transition to the

community, and while pursuing the efficiency of the market economy, the fairness will be taken into consideration to ensure the living of the residents in the community.

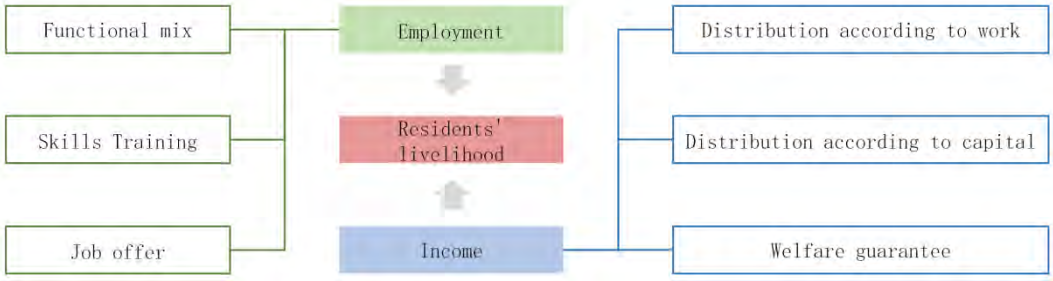


Figure 2. Ways to solve the livelihood problems of the residents in the resettlement community

Image source: painting by the author

3.4. More targeted spatial planning

The same as the planning of ordinary residential areas, the demolition and resettlement community should consider the combination of building groups, transportation methods and organization, public service facilities, municipal facilities and other relevant planning principles. However, at the same time, due to a series of reasons such as the demolition and resettlement community housing can not be sold by the market bidding mechanism, the change of the residential identity from the villagers to the citizens, spatial planning needs to pay attention to three aspects: fairness and homogeneity, continuity of traditional cultural context and flexibility of the program.

3.4.1. Fairness and homogeneity are particularly important

Most of the demolition and resettlement communities are government-led, so there is no corresponding market bidding mechanism in the housing phase. If there are large differences between the units, many neighborhood disputes and social contradictions will often be attracted. Therefore, the fairness and equity of the demolition and resettlement community planning Goodness is especially important. It is necessary to avoid the design techniques of “King building” and central green space, and the fairness of the units should be as fair as possible, so that the green landscape, road traffic facilities and public service facilities enjoyed by each type of house are relatively good.

3.4.2. Continue the original cultural context

The residents of the demolition and resettlement community were originally farmers. In the planning of demolition and resettlement community, the original cultural context should be continued, and the customary community public space formed by the villagers should be inherited and expanded. Much attention should be paid to the setting of the space where the original residents once gathered and exchanged, and attempt to restore all the vitality of the original residence, as well as the inheritance of the original habits and customs, and enhance the sense of identity and belonging of the residents.

3.4.3. Flexible program

It is impossible for each type of plan to be absolutely good, because the floor, space and landscape environment, roads and transportation facilities, public service facilities and other elements are different for different types of houses. The planning program needs to be

flexible in these aspects. Besides, through the combination of different elements, each household (and other elements it belongs to) should be basically average.

4. Empirical study on constructive detailed planning of Longhai South District

Longhai south District is located in the west of the township of Longgu Town, Juye County, Heze City, Shandong Province. It is a resettlement community for the relocation of villages in the coal-pressing area, which mainly undertakes the relocation of two villages in East Bihai and North Bihai, as well as villagers in Liuhai Village and other three villages that have not yet been resettled. In addition, the planned site is relatively flat and the slope is small, so several villages will form a water surface in the next 2-3 years due to coal mining subsidence of the New Dragon Group. The villagers will have no land to farm, but the New Dragon Group will subsidize 1,500 yuan for each mu a year.

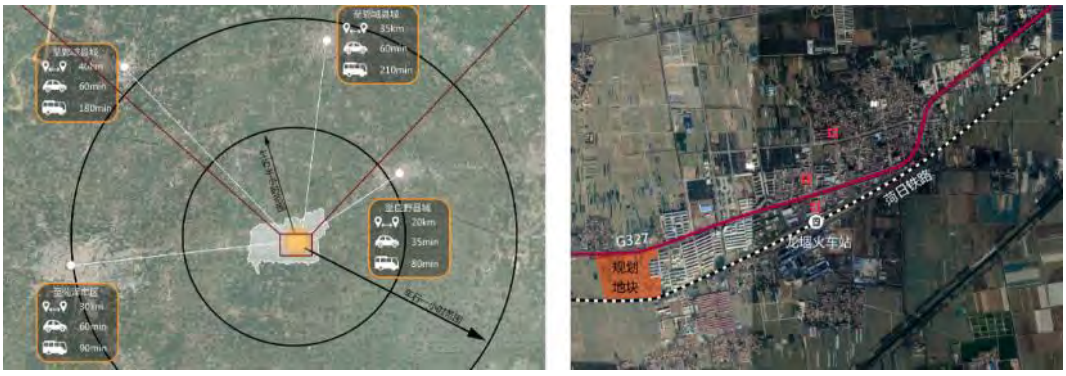


Figure 3. Location map of Longhainan District

Image source: painting by the author

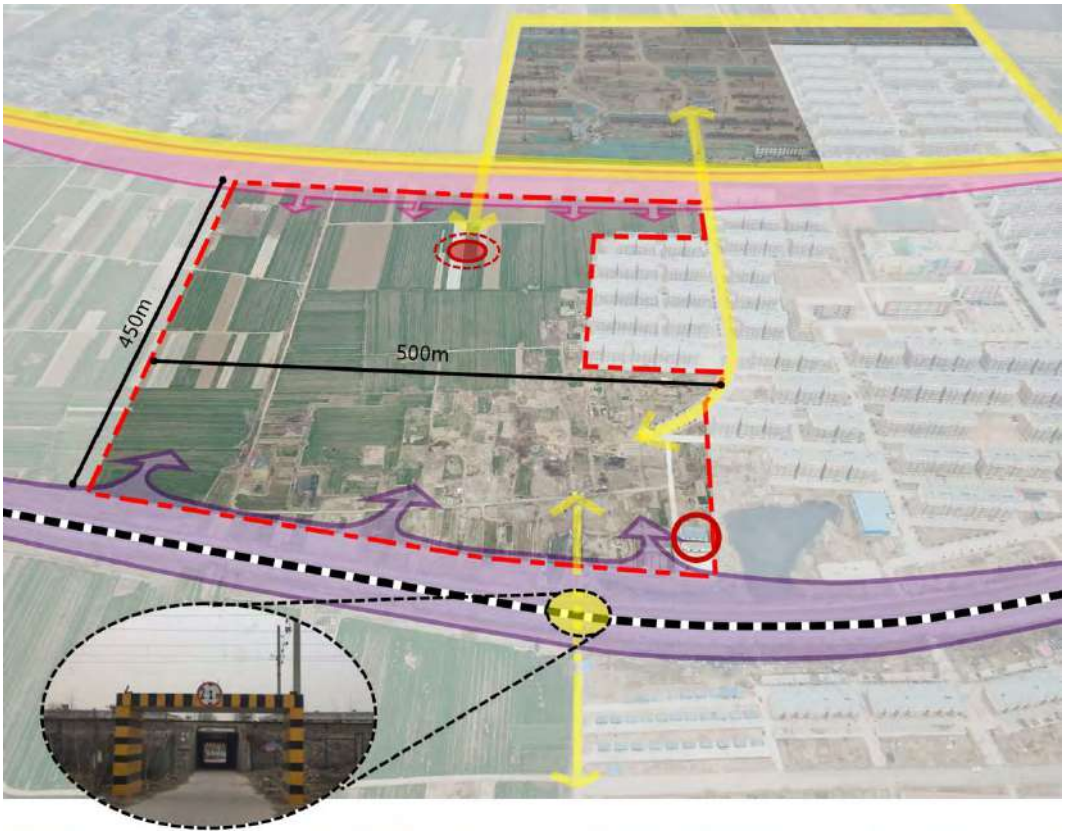


Figure 4. Schematic diagram of planning design conditions

Image source: painting by the author

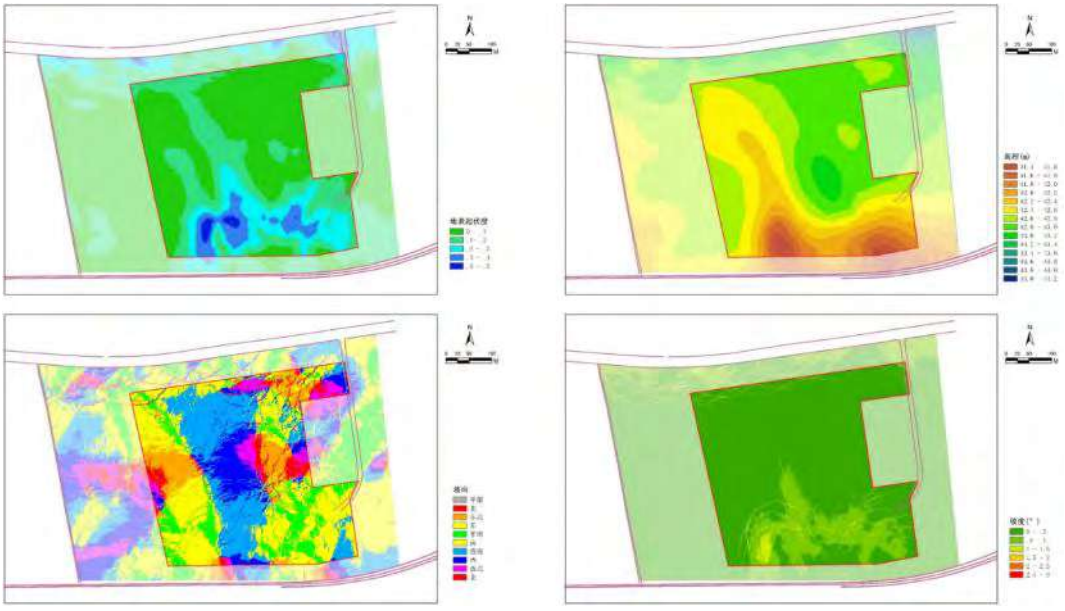


Figure 5. Topographic analysis

Image source: painting by the author

Table 1. Statistics of resettlement households

	North Bihai	East Bihai	Liuhai Village and other three villages	totle
120㎡	105	120		225
110㎡	510	445		955
90㎡	165	153		318
60㎡	18	16		34
totle	798	734	300	1832

Source of data: organized by the author according to planning requirements

4.1. Public participation in assisted planning and design

At the beginning of the design, villagers in East Bihai and North Bihai villages temporarily rented houses in the towns and villages because of the occupation of the village land. At the same time, many village children worked in the field. Many factors have led to the questionnaire not being distributed in paper form. Finally, the public participation was carried out by means of a combination of electronic questionnaires and on-site discussions.

4.1.1. Public participation and planning process

According to the planning and design conditions and on-the-spot investigations given by the government, combined with the design intention, the first electronic questionnaire was distributed, mainly to survey the age, living place, living habits, and the needs of the elderly for elevators and so on. A total of 734 copies were filled out. Among that, 718 copies are valid questionnaires.

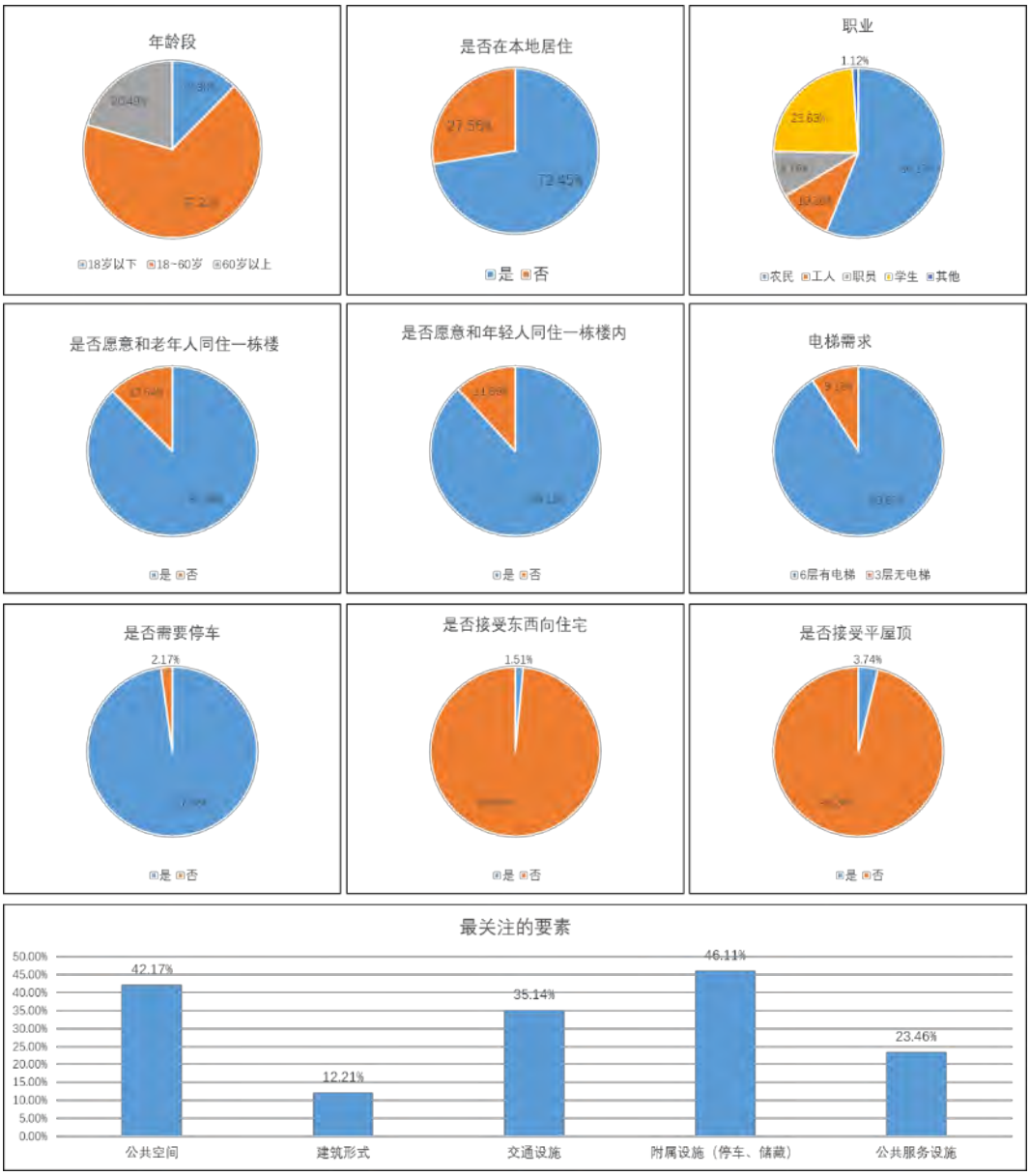


Figure 6. First questionnaire chart

Image source: painting by the author

In order to pursue the richness and change of space, the plan attempts to combine the north-south and the east-west housing, but the results of the questionnaire show that 98.49% of the residents do not accept east-west housing. Thus, it is determined from the beginning of design that all the units are north-south. The way to avoid the iteration of the planning scheme.

During the investigation, it is found that the elderly houses in the surrounding demolition and resettlement areas are all three-story elevator-free houses, and they are independently set in the corners of the community, which is not conducive to community integration and the physical and mental health of the elderly. The plan intents to mix old people's houses in other units. However, this idea faces the question of whether young people and old people

are willing to live in the same building or does the elderly accept the problem of changing from a 3rd floor elevator-free house to a 6th floor elevator house? The questionnaire results show that 87.46% of the elderly and 88.11% of young people don't mind mixing, and 90.87% of the elderly accept 6-story elevators.

Due to cost considerations, the government asked the residential roof to be a flat roof. However, the results of the questionnaire showed that 96.26% of the residents did not accept the flat roof. Combined with the existing situation that the surrounding resettlement areas were all sloping roofs, they persuaded the government to change the design conditions and change the slope roof to flat roof.

Through the first questionnaire survey, the following three points are determined to guide the planning and design: First of all, the house must be arranged in a north-south direction. Second, the roof form is a sloping roof. Third, the elderly houses can be mixed with other units.

After determining the mix of old people's houses and other types of houses, there must be an elevator on the mixed-use 6-story house. However, setting up the elevator will increase the corresponding cost and post-maintenance costs. Whether all residents want the house with elevator on 6-story of the house is uncertain. At the same time, the 110-square-meter unit in the planning and design conditions must be equipped with a 1:1 ratio of the ground floor garage, but whether the residents really need garage parking or a lower floor space is worth exploring. Combined with the deepening of the program and the advancement of the planning stage, a second electronic questionnaire was issued, focusing on whether the elevator is installed on 6-story building and whether the demand for the underground garage is necessary.

Figure 7. Research and on-site discussion

Image source: the photo was took by the author

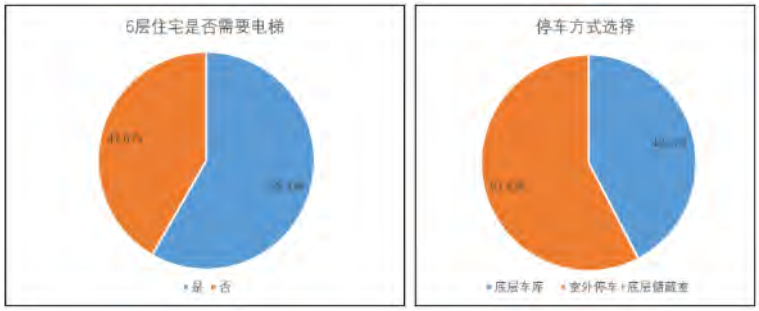


Figure 8. Statistics of the second questionnaire

Image source: painting by the author

According to the results of the questionnaire, about 58.33% of the residents chose the 6-story residential buildings with elevators. Therefore, the planning and design of 6-story residential buildings should include two types, one the elevator and the other without elevator. 42.37% of the residents chose the ground floor garage, and 57.63% of the residents chose the combination of the outdoor parking space and the bottom storage room, which verify the previous conjecture. At the same time, the planning plan did not need to design too many garages on the ground floor, resulting in the disadvantages of excessive depth.

4.1.2. Public participation in the guidance and revision of the planning plan

Some ideas for the beginning of the design can be clarified by means of public participation. According to the statistics of the actual residents' wishes, the planning and design techniques can be guided and limited, so as to avoid the repetition of the plan and a plan that is more in line with actual needs can be made. At the same time, different issues of industry at different stages can be clarified through public participation.

The planning and design conditions for the demolition and resettlement areas are mostly provided by the government, and the actual resident residents are less involved. However, through public participation, the government can fully understand the needs of the residents. What is more, it will also make up for the planning and design adjustments to a certain extent, and correcting the planning and design conditions will help the program to become more reasonable.

4.2. Organization management

At the beginning of the planning, a management system consisting of neighborhood committees, owners' committees and property companies has been established. The community of Longhai south District merged the village committees of Bihai and Liuhai involved in the demolition and resettlement, and established the community committee of Longhai south District, which is mainly responsible for daily life needs such as administrative management, social welfare, culture and education, publicity and education, and mediation of residents' disputes. At the same time, the community residents are guided to set up owners' committees, exercise the right of self-government, safeguard the common interests of the owners, and effectively supervise the residents' management power.

Starting from the two aspects of space and system, the plan solves the livelihood problems of community residents. First of all, construct commercial buildings in the community, so

that the internal functions of the community can be mixed to provide space security for the residents. Secondly, 30% of the commercial building area is taken as collective property, and the remaining 70% is allocated to households according to the proportion. The 100 square meter residential area is allocated for a commercial area of 2 square meters. Finally, the community set up a company, the residents convert the commercial building area into stock shares, entrust the company to operate in a unified manner, and the operating income is divided into internal dividends according to the stock.

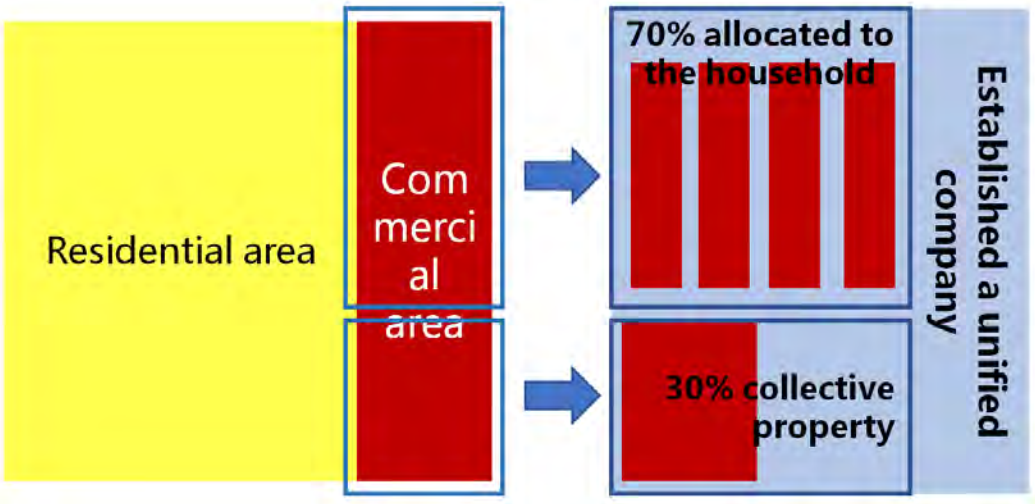


Figure 9. Community distribution and management model of community in Longhai south District

Image source: painting by the author

4.3. Spatial planning

After many rounds of communication and revision with the government and villagers, the plan for "one core, one axis, one belt, three districts" was finally formed. The planning method of the courtyard concept and the setting of the market axis make the plan achieve fairness and homogeneity as much as possible, and continue the traditional cultural context. At the same time, through the planning techniques such as wind simulation and noise simulation, let each A household has achieved the best quality of living under the existing conditions.

Figure 10. Planning master plan

Image source: painting by the author

Figure 11. Aerial view

Image source: painting by the author

4.3.1. Courtyard group

Taking "harmony" as the concept and the three images of "water" as the context, the plan connects three theme areas in series to form the theme of 11 groups of courtyards.

Figure 12. Schematic diagram of the courtyard group

Image source: painting by the author

There is no concentrated green space in the whole demolition and resettlement area, and each group has the same elements, which ensures the relative goodness of each group. A central square is set up in the center of the group, with construction activities and old trees and children's activity bunkers on both sides. Under the shade of ancient trees, there is a new place of communication for each courtyard group. People can chat and drink tea under the tree. The bunker is set around the ancient trees to facilitate the elderly to look after the children in the process of communication.

Figure 13. Aerial view of the group

Image source: painting by the author

4.3.2. Market axis

The survey finds that there is a market opening only one day a week in the south side of Longhai south District, which is very popular. However, since there is no corresponding space bearing, it causes traffic congestion and environmental mess. It is planned to set up a north-south non-mixed road in the middle of the resettlement area, reduce the speed by designing landscape pieces, and introduce the original southern market into the community, which not only continues the original living habits of the surrounding residents, but also increases the popularity of the resettlement area. At the same time, it also solved the urban problems caused by the previous market.

Figure 14. Market comparison chart

Image source: painting by the author

4.3.3. Flexibility plan

According to the statistics of the questionnaire, the demand for elevators varies from residents to residents. According to the development trend of elevator configuration and the relatively high proportion of elderly people in Longhai south District, the demand for elevators will become higher and higher in the future. In order to meet the interests of different groups of people and consider the future development, it is planned to reserve the location of the elevator shaft for all 6-story houses, but residents can choose elevators according to their needs.

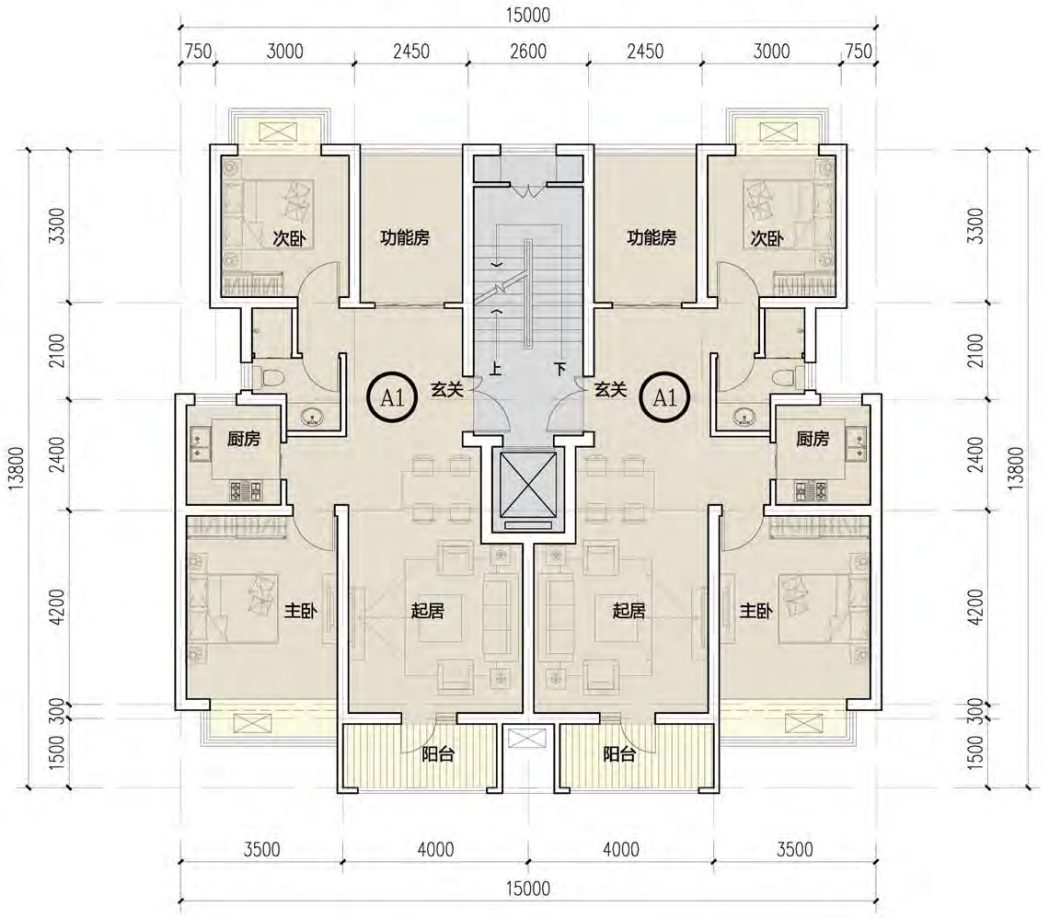


Figure 15. Plane floor plan for 90+90 units

Image source: painting by the author

It is planned to set up a parking garage and a plurality of storage rooms on the ground floor, and each storage room has a separate door. It is considered that different storerooms are allocated according to the different floors and garage sizes of different houses, and the uniform requirements are achieved through the flexible configuration of other elements.

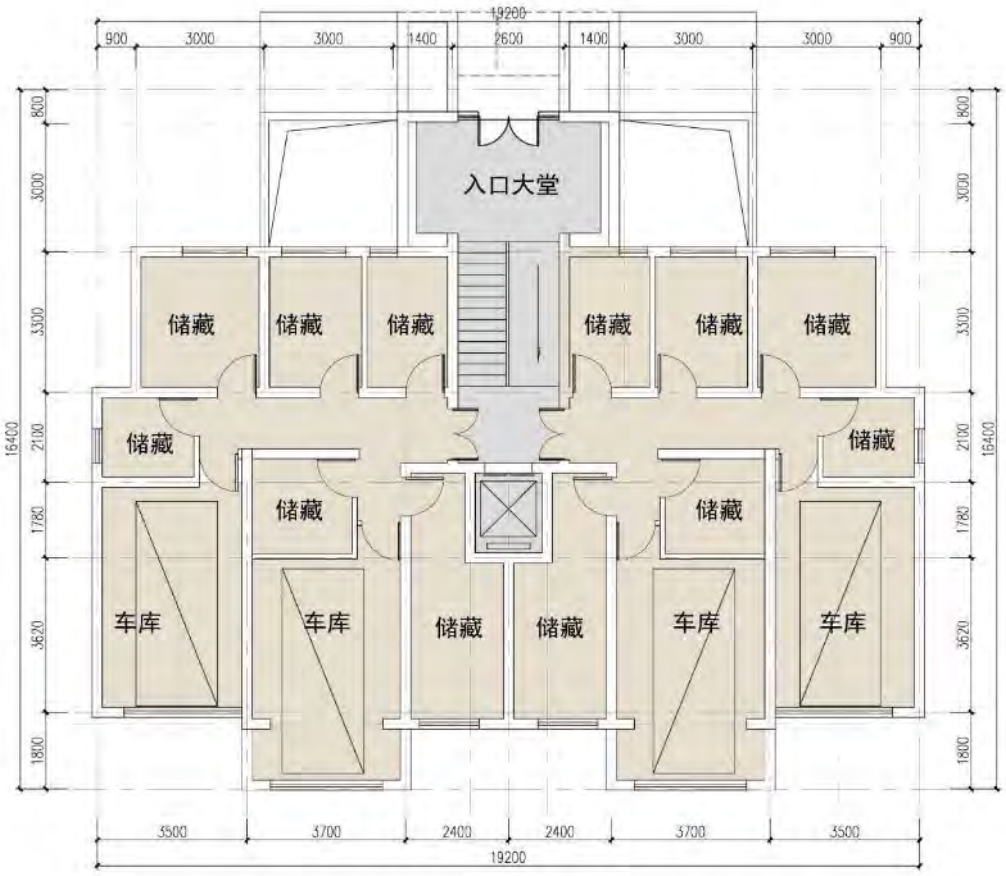


Figure 16. The ground plan of the 110+110 unit

Image source: painting by the author

4.3.4. Application of planning techniques

There is a railway 40 meters south of the planned land, which has some noise interference to the community. Through wind simulation, noise simulation, sunshine analysis and other technical means, the wind speed in each courtyard group can be controlled at its smallest state in winter and largest in summer, and the interior of the community is least affected by railway noise. By doing so, the living quality reaches optimal under the existing conditions.

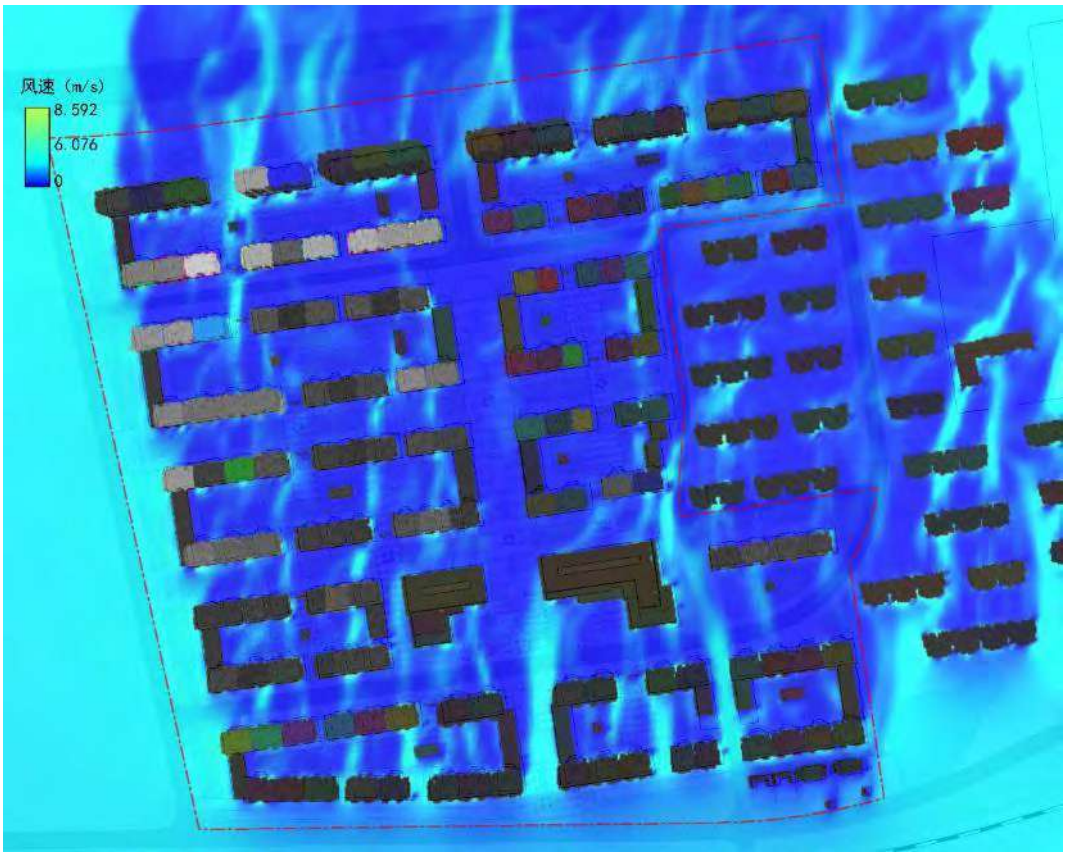


Figure 17. Schematic diagram of summer wind simulation

Image source: painting by the author

Figure 18. Schematic diagram of noise simulation

Image source: painting by the author

Figure 19. Schematic diagram of sunshine analysis

Image source: painting by the autho

5. Conclusion

The urbanization has undergone a rapid growth across the country. A large number of villages in China are converted into demolition and resettlement communities due to government land replacement and relocation of villages each year. For the time being, the demolition and resettlement communities have many problems such as it has the same planning means as ordinary commercial housing communities, it simply pays attention to space while neglecting residents' livelihoods, or the public participation is in the form and so on. Hence, the research on planning strategies for demolition and resettlement communities is of great importance.

In light of the problems in the existing demolition and resettlement community planning, combined with the construction detailed planning practice case of Longhai South District, a four-point planning strategy is proposed through the combination of theoretical research and actual cases: First of all, strengthening public participation can assist planning and design, the electronic questionnaire combined with the on-site discussion are recommended to public participation in the demolition and resettlement community. At

the same time, public participation can guide the planning and design to make it more rational and pertinent, and to some extent, to revise the planning and design conditions. Second, innovative organization management system is beneficial to the promotion of the conversion process of farmers to the citizenship. Third, planning should not only consider the space but ignore the future livelihood of the residents, and it is of great importance to increase the employment opportunities and income sources of the residents. Fourth, the fairness and homogeneity of the demolition and resettlement community planning is particularly important, much attention should be paid to the continuation of the traditional context.

6. References

[1] Wu Ying, Wang Lan. Exploring the Optimization of Community Planning and Design in the Process of "Village Committee Changing to Community Committee" in Urbanization -- Based on the Spatial Characteristics and Evaluation of 31 Communities [J]. Urban Planning Journal, 2018(02):37 -43.

[2]Chen Guangyu, Luo Xiaolong, Ying Yunyun, Jiang Jiali. Research on Urban Community Governance in Transitional China [J]. Shanghai Urban Planning, 2016(02): 20-25.

[3]Chen Ming. Demolition and Resettlement Community: Governance Dilemma and Reform Path -- Based on the Investigation of Z Village in Haidian District, Beijing [J]. Rural Economy, 2018(04): 75-81.

[4] Huang Xuhua. Research on government management model in the development of resettlement community [D]. Shanghai Jiaotong University, 2008.

[5] Li Qin. Research on the construction model of affordable residential areas in Beijing under the background of livability [D]. Xi'an University of Architecture and Technology, 2013.

[6] Yu Yifan. Housing and Sociology [J]. Urban Planning Journal, 2003 (03): 30-33+95.

[7]Wang Chenlei. Research on community governance countermeasures for rural migrants in Pengshan District [D]. Southwest Jiao Tong University, 2018.

[8] Sheng Dong. Community governance problems and countermeasures in demolition and resettlement communities in urban and rural areas [D]. Suzhou University, 2016.

[9] Sun Wei. Participation in rural demolition and resettlement community residents [D]. Huazhong Normal University, 2018.

[10] Li Wenjun. Research on the reform of collective asset management system under the background of "Village Committee Changing to Community Committee" [D]. Shandong Agricultural University, 2017.

[11] Zhang Zhengtao. Research on the development of affordable housing in the main urban area of Chongqing from the perspective of harmony [D]. Chongqing University, 2010.

[12] Hu Xiaoping. Practical Research on Management of Demolition and Resettlement Community in the Process of Urbanization [J]. Journal of Changzhou University (Social Science Edition), 2014, 15(04): 69-72.

[13]Yao Liang. Research on Management Difficulties and Grid Management Mode of Demolition and Resettlement Community -- Taking B City Economic and Technological Development Zone as an Example[J].Journal of Huaihai Institute of Technology (Humanities and Social Sciences), 2019,17(03): 108-110.

[14] Li Peilei. Research on public space management of demolition and resettlement communities [D]. Northwest A&F University, 2018.

[15]Tiwanna DeMoss-Norman. From Informal Settlements to Formality: A Resettlement Group's Adaptation to a Newly Planned Community in Port Elizabeth, South Africa[J]. Economic Anthropology,2015,2(1).

[16]John J. Betancur and Douglas C. Gills. Community Development in Chicago: From Harold Washington to Richard M. Daley. The ANNALS of the American Academy of Political and Social Science, Jul 2004; vol. 594:p92 - 108.

Research Paper

Users' Perceptions of Walkability Attributes in Residential Areas: Reliability and Validity

Yang Ye, Harbin Institute of Technology; China

Abstract

In recent years, urban environmental quality and urban vitality have attracted more scholars' attention than ever as Chinese cities experienced a rapid development stage. To test the influence of urban built environment on walkability in residential areas, this study developed a questionnaire to perceive the users' perception of walkability around their neighbourhood in residential areas, which was based on the Neighbourhood Environment Walkability Scale for Mainland China (NEWS-MC). The original Neighbourhood Environment Walkability Scale (NEWS) are developed for use in USA to measure residents' perceptions of the environment attributes, and has been applied in many countries, such as US, Australia, Korea and Hong Kong, and be modify to be Neighbourhood Environment Walkability Scale for Mainland China (NEWS-MC) and been applied in Chinese cities. NEWS-MC has been found have moderate to high rest-retest reliabilities and good criterion The evidence illustrated high-walkable neighbourhoods be found with higher density, land-use mix, street connectivity, more safety and have more aesthetics elements. In this study, we modified NEWS-MC to reflect the characteristics of cold region Chinese built environment and people's behaviour mode. To perceive the final version of Neighbourhood Environment Walkability Scale for cold region Chinese cities (NEWS-CRC), We made a pilot study which include 50 samples, then interview 800 residents from 6 selected residential districts in Harbin (the capital city with highest latitude in China) which were different in walkability attributes and economic status. The final version of the NEWS-CRC included 8 subscales and 3 single items (76 items in total). Test-retest reliability showed moderate to high except 4 items . In total, the NEWS-CRC could illustrate residents' perceptions of walkability attributes in cold region Chinese cities and could be use in other Chinese urban attributes studies related to walking.

Keywords

Keyword 1, keyword 2, keyword 3 (3-5)

1. Introduction

The high speed of cities sprawl and urban regeneration worldwide make public space and acclivities in public space gain increasingly attention than ever. Meanwhile, there is growing interest on research about relationship between built environment attributes and residents' physical activity. Studies focus on walking suggest than higher residential density, higher

level of land use mix- both diversity and accessibility, more aesthetic elements are attributes could hence more walking, and associated with neighbourhoods more walkable .

'Walkability' is referred to and generally defined as "...the extent to which walking is readily available as a safe, connected, accessible and pleasant mode of transportation". In the last decade, there were increasing evidence of the influence of neighborhoods built environment characteristics on walkability. Smith and Clifton illustrated that an built environment friendly to pedestrians usually includes characteristics such as high density, convenience to walk to facilities, system coherence, high street connectivity, safety from traffic and crime, comfortable and attractiveness . Researcher in urban planning and transportation also identified key environment attributes on creating walkable neighborhood. Cervero and Duncan found density, trip distance, land use diversity, existing of sidewalk and bike lane could affect people's choice of walk or bike . The studies by De bourdeaudhuij demonstrated the effects of space proportion, size of block and traffic congestion on user's choice of travel mode .

To make more research on influence of urban environment's walkability on physical activities and psychological health or residents, valid measures of walkability are needed. The Neighborhood Environment Walkability Scale(NEWS) and its abbreviated version(NEWS-A) are developed for use in USA to measure residents' perceptions of the environment attributes . They value built environment characteristics that are believed to affect residents' walking choice. Both NEWS and NEWS-A have been found have moderate to high rest-retest reliabilities, and good criterion The evidence illustrated high-walkable neighborhoods be found with higher density , land-use mix, street connectivity, more safety and have more aesthetics elements . Although NEWS and NEWS-A have been applied in many countries, such as US, Australia, Korea and Hong Kong, the validity and reliability of the NEWS or NEWS –A have not been examined in mainland China.

2. Method

2.1. Measures

Neighborhood Environment Walkability Scale(NEWS) is a instrument used to obtain residents' perception of built environment attributes related to walking and bicycling around where they live. The original NEWS includes 98 items and is rarely used, the abbreviated version of it, NEWS-A , which has similar structure to the full version but has fewer items in subscales, is commonly used and have been applied in many countries (Brazil, Australia, Poland, Korea, Mexico, and Hong Kong). So in this study we also used NEWS-A as the source to develop the NEWS version which appropriate for Mainland China(NEWS-MC). NEWS-A has 8 multi-item subscales, a) residential density; b) land-use mix-diversity; c) Land-use mix-access; d) street connectivity; e) infrastructure and safety for walking; f) aesthetics; g)traffic hazards and h) Crime safety, and 5 single-item subscales, including Lack of parking, lack of cul-de-sacs, hilliness, physical barriers and social interaction while walking. All items except the ones in residential density and land-use mix-diversity subscales are rated on a 4-point Likert scale(1- strongly disagree, 2-disagree, 3-agree, 4-strongly agree). Items in residential density subscale are rated on 5-point Likeert scale, by asking about the frequency of perceive certain type of residences, and weighted ratings are summed to make a residential

density perceptions score. Land-use mix-diversity is assessed by time walking from home to various types of destinations, with responses ranging from distance for 1-5mins walking(coded as 5) to distance for more than 30mins walking(coded as 1).

2.2. Participants and procedures

2.2.1 Development and adaptation The original NEWS and NEWS-A were developed in US, to develop a version of NEWS which could adapt Chinese cities' build environment attributes and reflects residents' need, 15 experts from multi-research fields, urban planning and urban design(7members), public health(3 members), environment-behaviour studies(2 members), physical activity(2 members) and Rehabilitation & Healthcare(1 member) were interviewed with a goal to draft a NEWS-MC. All members of the committee reviewed NEWS-A, we also provided them NEWS-Youth , NEWS for senior citizen and NEWS Hong Kong as reference. Committee members gave their opinions on whether each item should be kept, modified or deleted, or any item should be add after careful thinking about items relevant to mainland Chinese urban environment characteristics and residents' behaviour mode. In total, 57 items in NEWS-A were kept, 9 of them were modified , 17 new items were added and 1 item was deleted considering their relevant to the study setting. (Table 1).

Items in residential density subscale were modified to fit the medium to high residential density characteristic in mainland Chinese cities. 'detached single-family residences' and 'townhouses or row hoses of 1-3 stories' were merged into a single item as these kind of residential buildings are very rarely in mainland china; apartments of 4-6, 7-12 and more than 13 stories were modified to apartment of 4-7, 8-18, 19-26 stories and apartments of 27 stories or more was added to this subscale, as 7, 18, 26, 27 and above stories residential buildings are the extreme height for multi-stories, mid-high rise, high rise and super high rise residential buildings through the Chinese building codes. 5 items in land –use mix-diversity were also modified to fit Chinese urban environment(see Table 1). 17 items were added to the questionnaire to provide a better match mainland Chinese urban built environment features and culture background- medium to high population density and building density, high percentage of walking or using public transportation in daily travel, high risk of air pollution and safety issues related by traffic and crime. Item 'video store' was deleted because it is very rarely in mainland Chinese cities now, maybe caused by the development of internet everyone watch or buy movie or video online(see Table 1).

2.2.2 Test-retest reliability Potential participants were chosen from the four Harbin residential neighborhoods mention above, the economic status were obtained from national 2015 Census data. Walkability was measured by residential density, intersection density, destination density(service, commercial and facilities), road density(length of street could walk per km2) and type of street block(square grid, radial shape or have many cul-de-sacs). These data were achieved from baidu map(http://map.baidu.com/).

Four residential neighborhoods, with 125 potential participants were chosen randomly from each neighborhood. The survey were done in March 2017, We went to each neighborhood in both weekday and weekend, morning, noon and evening. When picking the participants, firstly we found the people showed up in that area and asked whether they lived in this neighborhood, if the answer was yes, we further asked whether they would be willing to be reassessed 10 days later after the first survey, and they were told if they finished both survey, they will get 10RMB as reward. After confirm lived in that residential neighborhood and agreed to attend both survey, one became our participant. The process was the

interviewer and the participants added each other as 'friend' on wechat (a social App with high popularity in smart phone holders of all ages, add as friends mean two can message each other, and could also pay and receive money, receive and send documents to each other) , then sent them the NEWS-MC questionnaire forms, the participants could contacted the interviewer by wechat if they had any questions about the questionnaire. After they sent the first-time forms back, they could get 3RMB. 10 days later we sent them the forms again, and gave who sent forms back 7RMB, the ones who did not sent form back were reminded twice on wechat. The interval between the two surveys ranged from 10-16 days(average 12.4 days) . The recruitment rate of the first survey was 85%, 92, 93, 85 80and participants responded the second survey, so the total recruitment rate is 70%.

Table 1. Adaptations of the NEWS-A for Mainland Chinese

Item
Addition items
Distance to community doctor service
Distance to Chinese drink or noodle shop
Distance to Chinese non-fast food restaurant
Distance to Bakery/dessert/cake shop
Distance to community centre
Distance to copy /scan passport photo-taken shop
Distance to place could pay all kinds of fees(gas, water, cable TV and internet)
Distance to pets' food or clothes shop
Shopping areas are easily accessible via public transport.
The streets are so crowded that it is difficult to walk.
Need to walk over a pedestrian bridge or through a wide road to access the nearest services
There are 'hawkers' and shops on the streets and sidewalks blocking the way
There are many cars parking on the sidewalks blocking the way
There are indoor, air-conditioned places (shopping malls) where people can walk
The streets of my neighborhood are often slippery in winter
The level of air pollution in my neighborhood is often high
It is unsafe to walk in my neighborhood because of objects dropping from high-rise buildings
There are many homeless people, drunk people in my neighborhood
Modifications items
Two items detached single-family residences and townhouses or row hoses of 1-3 stories merged into a single item
apartments of 4-6 stories change to apartment of 4-7 stories.
apartments of 7-12 stories change to apartment of 8-18 stories.
apartments of more than 13 stories changed to 'apartments of 18-26' stories. Additional item referring to commonness of apartment buildings with more than 26 stories added .
Destination 'fruit/vegetable market' renamed 'fresh food market' .
Destinations 'fast-food restaurant' renamed 'Chained Western or Chinese fast-food restaurant' .
Destination 'non-fast food restaurant' changed to 'Western/international non-fast food restaurant' .
Destination 'recreation centre' changed to 'recreation centre or outdoor recreation space' .
Destination 'clothing store' changed to 'clothing & shoe store' .
'Walkers and bikers on the streets can be easily seen by people in their homes' changed to 'walkers and bikers on the streets can be easily seen by other people' .

Deleted items
Destination 'video Store'

3. Results

Four hundreds and twenty-five participants attended the first survey, with 227 men and 198 women, mean age 45.2. 48% participants had a collage degree or above. Among all participants, 32% of them own 1 car or more, and 45% reported they use public transportation 'very often'. Three hundreds and fifty participants completed both surveys (193 men and 157 woman), response rate was 82%. The sample size per neighborhood was: 90 and 93 in high-walkable neighborhoods, 82 and 85 in low-walkable neighborhoods.

Through previously built satisfaction systems, we took ICC value below 0.50 as poor, 0.50 to 0.75 as moderate, and above 0.75 as reliability. Test-retest reliability for all subscales and single items of the NEWS-MC are shown in Table 2. All subscals and single-items except one-hilly roads-showed moderate to good level of reliability(>0.75), 6 subscales or single items show high level of reliability (>0.90), and all $p<0.05$.

Table 2 illustrates the results of mean scores on neighborhood walkability subscales between residents from high-walkable and low-walkable neighborhood. Residents from high-walkable neighborhoods provided ratings indicative of higher residential density($t(412)= 6.85$, $p<0.001$), land-use mix-diversity($t(420)= -10.97$, $p<0.001$); Land-use mix-access ($t(420)=4.15$, $p<0.001$); street connectivity($t(415)= 2.93$, $p<0.001$), infrastructure and safety for walking($t(397)= 5.32$, $p=0.006$), traffic hazards($t(399)=2.07$, $p=0.021$), parking difficulties($t(408)= 6.81$, $p=0.004$), physical barriers($t(388)= 8.74$, $p<0.001$) and social interaction while walking($t(386)= -4.85$, $p<0.001$). Mean while, residents from low-walkable provided higher ratings of aesthetics($t(418)= -6.28$, $p=0.008$) of their neighborhoods. Residents' perception of crime safety($t(385)= 8.76$, $p<0.315$), not have many cul-de-sacs($t(408)= 5.79$, $p<0.438$), and hilliness($t(408)= 5.79$, $p<0.570$) did not show difference between low and high walkable neighborhoods.

4. Discussion

The result of this study indicated the link between walkability and residents' perception of built environment attributes. By using NEWS-MC, a form designed to obtain residents' perception of walkability attributes in medium to high density mainland Chinese cities, as instrument, this study examined the test -retest the reliability and validity of the subscales and single items of NEWS-MC. Moderate to high level of reliability was founded from the result of test-retest reliability of NEWS-MC. The intra-class correlation range from 0.65 to 0.98, which showed a higher reliability than the result in United States(0.58-0.80), Australia(0,62-0,88) and comparable to those observed in Hong Kong(0.57-0.99). The difference may because in US and Australia the researcher used self-administered survey, in this study although we sent the NEWS-MC form to participates but they could communicate with the interviewer by wechat so it kind of like a interviewer administered survey which was used in Hong Kong studyi. Besides, the time interval of first and second survey was 10-16 days, which is shorter than the previous studies (14-21 days).

The result of this study supports the applicability of the NEWS-MC to medium to high-density cities in mainland China and most Asian cities, such as Harbin. The data showed significant difference in residents' perception on built environment characteristics between high-walkable and low-walkable urban areas. Residential density, land-use mix-diversity, Land-use mix-access, street connectivity, infrastructure and safety for walking, traffic hazards, parking difficulties, physical barriers and social interaction while walking illustrated residents could perceive higher level of attributes in these subscales from high-walkable neighborhoods. The walkability of the neighborhoods was objectively measured by residential density, land-use mix, and pedestrian sidewalk connectivity, and the residents' self-reported result reflected the difference of perceiving these attributes. It is observed that the different direction of ratings on aesthetics, low-walkable neighborhoods were rated higher in most of the items in this subscale, which is the same in Australia and Hong Kong, may be attributed to residents' preference open view and street streets and more green bushes or grass which the low-walkable neighborhoods had more to other aesthetic elements, such as street furniture and sculpture, which the high-walkable neighborhoods had more. The insignificant on crime, hilliness and cul-de-sacs subscales were likely because Harbin is a flat city without many hill and the public order is very good here, and the road network in Harbin is basically grid or radiate, the cul-de-sacs is very rare even in residential area, so residents can not perceive the relationship between items in these subscales or single items and walking.

The mean values comparison between NEWS-MC to NEWS Untied States, Australia and Hong Kong indicated that, as hypothesis, residential density was rated much higher than US and Australia but lower than Hong kong. This can be attributed to the fact that the overall mainland Chinese cities are medium to high density, the urban residential density is higher than US and Australia, but lower than Hong Kong. Land-mix diversity was rated higher in both high-walkable and low-walkable neighborhoods than all the other three studies. It should be notice that the previous studies all used the long version NEWS and we used NEW-A the measure instrument, precluded a direct comparison of the findings.

The limitations of this study include:1) The participants are the ones who will to attend the survey, not matched on individual respondent demographic. 2) we only do research in for residential neighborhoods, the small number of areas and small sample number of participants may have limited the reliability and variability of some items. 3) We may omitted some environment attributes that related to walkability of medium to high density mainland Chinese cities.

In conclusion, the result of this study support reliability and construct validity of the NEWS-MC, so we could take the NEWS-MC as a instrument for further study of cross-national or international research on the relationship between built environment characteristics and residents' walking choice.

5. References

[1] Hardoy, Jorge; Satterthwaite, David (1983) "ISOCARP: Exchange of ideas", Cities, The International Journal of Urban Policy and Planning, Vol. 1 No. 1 (August).

[2] Humpel, N., Owen, N., & Leslie, E. (2002). Environmental factors associated with adults' participation in physical activity: a review.American Journal of Preventive Medicine, 22(3), 188-199.

[3] Killingsworth, R. E. (2003). Health promoting community design: a new paradigm to promote healthy and active communities. American Journal of Health Promotion Ajhp, 17(3), 169.

[4] Green, W. A., & Stoltz, R. R. (2004). Health and community design: the impact of the built environment on physical activity by lawrence d. frank, peter engelke and thomas schmid. Landscape & Urban Planning, 69(4), 467-470.

[5] Sallis, J. F., Bauman, A., & Pratt, M. (1998). Environmental and policy interventions to promote physical activity. American Journal of Preventive Medicine, 15(4), 379-397.

[6] Lawrence D. Frank, James F. Sallis, Terry L. Conway, James E. Chapman, Brian E. Saelens, & William Bachman. (2006). Many pathways from land use to health: associations between neighborhood walkability and active transportation, body mass index, and air quality.Journal of the American Planning Association, 72(1), 75-87.

[7] Krizek, K. J. (2000). Pretest-posttest strategy for researching neighborhood-scale urban form and travel behavior. Transportation Research Record Journal of the Transportation Research Board,1722(1722), 48-55.

[8] Clifton, K. J., Smith, A. D. L., & Rodriguez, D. 2007. The development and testing of an audit for the pedestrian environment. Landscape & Urban Planning, 80(1–2), 95-110.

[9] Cervero, R., & Duncan, M. 2011. Walking, bicycling, and urban landscapes: evidence from the san franci. American Journal of Public Health, 93(9), 1478-1483.

[10] De Boudeaudhuij, I., Sallis, J. F., Saelen, B. E., De Bourdeaudhuij, I., Saelens, B., & De Bourdeaughuij, I., et al. 2003. Environmental correlates of physical activity in a sample of berlgian adults. American Journal of Health Promotion, 18(1), 83-92.

[11] Cerin, E., Conway, T. L., Saelens, B. E., Frank, L. D., & Sallis, J. F. 2009. Cross-validation of the factorial structure of the neighborhood environment walkability scale (news) and its abbreviated form (news-a).International Journal of Behavioral Nutrition and Physical Activity, 6(1), 1-10.

[12] Leslie, E., Saelens, B., Frank, L., Owen, N., Bauman, A., & Coffee, N., et al. 2005. Residents' perceptions of walkability attributes in objectively different neighbourhoods: a pilot study. Health & Place, 11(3), 227-236.

[13]1 Saelens, B.E., Sallis, J.F., Frank, L.D., 2003b. Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. Annals of Behavioral Medicine 25 (2), 80 – 91.

[14] Saelens, B. E., Sallis, J. F., Black, J. B., & Chen, D. 2003. Neighborhood-based differences in physical activity: an environment scale evaluation. American Journal of Public Health, 93(9), 1552.

[15] Cerin, E., Leslie, E., Owen, N., & Bauman, A. 2008. An australian version of the neighborhood environment walkability scale: validity evidence. Measurement in Physical Education & Exercise Science,12(1), 31-51.

[16] Rosenberg, D., Ding, D., Sallis, J. F., Kerr, J., Norman, G. J., & Durant, N., et al. 2009. Neighborhood environment walkability scale for youth (news-y): reliability and relationship with physical activity. Preventive Medicine, 49(2–3), 213–218.

[17] Shigematsu, R., Sallis, J. F., Conway, T. L., Saelens, B. E., Frank, L. D., & Cain, K. L., et al. 2009. Age differences in the relation of perceived neighborhood environment to walking. Medicine & Science in Sports & Exercise, 41(2), 314.

[18] Cerin, E., Macfarlane, D. J., Ko, H. H., & Chan, K. C. A. 2007. Measuring perceived neighbourhood walkability in hong kong. Cities,24(3), 209-217.

Research Paper

Outdoor public space activities characteristics of children and their inter-generational parents and design strategies from the health perspective: A case study in Harbin, China

Qing YUAN, Ran GUO, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Abstract

With the rapid urbanization of China and the establishment of the new family structure of "four-two-one" (four grandparents-two parents-one child), taking care of children by the their grandparents has become pretty common in the current Chinese urban families. Currently, 41.43% of the elders in China raise and take care of their grandchildren. Such proportion demonstrates an increasing trend annually. In the meantime, it has been shown from the statistics that the major the groups exercising in the public area during the working days are the children and their inter-generational parents (as 'the Group' in the following). Due to the preschooler's special feature of requiring accompany in amusements, the preschoolers and their inter-generational parents have been the second major users of outdoor public space (OPS) in the cities of China following the older groups. As the major place where the daily life and leisure activities of the Group happen, the environment quality of the urban public and OPS has direct impact on the physical and mental health of the Group. To design and build an appropriate OPS, it is necessary to have a deeper understanding regarding the psychology and behavior demands of the children and their inter-generational parents. This paper aims to have a discussion about this issue. This study is carried out by taking the questionnaire as the major method, which is combined with field research with interview. The questionnaire consists of two parts, network questionnaire and on-site questionnaire. 515 copies of effective questionnaire are received. There is a survey questionnaire designed in the study based on the social-ecological models for the Group by taking three factors into consideration, which are individuals, families and society, material environment and ecological environment. Based on the survey result, information of the Group, such as the overall distribution, health status, activity characteristics, space use restrictions, and preference of the OPS was collected. The result of this specific study shows that: (i) The Group is mainly distributed in four spaces, park green lands, squares, community activity place and spontaneous activity space. There are great differences of the functions of different OPS. (ii) The proportion of the grandparents taking care of their grandchildren usually live in the local city and have a good economic condition. At the same time, the result of emotion self-assessment of the grandparents who are engaged in taking care of children properly is more satisfying. (iii) In terms of the status of the

use of OPS, the activity type of the Group is much concentrated. The activity frequency of the group is related to the walking distance while the duration of the activity is related to the fatigue state of grandparents. (iv) The security of space is the major factor restraining the development of activities. The lack of social communication is the main factor causing the low participation of activities. Besides, the bad condition of microclimate environment will also decline outside activity participation degree greatly. This paper makes a deep investigation and research on the urban OPS, mainly focusing on the connection between OPS, space comfort, facilities arrangement, the social attribute of the Group and healthy activities. Research limitations: The activity feature of the Group in the urban OPS can be influenced by other factors, such as the urban integral economy level, traffic condition, population and social economy science. More detailed problems still require further study.

Keywords

outdoor public space design, public health, children and their inter-generational parents, activity characteristics, design strategies

1. Introduction

As the major place for bearing residents' outdoor activities, forming positive social life and interpersonal communication (Chen Z and Ye M, 2009), outdoor public space (OPS) has been extensively researched in terms of effectively promoting the physical activity (Deborah C, et al., 2006), relieving psychological stress (Tan SH and Li J, 2009) and improving quality of life (Karmanov D and Hamel R, 2008). There is also abundant evidence to support that participating in outdoor activities appropriately is beneficial for physical and mental health of the elderly and children (Listed N, 2009). Meanwhile, the outdoor environment has been increasingly proved as the key spatial factor affecting population health by scholars (Wang L, et al., 2016).

In the urban areas of China, the contradiction between getting on at work and fulfilling family commitments makes the young and middle-aged people have too much pressure to take care of their own children (Yang JH and Li LL, 2016). It's very common that the elders take care of the grandchildren. With a large number of one child moving into the marriage age, the "four-two-one" family structure has gradually become the main forms of the Chinese family structure currently (Hui LB, 2010). The rising age of first birth, the adjustment of birth policies including the two-child policy (Liang HY, 2013) and the increasing number of a single-parent family (Sun JJ and Zhang HK, 2013) has all led to more preschoolers receive care from their inter-generational parents. It has been shown from the statistics that currently, 41.43% of the old in China provide support and take care of their grandchildren (Sun JJ, 2013), and the proportion shows an increasing trend annually (Burn K, et al., 2015; Meng XJ, et al., 2004). In addition, taking care of grandchildren is also the main reason for the migration of the elders in China. More than half of the migrant elders in Beijing came for this reason and became "Lao Piao Zu" (elderly migration group) (Meng XJ, et al., 2004). Despite enjoying the joys of family, elders are also forced to accept physical and mental stress due to some factors including care tasks, changes in family roles, and being far away from hometown (Listed N, 2009; Liang HY, 2013; Zhou J, et al., 2016). Therefore, in recent

years, the social phenomenon of inter-generational care (taking care of children by their grandparents) has attracted more and more attention from scholars of all circles.

Inter-generational care is a kind of inter-generational support behavior, which not only requires time (Sun JJ, 2013), physical labor and material wealth of the elderly, but also affects the physical and mental health as well as life quality of elderly and grandchildren to a large extent (Sun JJ and Zhang HK, 2013). Statistics show that due to the special feature of preschools of needing accompany in their amusements, the preschoolers and their inter-generational parents (as 'the Group' in the following) have been the second major users of urban outdoor public space (OPS) in the cities of China following the older groups (Zhang Y, 2007). Bringolf, et al. (2017) have conducted a study exploring the conditions of the outdoor environment elements. The perception of the companions on the outdoor public space will not only affect the OPS activity quality of preschoolers directly, but also change the physical and mental health status of the inter-generational parents. As the main place for the daily life and leisure activities of the Group, the quality of OPS will have direct impact over the physical and mental health of the Group.

Although the phenomenon of inter-generational care is very common and relevant policies also attach the focus on this care behavior from the elders in China (GOSC. PRC, 2011). However, the current research on the Group mainly concentrated on sociology, pedagogy, medicine and other fields. There are few studies related to the health activities and space use from the health perspective. At the same time, due to the lack of understanding about inter-generational support and conflict (Zhang Q, 2014) in the health activities for preschoolers and their inter-generational parents, the differences in subjective spatial preferences, activity characteristic, psychological and behavioral needs, and other aspects between the Group and the other elderly and children are still not clear. Combined with the space construction and the Group needs, this paper selects representative OPS for investigation and research, and puts forward optimization design strategies to meet the demands of inter-generational relations.

2. Methods

Based on the theory of social-ecological model, a questionnaire is designed in this research regarding the outdoor activities of the Group from three aspects including personal, family and social subjective factors, material factors and ecological and environmental factors (Kang LP, et al., 2015). Afterwards, information is collected about the activity characteristics, health status and spatial preference of preschoolers and their inter-generational parents under the influence of inter-generational relations.

The survey is mainly based on questionnaire surveys, combined with field surveys and interviews. The questionnaires are composed of online and on-site questionnaires, which are distributed at the same time. The online questionnaires are produced by SO-JUMP (a professional questionnaire platform, https://www.wjx.cn/) and distributed through the WeChat social software. The on-site questionnaires are distributed in several residential communities, kindergartens and urban OPS with intensive activities of the Group, which all have different location conditions and the consumption levels in Harbin, Hei Longjiang Province (Figure 1). On the premise of sufficient respondents, the survey is conducted from

April to June (2018/04/03~2018/06/15), when the weather condition of Harbin is relatively suitable, in order to ensure the interference of weather condition on the subjective needs of the Group could be excluded. The survey subjects are preschoolers' inter-generational parents who are responsible for taking care of preschoolers' daily life as well as preschool children. When the preschoolers are unable to complete the questionnaire due to their limited cognitive levels, relevant information is provided by their inter-generational parents instead. At the same time, during the on-site questionnaire survey, respondents with strong participation consciousness are selected for in-depth interviews to collect the overall and general characteristics of the target population widely, avoid the influence of individual cognitive differences and ensure the random data samples. A total of 515 effective questionnaires are received, including 196 online questionnaires and 319 on-site questionnaires.

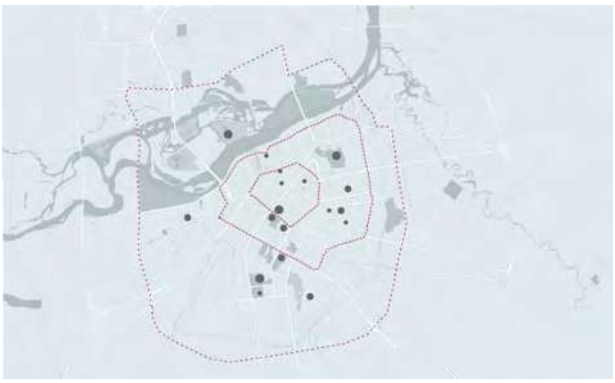


Figure 1 Distribution areas of questionnaires in Harbin

3. Results based on field surveys and interviews

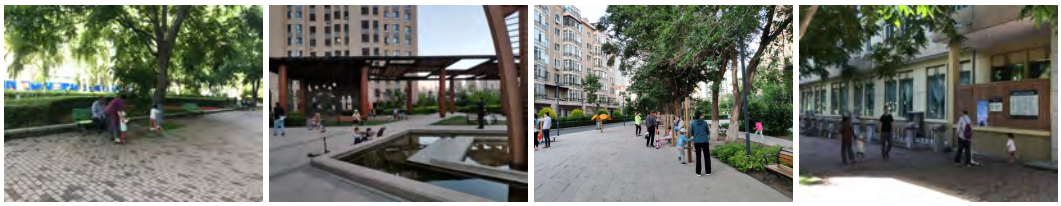
The daily activity demands and consciousness of leisure and entertainment of the Group are increasingly enhanced and meanwhile are also getting diversified. The urban outdoor public space can be divided into four types, namely green space, square space, residential outdoor space and spontaneous activity space, according to the spatial functions and forms as well as the activity rules of the Group (Figure 2(a)~(d)). All types of OPS have slightly different functions and activity carrying rates.

Green space. It is mainly for leisure and entertainment function, with diverse space types, population composition, and preferable plant coverage. For the Group, green space provides relatively large activity and play areas, rich services and entertainment facilities, including comprehensive parks, special parks (such as botanical gardens), etc.

Square space. It is relatively wide with plenty of public space available for the Group. However, mainly based on great number of pavement, it has single landscape type, microclimate environment and limited public services facilities, which is not very participating and suitable for recreational activities for the Group.

Residential outdoor space. It is the most convenient and frequently-used outdoor public space type for daily use of the Group. Spaces such as greening, rest, leisure and fitness are mostly constructed and designed. However, the available space types and quantities remain quite limited. Users are relatively fixed, most of whom are residents in the community.

Spontaneous activity space. Based on the willingness and preferences of the Group, it also satisfies the space needs of spontaneous activities, which are usually variable and accidental, including street space, surrounding space of public service facilities (such as the outer space of commercial buildings), surrounding space of landscape structures, etc.



(a) (b) (c) (d)

Figure 2 The four types of urban OPS

4. Results based on questionnaires

4.1. The characteristics of the Group in OPS

4.1.1 The proportion of inter-generational parents who are healthy, live in the local city and have middle range of income is high.

Taking care of grandchildren is a kind of inter-generational supportive behavior that has certain requirements for health conditions, financial capability and time cost of the inter-generational parents. Among the surveyed the Group, the age range of inter-generational parents interviewed is from 49 to 75 years old. Meanwhile, the proportion between 60 and 64 years is the highest, which is about 38.0%. There is no significant gender difference in the proportion of male and female inter-generational parents. The proportion and intensity of children taken care of local inter-generational parents are higher than those are outsiders. In addition, the proportion of inter-grandparents who have middle range of income and self-assessment as "basically free from financial stress" is the highest, which further indicates that those inter-generational parents with better conditions and abilities will take more care of their grandchildren.

Table 1 Information of inter-generational parents in OPS

Gender	Male	264	51.30%
	Female	251	48.70%
Age	49~54	21	4.10%
	55~59	102	19.80%
	60~64	198	38.30%
	65~70	116	22.60%
	70~75	78	15.20%
Identity	Local	323	62.70%
	Outsider	192	37.30%
Self-assessment of finance	Wealthy	111	21.50%
	Basically free from financial stress	228	44.30%
	Financial stress	176	34.20%
Self-assessment of health	Healthy	248	48.20%
	Ill health	267	51.80%

4.1.2 The emotional self-assessment results of the inter-generational parents who participate in the care activities moderately are better.

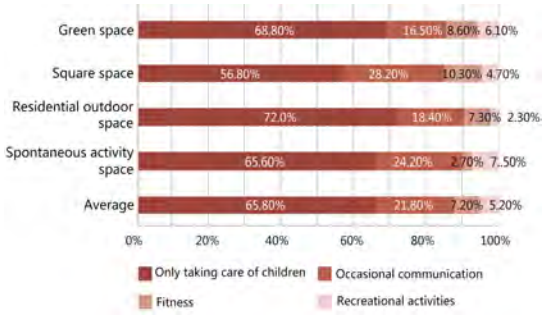
The behavior and activity characteristics of preschoolers make the inter-generational parents always keep busy. Among the surveyed, the proportion of inter-generational parents involved in daily caring for grandchildren is as high as 76%. Besides, in this group, the proportion of grandparents who take care of grandchildren all day long is about 40%. The proportion of fatigue feeling and negative emotions generated of grandparents with prolonged care is significantly higher than that of whom being involved in caring for part of the day. In addition, as a form of social participation, nearly 80% of inter-generational parents consider that they can maintain a relatively good mental state by caring for their grandchildren to participate in outdoor activities, especially in fighting against negative emotions such as loneliness and depression. However, when grandchildren have abnormal emotions or accidents, the inter-generational parents will show more obvious anxiety and stress. In general, there is an inverse "U" shaped relationship between the duration of taking care for preschool grandchildren and the emotional self- assessment results of inter-generational parents group. Those results are similar to a previous study about the relationship between the care of grandchildren and the attitudes toward aging among Chinese older People (Sun JJ, 2015).

4.2. The characteristics of activities and OPS utilization of the Group

4.2.1 Activity types are concentrated

Among the surveyed samples, the major types of daily activities of 3 years' children in the outdoor space mainly include playing with children's recreation facilities and doing simple sports. The phenomenon of watching children of other age groups to do the activities is quite obvious. On the basis of the same preferences mentioned, children around the age of 4 hold avid interest over sand, mud, stone, water and other natural elements. However, the behaviour of watching others' activities is reduced. Children aged from 5 to 6 years old prefer sports and role-play games, and their interest in electronic devices is gradually increasing. This is basically consistent with Joe L's conclusions about the behavioral characteristics of children's games (Joe L Frost, 2015).

The main activity types of the inter-generational parents in OPS, the proportion of physical activities and daily social activities, are main based on "only taking care of and accompanying their grandchildren" and "occasional communication with others while taking care of their grandchildren", the proportions of which are significantly different from fitness and recreational activities (Figure 3). With the increase of grandchildren age, the proportion of fitness and leisure activities (playing cards and chess, etc.) of inter-generational parents also increases. However, there are limited changes. Meanwhile, the activity types are still focused on their grandchildren, which are relatively concentrated (Figure 4).



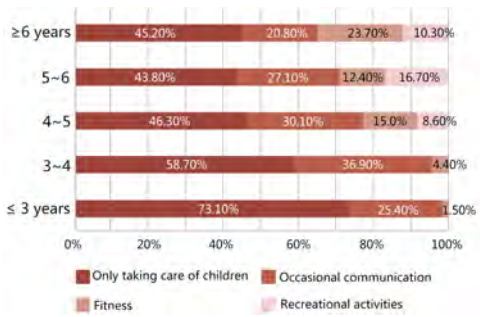
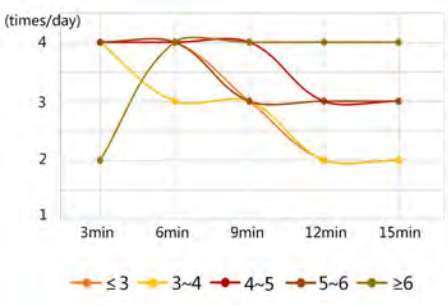


Figure 3 Inter-generational Parents' Activities in Varied OPSs

Figure 4 Activities of Inter-generational Parents with Preschoolers of different Age in OPSs

4.2.2 Activity frequency of Group is correlated with walking distance

Walking distance refers to the average walking length of the daily one-way trip to the activity site. The activity site within the acceptable walking distance range can better stimulate the subjective initiative of participating in activities. It is generally accepted among the Group that walking distance had decisive impact over the daily travel of the Group, which is the most important factor affecting activity frequency. For the walking distance within the acceptable range of the Group, activity frequency has a significantly negative correlation with the walking distance, and they prefer an environment with convenient walking condition (Figure 5). Among them, the activity frequency in outdoor activity sites is high when it can be reached within 9min walking distance. In addition, although the residential outdoor space is limited in the degree of visual richness and content of recreation, it has become the most frequently-used activity site for the Group due to it is easy access to (Figure6).



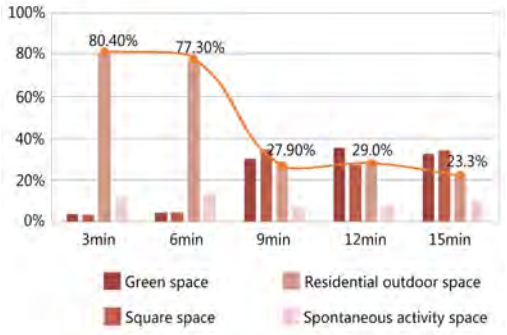


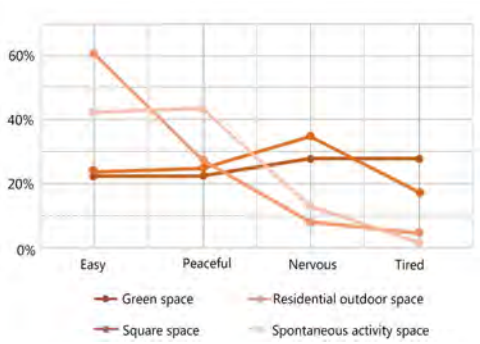
Figure 5 Relationship Between Walking time and Frequency of Activity Among Preschoolers of Different Age Groups

Figure 6 Choice of OPS based on Walking Time

4.2.3 Activity duration of the Group is associated with fatigue state of inter-generational parents

Generally, the single continuous activity duration of the Group is 0.5 to 3 hours, and the majority go out for 2 to 4 times a day. Due to the preschoolers' special feature of needing accompany in their recreation, which makes inter-generational parents have little chance to rest while taking care of their grandchildren. Furthermore, the number and layout of the rest

facilities in the activity sites are unreasonable, which can lead to different degrees of physical and mental fatigue for the inter-generational parents (Figure 7). Although there are individual differences in age, personality, physical quality and other aspects, only 26.88% of the inter-generation parents consider that such care work is easy (Figure 8). Most of the inter-generation parents express that they will stop outdoor activities in advance when they feel tired. The activity duration shows a significant downward trend with the increasing fatigue of inter-generational parents.



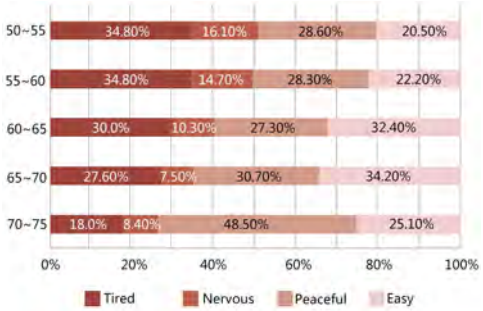


Figure 7 Emotional Cognizance of Inter-generational Parents in Different Spaces

Figure 8 Emotional Cognition of Inter-generational Parents of Different Age Groups

4.2.4 Safety is the primary factor restricting the activities

Through the interviews, it is found that due to the potential safety risks in the composition of open public space population composition, vehicle traffic acting, site facilities and other aspects, inter-generational parents are usually very cautious when they take care of grandchildren. Besides, they mainly focus on children and even keep their grandchildren within their sights all the time. According to the survey data, in the process of caring for grandchildren, only 5.04% of children have suffered from accidental injuries in the activities for more than 3 times, such as road traffic crashes, falls, bruises. There are 66.81% of children have never suffered from any accidental injuries, which demonstrates the importance that inter-generational parents attach to grandchildren safety (figure 7). By making the statistics and ranking the environmental factors of restricting outdoor activities, the safety is the primary factor that affects choosing play areas of the Group.

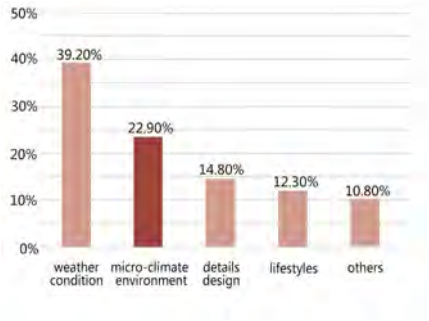
4.2.5 Lack of social interaction is the main reason for restricting inter-generational parents involved in activities

Among the surveyed group, the time for interests and hobby of 80.42% inter-generational parents is largely occupied due to that they need to take care of their grandchildren. Besides, 64.68% of the inter-generational parents express that except family members, the main partners are other grandparents, who get to know when they accompanied their grandchildren. They chat during this caring process of their grandchildren and further discuss the time and contents of joint activities. At the same time, they also express that they have to always follow the children. Coupled with noisy site, less life intersection, accent and other restrictions, there is no in-depth interpersonal communication and chat. Grandchildren become their common and only topic of their conversation. From the perspective of demands, inter-generational parents have the highest demand for the social interaction of

the OPS, in order to deepen their communication and broaden the original social network (figure 8).

4.2.6 Participation in outdoor activities drops sharply during the cold seasons

The Group has a relatively weak constitution and has poorer tolerance to cold weather. The survey results show that nearly 80% the Group once reduced winter activity frequency due to low temperature and cold wind. However, with the increase of health awareness of inter-generational parents, the proportion of the Group who still adheres to the outdoor activities in cold seasons is more than 70%. Through making the statistics and ranking the environmental factors restricting winter outdoor activities of the Group, there are three activities lacking of suitable activity sites, poor accessibility and delay maintenance of public space respectively. Among them, on activity sites, poor micro-climate adaptation is the primary factor for the decline in the activity participation and usage rate of space during the cold seasons (Figure 9). Comfort mainly affects the sensory needs of people. Figure 10 shows the comfort needs of micro-climate environment of respondents in different OPS, involving temperature, wind, sunshine, sound and air quality. Among them, the comfort needs of the Group present obvious seasonal differences. It has been found that the comfort needs for sunshine, wind speed and the air quality are comparatively higher in early spring, late autumn and winter.



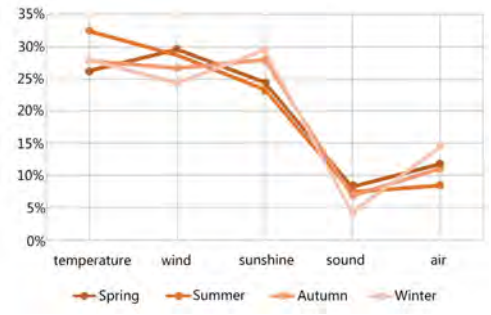


Figure 9 Reasons for Decrease in the Group Activities during Cold Seasons

Figure10 Microclimate Requirements in Different Seasons

4.3. The OPS satisfaction of the Group

4.3.1 Space satisfaction is mainly related to the activity experience of preschoolers

The interviews revealed that although the needs of inter-generational parents for OPS were different, the overall comments of OPS mainly depended on the emotional satisfaction level of grandparents. The satisfaction of OPS has a significantly positive correlation with the emotional level of grandchildren during the activity, and the comfort of children is the most important factor for the satisfaction. In addition, according to the comments of inter-generational parents, the degree of accessibility, plant richness, service facility perfection and facility maintenance are the key objective factors impacting satisfaction (figure 10). Meanwhile, there are demographic and sociological differences for the satisfaction. Age, economic levels and habitation are significantly correlated with the satisfaction, which are three subjective factors.

4.3.2 Trip satisfaction is affected by walking distance

Walking is a transporting mode of energy and time consumption. Walking distance is negatively correlated with activity satisfaction. Through making the statistics and ranking the factors affecting trip satisfaction, the top three are walking distance, less vehicles, walking path with great landscape.

The average daily walking distance of the Group is 0.46km (average time 6.9min). The satisfaction proportion of the Group with the walking less than 5min is more than 70% while the rest of the respondents think that walking within 10min is a suitable distance. Inter-generational parents express that the distance within 10min to 15min is the upper limit that their grandchildren could bear, while the proportion of the Group who walk more than 30min is less than 3%. Considering the age structure of the Group and taking 1.2m/s as the basic walking speed (children's walking speed is about 1.2 ~ 1.4m/s (Zhou T and Chen X, 2015)) while the comfortable walking distance is about 400m, and the acceptable walking distance is about 1km.

5. Conclusion

5.1. Space of the inter-generational sharing

The planning and design strategies of OPS usually lacks the consideration of inter-generational sharing. Reasonable space design can improve the using rate and also promote communication. In addition to taking care of their grandchildren, the activities that both grandparents and grandchildren participate in include running, strolling, resting and using fitness apparatus. According to the subjective evaluation data, 67.2% of the inter-generational parents express that the above activities can be participated jointly. The design of size, scale and of details in activity space lacks consideration of both children and adults, which affects the activity frequency. Secondly, as the public space is less functionally compatible, the number of spaces that can satisfy the needs of two groups are small. Meanwhile, such type of activity site is single, all of which extremely limited the activities and reduce interactions. In addition, most of the space elements are monotonous, which is unable to have long-term visual attraction for children to satisfy their immense curiosity and imagination to extending their play duration effectively.

5.2. Space comfort needs

For winter cities with long cold periods, the impact of micro-climate conditions on public outdoor space is mainly reflected in the wind environment and solar environment (Liu YQ, 2006). The lack of considering the cold climate features in design part of OPS of severe cold regions results in harsh microclimate environment. Factors like large building shadow areas and cold wind can have serious impact over the outdoor activities in cold seasons (Jiang CY and Leng H, 2017), especially for elderly inter-generational parents and young children. Regarding air quality and noise, in recent years many studies on health leisure activities have pointed out the air quality will affect the health of cardiovascular and respiratory systems directly. Bad acoustic environment will cause both physical and mental harm to people including audition, vision, even affecting people's nervous system and having irritable and fractious emotion (Dong JY, 2013). The interviews and observations revealed that the different locations result in large differences in the comfort needs of the Group. The demand for air quality and acoustic environment mainly comes from the activity sites along the roads.

The poor air quality caused by vehicle exhausts, the noise pollution caused by traffic and fitness activities (such as square dance) all have adverse influence on the Group, such as shortening time, decreasing frequency and intensity, reducing interaction activity and affecting the emotional of the Group.

5.3. Facility allocation

Bringolf, et al. (2010) deemed that the objective conditions of he outdoor environment will affect the outdoor activity quality of preschoolers and their companions directly. The level of OPS service facilities is another important factor restricting the activities of the Group.

In order to explore the influence of the OPS design elements on the health activities of the Group, an analysis of 5 aspects was carried out, the results of which have demonstrated that "activity facilities" > "service facilities" > "sanitary facilities" > "landscape" > "space scale". In terms of "activity facilities", the proportion of the Group's needs for children's playgrounds and sports facilities is higher than that of the middle-aged and elderly people. Respondents have expressed that children's activity facilities are relatively simple, which cannot attract children's attention for a long time and satisfy their curiosity and desire to explore and therefore increase the fatigue feeling of inter-generational parents to some extent. In terms of "service facilities", there is an obvious demand for the number and arrangement of rest facilities as well as rain-shelter facilities. Meanwhile, the service and the service facilities layout are not designed in combination with spatial functions and user needs reasonably. In terms of "sanitary facilities", demands for toilets and dustbins are much higher than that for other items. The details, management and maintenance of sanitary facilities are unsatisfactory, which limits the travel distance and range of activities. As for "landscape", the Group has the highest demand for the planting compared with the pavement areas and landscape structures. It is generally considered that the activity experiences are poor in hot seasons and the greening construction still needs to be strengthened.

6. Discussion

6.1. Establish urban open public space system

The urban OPS system meeting the health needs should connect the Group and the public space more closely, improve health functioning of public space fully and effectively, and enhance overall health level of the Group. Given the differences of the space levels, such as urban, block, and community, the planning processes and designs of OPS by the frequency and preference of using type should be different. The activity space within the walking distance limit and the space of random activity should be emphasized, which makes OPS arrangement consistent with the needs of the Group activities and plays different health roles. In addition, the Group is sensitive to the overcrowded or empty open space in the activities, providing a public space of appropriate scale, which not only ensures the activity needs and gathers popular, but also avoids the space waste and poor microclimate condition caused by large scale.

6.2. Promoting the inter-generational sharing of OPS

Urban OPS should develop inter-generational sharing design gradually to make the Group feel more convenient in the activities. Firstly, they need to determine the source of use objects and their activity types, and create a functional composite space composed of

sub-spaces with different functions. During the design and reconstruction processes, they need to pay attention to functional compatibility of the OPS based on the needs of preschoolers' activities and also taken into account the needs of inter-generational parents' communication and fitness. Sharing space can provide children with more sites and possibilities for activities, thereby increasing social interaction opportunities among the inter-generational parents, deepening understanding gradually each other and broadening the social network. Besides, the spaces and facilities are designed based on the Group scale, meet the requirements and standards of children and adults in pavements, facilities, and pedestrian path organization, which can offer support for mutual participation in activities. In addition, in terms of landscape, create attractive and interesting landscape can have great impact on improving visual comfort and the spirits, thus promoting the outdoor activities of the Group effectively.

6.3. Optimizing public space comfort

In order to eliminate the utilization restrictions of affecting the Group's sensory needs, attention should be paid to the comfort needs design of the OPS. As the decline of inter-generational parents' physical functions and resistance, sunshine and wind have a great impact on them. For northern cities with long cold seasons, areas with high wind speed in winter and no wind in summer can be assumed to be green areas while areas with windy summers and low wind speeds in winter are arranged as activity areas of the Group (Leng H, et al., 2007). The activity facilities and sites are placed in areas with shadows in summer and sunshine in winter. Deciduous tress can be planted around the activity areas to maximize sunshine hours during the winter. In terms of plant species, cold-tolerant evergreen trees, such as Chinese pines, camphor pines and other native species, can be planted around the public space to create an evergreen effect, and resist cold winds inside the open space during cold seasons effectively (Leng H and Yuan Q, 2014). In terms of air quality and noise improvement, increasing the plant community and green plants density in the activity sites along the roads can balance off the adverse effects of driving noise and exhaust on children and the elderly.

6.4. Improve facilities of open public space

Urban space should improve facilities gradually to be used in the Group activities easily. OPS should give priority to the physical state of inter-generational parents so that they can take care of their grandchildren closely. Based on that, the location, quantity and direction of the rest facilities, shelves and shading facilities should be designed. In the meantime, diversified rest options should also be provided, such as the installment of stood-leaned against rest facilities. During the selection of pavement materials, attention should be paid to the protective characteristics of the materials, especially the non-slip and moisture resistance of the paving materials. The suitable paving materials can be selected according to the characteristics of various activities, such as soft materials suitable for children's activity sites. Wood and plastic should be used as the major materials for seats and other rest facilities, avoid the use of hard, sharp materials such as metals and stones. Bright colors are used to decorate the ground pavements, signs, sculptures, fitness facilities and children's recreational facilities, which not only can be convenient for inter-generational parents to be hard to identify due to poor eye sights, but also can reinforce the boundary range of children's game space through using bright color. In addition, the space design should consider barrier-free facilities and the height differences between spaces to avoid the

obstacles for pram to go through and the other potential danger of falling, fracture and so on.

An in-depth research is conducted on urban outdoor public space, focusing on the correlation between factors such as the public space system, spatial comfort, facility condition, and social attribute of inter-generational group and health activities. Urban outdoor public space should be designed and reconstructed according to characteristics of the Group, which is of great significance for improving life quality of the Group, promoting public health and bringing long-term health benefits. In addition, the activity of the Group may also be affected by other factors, such as the overall economic level of the city, traffic system, population and social-economic characteristics, etc. More specific and targeted problems need to be further studied.

7. Acknowledgements

This research was financially supported by the National Key Research and Development Program of China (Grant No. 2017YFC0702306-1).

8. References

Chen Z, Ye M. (2009). “What is Authentic Urban Public Space? — A Review of Western Public Space Theories and an Evaluation of the "Publicness" of Public Space”, Urban Planning International, Vol. 24 No. 3 (March).

Deborah C, et al. (2006). “Park Use and Physical Activity in a Sample of Public Parks in the City of Los Angeles”, Rand.

Tan SH, Li J. (2009) “Restoration and Stress Relief Benefits of Urban Park and Green Space”, Chinese Landscape Architecture, Vol. 25 No. 6 (April).

Karmanov D, Hamel R. (2008) “Assessing the restorative potential of contemporary urban environment(s): Beyond the nature versus urban dichotomy”, Landscape & Urban Planning, Vol. 86 No. 2 (January).

“Physical Activity Guidelines Advisory Committee report, 2008. To the Secretary of Health and Human Services”, Nutrition reviews, Vol. 67 No. 2 (October).

Wang L, Liao SW, & Zhao XJ. (2016) “Exploration of Approaches and Factors of Healthy City Planning”, Urban Planning International, Vol. 31 No. 4 (August).

Yang JH, Li LL. (2016) “Intergenerational dynamics and family solidarity: a comparative study of mainland China, Japan, Korea and Taiwan”, Sociological Studies, Vol. 24 No. 3 (May).

Hui LB. (2010) “The housing pattern research of 4-2-1 family structure”, Xi’an university of architecture and technology.

Liang HY. (2013) “The analysis of Chinese reproductive women fertility completeness from 2000 to 2010”, Population Journal, Vol. 35 No. 3 (May).

Sun JJ, Zhang HK. (2013) “The situation and influencing factors of Chinese older people taking care of their grandchildren”, Population & Economics, Vol. 35 No. 3 (May).

Sun JJ. (2013) “Chinese Older Adults Taking Care of Grandchildren: Practices and Policies for Productive Aging”, Ageing International, Vol. 38 No. 1 (March).

Burn K, et al. (2015) “Is grandparenting a form of social engagement that benefits cognition in ageing?”, Maturitas, Vol. 80 No. 2 (November).

Meng XJ, et al. (2004) “The floating elderly population in Beijing: characteristic and determinants”, Population Research, Vol. 28 No. 6 (November).

Zhou J, et al. (2016) “The impact of caring for grandchildren on grandparents physical health outcomes: the role of intergenerational support”, Res Aging, Vol. 30 No. 3 (February).

Kelley SJ, Whitley DM, & Campos PE. (2013). “Psychological distress in African American grandmothers raising grandchildren: the contribution of child behaviour problems, physical health, and family resources”. Res Nurs Health, Vol. 36 No. 4 (April).

Zhang Y. (2007) “The requirements of 3-10 years old children to the play circumstances in their neighborhoods”, Tongji University.

Bringolf I B, et al. (2010) “Built environment, parents' perception, and children's vigorous outdoor play”, Preventive Medicine, Vol. 50 No. 5-6 (March).

GOSC, PRC. (1011) “China’s 12th Five-Year Plan for the development of China’s undertakings for the aged”, General Office of the State Council, PRC. http://www.gov.cn/jrzg/2011-09/23/content_1955070.htm

Zhang Q. (2014) “Intergenerational relations and the elderly immigrants’ adaptation- a qualitative study of community of Shanghai”, East China University of Science and Technology.

Kang LP, Guan WH, & Ying J. (2015) “Relationship between physical activity and environmental research under the perspective of ‘social ecological model’”, Journal of Shandong Forestry Science and Technology, Vol. 45 No. 1 (February).

Joe L Frost. (2015) “Play and children development”, Beijing, China, Chain machine press.

Zhou T, Chen X. (2015) “Speed investigation and signal design for special pedestrians crossing the street”, Modern transportation technology, Vol. 12 No. 5 (October).

Jiang CY, Leng H. (2017) “Climate comfortable condition analysis and planning implications of residential district public spaces in transition season of cities in severe cold region: taking Harbin as an example”, Urbanism and architecture, Vol. 12 No. 1 (January).

Dong JY. (2013) “Analysis and evolution of sound environment in public spaces of urban residential areas in Harbin”, Harbin Institute of Technology.

Leng H, Yuan Q, & Guo NZ. (2007). “Study on the "Winter Friendly" Based Design Strategy of Amenity Cold City”. Architectural Journal, Vol. 12 No. 9 (September).

Leng H, Jiang CY. (2015) “The activity characteristic of senior people in outdoor public space during winter in severely cold regions and relating inspirations for planning”, Architectural Journal, Vol. 12 No. 9 (January).

Leng H, Jiang CY. (2015) “The activity characteristic of senior people in outdoor public space during winter in severely cold regions and relating inspirations for planning”, Architectural Journal, Vol. 12 No. 9 (January).

Leng H, & Yuan Q. (2014). “International experience and enlightenment on urban microclimate environment control and optimization”. Urban Planning International, Vol. 12 No. 6 (January).

Shizer A. (2008). “Assessment of the effects of environment radiation on wind chill equivalent temperatures”. European journal of applied physiology, Vol. 104 No. 2 (October).

Qi JG, et al. (2001) “The negative influences of the living environment in modern metropolis on the growth of children”, Journal of Beijing Normal University (Natural Science), Vol. 37 No. 3 (June).

Keller, et al. (2005) “A warm heart and a clear head. the contingent effects of weather on mood and cognition”, Psychological Science, Vol. 16 No. 9 (October).

Wang F, Wang CX. (2015) “Research on Residential Waterscape Based on Preschoolers and Their Grandparents' Perspectives”, Chinese Landscape Architecture, Vol. 12 No. 8 (Augest).

Research Paper

Association between Neighborhood Built Environment and Body Mass Index among Chinese Adults: Hierarchical Linear Model

Mengqi Zhong, Tongji University; China
Yuanyi Shen, Tongji University; China
Yifan Yu, Tongji University; China

Abstract

Obesity is becoming a global health problem. With the living standards of residents have improved rapidly in China, the problem of obesity becomes a serious threat to people's health. Although obesity effected by many factors, the role of the built environment in relation to obesity among population should be taken into consideration. This paper examines the association of built environment and body mass index with the hierarchical linear model, based on the data from 2016 China Labor-force Dynamics Survey (CLDS), which involves 29 provinces in China and investigates 401 villages or communities as well as 14226 families. In this paper, the village or community is used as the basic analysis unit, and the body mass index of the residents is used as the dependent variable, and neighborhood built environment (e.g. density of exercise facilities, square or park and distance to them) is as independent variables, socioeconomic status (e.g. age, gender, education, marital status, income and employment status) and health and exercise characteristics (e.g. self-rated health, average weekly exercise time and frequency) are as control variables. Participants are adults aged 15-65 years (n = 21086; 63.30% rural vs urban). With the independent variables from both individual and residential levels, hierarchical linear model is applied respectively to examine how body mass index is affected. Additionally, samples are classified by age group, urban/rural neighborhood and we figure out which factor mainly effected different groups. We explore that BMI is higher in high- vs. low-facility density neighborhoods but not significantly differ by neighborhood income. Overweight/obesity (BMI >= 25) is lower in high-developed districts. Physical fitness is higher in high-income neighborhoods but unrelates income. We conclude that living in walkable neighborhoods is associated with more physical activity and lower overweight/obesity but not with other benefits. Adults in higher-income neighborhoods have lower BMI and higher mental condition. These findings have important implications for urban planning and the corresponding improvement strategy is proposed.

Keywords

body mass index, health facilities, built environment, hierarchical linear model

1. Introduction

1.1. Background

Obesity rates have been rising globally in recent decades. According to the World Health Organization, more than one in ten people in the world are now classified as obese (WHO,2013). Nowadays, obesity is considered as one of the most important medical and public health issues of our time (Ells L & Cavill N, 2009). Obesity can be measured in various ways. Body mass index (BMI) is the most commonly used measure of assessing obesity in adults. (A Must and SE Anderson, 2006). BMI is used not only for assessing weight at the individual level, but also at population level assessment for its measurement method is very convenient and practical. Based on individual height and weight, BMI is calculated as weight in kilograms divided by the square of height in meters.

$$\mathrm{BMI} = \frac{weight(kg)}{height(m)^2}$$

1.2. The danger of obesity

Many studies have investigated how BMI contributes to the morbidity and mortality of various related diseases. BMI as a measure of unhealthy weight and related diseases in the population, different studies using statistical methods to analyze it may help to determine the correlation between obesity, health characteristics and influencing factors. Epidemiological studies have shown that people with very high BMI have a high risk, such as severe (⩾35kg/m 2) or morbid (⩾40kg / m 2) obesity (CM Kitahara, 2014), and underweight will increase its morbidity and mortality. Both overweight and obesity are associated with the incidence of multiple comorbidities including type II diabetes, cancer and cardiovascular diseases, which can pose a threat to people's health and place a heavy burden on the health care system. Maintaining a healthy weight is important in the prevention of the large disease burden in the future. (Daphne P Guh et al., 2009).

1.3. Influencing factors of BMI

BMI is affected by many factors. In 1989, Sobal and Stunkard (1989) first studied the relationship between socioeconomic status (SES) and obesity. The understanding and pursuit of attributes that are valued in developed societies, such as healthy and lean bodies, people in higher socioeconomic groups tend to have a healthier diet. Meanwhile, education may also mean expectations of individual achievement, whether in general or health, weight and appearance. Studies have shown that it is reasonable for high-educated women to favor the pursuit of thin attributes. (McLaren L, Kuh D, 2004). Women in low- medium human development index countries have the most common positive correlation between SES and body size.

In the context of urban planning, some scholars pay attention to the relationship between built environment and BMI. Access to physical activity facilities is the most common measure of the built environment. Urban construction environments, including parks and other green spaces, and recreational projects that provide structured settings for sports, may also create opportunities for physical activity that affect the increase of obesity (Jennifer Wolch et Al., 2011). Hoehner et al. (2013) found that the characteristics of the built environment around the home and workplace may affect the BMI, and the increase in recreational facilities

(exercise facilities and parks) can decrease the individual's BMI, which may increase the exercise opportunities of residents due to the increased facilities. Giles-Corti B, Macintyre S, Clarkson J, et al (2003) calculated the distance between the study participants' homes to the nearest recreational facility, showing a positive correlation between the distance from the nearest facility and the increased risk of overweight. Gordon-Larsen P, Nelson MC, Page P, et al (2006) found that there is a positive correlation between the number of recreational facilities and the likelihood of being overweight. Mobley LR, Root ED, Finkelstein EA, et al (2006) found a significant negative correlation with BMI using density measurements (the number of fitness facilities per 1,000 inhabitants, in the postal code).

2. Methodology and data

2.1. Methodology

In the social sciences, we have variables that describe individuals. The group consisting of individuals also has a series of variable descriptions. In this case, the data structure has a stratification phenomenon. Ordinary linear models are difficult to measure data on two levels, so a hierarchical linear model is chosen.

Hierarchical linear modeling allows the data to be structured in at least 2 levels. In this model, the first level is the repeated measure (time or condition) nested within the second level, which is the person-level data (Raudenbush SW, Bryk AS, 2007). The first level captures the within-subject variation, whereas the second level describes the between-subjects variability(Van Der Leeden R.,1998).

In practical application, the regression equation is built with the first-level variables, and then the intercept and slope in the equation are used as the dependent variables, while the variables in the second-level data are used as the independent variables. Then two new equations are established. Through this process, the influence of different level variables on the dependent variable can be explored.

2.2. Data

The data used in this paper is from the China Labor-Force Dynamic Survey conducted by the Center for Social Survey (CSS), Sun Yat-sen University in 2016. The survey uses a multi-stage, multi-level probability sampling method, which is proportional to the size of the workforce. The survey conducted a biennial tracking of urban and rural villages in China, and established a comprehensive database of labor force surveys, including three levels of tracking and cross-sectional data of individual labor, family and community. Its content covers migration, education, work, health, social participation and other information. At present, the CLDS has included the 2011 Guangdong Provincial Trial Survey, the 2012 National Baseline Survey, the 2014 Tracking Survey, and the 2016 Tracking Survey. The 2016 CLDS survey was conducted in 29 provinces, municipalities and autonomous regions across the country (excluding Hong Kong, Macao, Taiwan, Tibet, and Hainan). A total of 401 village community questionnaires, 14226 family questionnaires, and 21086 individual questionnaires for 15-64 labor force populations were completed. After deleting the samples with missing data values, a total of 12,648 samples from 374 village neighborhood committees were obtained for analysis.

2.3. Measures

Individual-level independent variables

In the individual-level, the study includes variables such as individual socioeconomic attributes, self-reported health, and exercise status. We transform the descriptive variables into dummy variables for analysis.

Table 1 Individual-level independent variables

Variable	Definition
UNITTYPE	1:community; 0:village
GENDER	1:female; 0:male
AGE	in years
MARRIAGE	1:married;0:otherwise
EDUCATION	1:elementary school and below
	2:middle school
	3:university and above
INCOME	total income in 2016
EMPLOYME	1:employed; 0:otherwise
HEALTH	1:very bad
	2:bad
	3:moderate
	4:good
	5:very good
WHETHER EXERCISE	1:yes; 0:no
EXERCISE TIME	1:0min
	2:1-150min
	3:150-500min
	4:500-1000min
	5:over 1000min

Neighborhood-level independent variables

In the neighborhood-level, we mainly use the density of exercise facilities and parks/squares in the neighborhood unit as well as the frequency of use of these facilities as independent variables. This paper argues that the density of recreational facilities and the atmosphere of physical activity can affect the physical activity of the residents and futher affect their BMI.

Table 2 Neighborhood-level independent variables

Variable	Definition
Exercise facilities density	=quantity / area
Park/square density	=quantity / area
Frequency of use of exercise facilities density	1-5: frequency from less to more
Frequency of use of park/square	1-5: frequency from less to more

Outcome variables

We use BMI as the dependent variable, and the BMI is calculated by height and weight. The obtained BMI is divided into 5 levels according to WHO standards. The current WHO BMI cut-off points of <16.0 kg/m2 (severe underweight), 16·0–18·49 kg/m2 (underweight), 18·5–24·9 kg/m2 (normal range), ⩾25 (overweight), 25–29·9 kg/m2 (preoboese), ⩾30 kg/m2 (obesity). (WHO Expert Consultation, 2004).

Table 3 Outcome variables

BMI	Definition	nutritional status
1	<16.0	severe underweight
2	16.0-18.49	underweight
3	18.5-24.9	normal range
4	25.0-29.9	Preoboese
5	⩾30.0	obesity

3. Data analysis

3.1. Model

We build models based on the above conditions. The model is as follows:

Level-1 Model

Y = B0 + B1*(UTYPE201) + B2*(GENDER) + B3*(AGE) + B4*(MARRIAG) + B5*(EDUCATION) + B6*(INCOME) + B7*(EMPLOYME) + B8*(HEALTH) + B9*(WHETHER EXERCISE) + B10*(EXERCISE TIME) + R

Level-2 Model

B0 = G00 + U0

B1 = G10

B2 = G20

B3 = G30

B4 = G40

B5 = G50

B6 = G60

B7 = G70

B8 = G80

B9 = G90 + G91*(EXERCISE FACILITIES DENSITY) + G92*(PARK/SQUARE DENSITY) + G93*(FREQUENCY OF USE OF EXERCISE FACILITIES) + G94*(FREQUENCY OF USE OF PARK/SQUARE)

B10 = G100 + G101*(EXERCISE FACILITIES DENSITY) + G102*(PARK/SQUARE DENSITY) + G103*(FREQUENCY OF USE OF EXERCISE FACILITIES) + G104*(FREQUENCY OF USE OF PARK/SQUARE)

3.2. Analytic strategy

First, we establish a stochastic regression model of the first level of variables. Based on the significance test results of the first-level variable regression analysis, we determine whether the difference of the first level of variables on the second level is significant. If the difference is significant, we will select the variables on the second level to establish a regression model for further analysis. This paper uses HLM 6.08 software to run the hierarchical linear model.

4. Result

Descriptive statistics are provided in Table 4. Of all the samples, 33.6% are urban residents and 66.4% are rural residents. 83.8% of them are women and 16.2% of them are men. 86.9% samples are married while 13.1% samples are otherwise. 0.5% of people are severe underweight, 6.4% of people are underweight, 67.6% of people are normal range, 22.3% of people are preoboese, and 3.1% of people are obesity.

Table 4 Descriptive statistics for dependent and independent variables

VARIABLE NAME	N	MEAN	SD	MINIMUM	MAXIMUM
Individual-level					
UTYPE	12648	0.34	0.47	0	1
GENDER	12648	0.84	0.37	0	1
AGE	12648	45.63	12.83	16	96
MARRIAGE	12648	0.87	0.34	0	1
CENUSACC	12648	1.41	0.83	1	5
EDUCATION	12648	3.64	2.35	1	11
INCOME	12648	33658.48	61158.56	100	305000
EMPLOYMENT	12648	4.25	1.16	1	10

HEALTH	12648	3.66	0.96	1	5
WHETHERE	12648	0.29	0.45	0	1
EXERCISE TIME	12648	1.5	225.46	0	5130
BMI	12648	4.2	0.87	1	5
Neighborhood-level					
EXERCISE FACILITIES DENSITY	374	9.54	91.17	0	1666.67
PARK/SQUARE DENSITY	374	5.77	86.29	0	1666.67
FREQUENCY OF USE OF EXERCISE FACILITIES	374	2.54	1.98	0	5
FREQUENCY OF USE OF PARK/SQUARE	374	1.79	2.17	0	5

We use a hierarchical linear model to analyze the impact of the built environment on BMI, which is done in several steps. Step one, we run the empty model and get the variance within the group is 0.35851 while the variance between groups is 0.02972. ICC(1)=0.076552>0.059, ICC(2)=0.703>0.7. So, this data is suitable for HLM analysis. Step two, we put the level-1 variable into the model and get the model1. Step three, we put the level-1 and level-2 variables together into the model to get the model2. Results are provided in Table 5.

Table 5 Multi-level analysis of community environments on labors' BMI

	Model 1			**Model 2**		
	Coefficient	error	P-value	Coefficient	error	P-value
Fixed effects						
Grand intercept	2.99215	0.04772	0.000	3.000756	0.047852	0.000
Individual-level predictors						
Unit type	0.051985	0.021476	0.016	0.042277	0.021951	0.054
Gender	0.077455	0.017339	0.000	0.078242	0.017355	0.000
Age	-0.0011	0.000586	0.059	-0.00112	0.000585	0.056
Marriage	0.119835	0.01864	0.000	0.120478	0.018695	0.000
Education	-0.02543	0.011914	0.033	-0.02453	0.012017	0.041
Income	0	0.000000	0.569	0	0	0.557
Employment	-0.01415	0.005325	0.008	-0.01385	0.005312	0.010
Health	0.009358	0.006932	0.177	0.009107	0.006969	0.192
Whether exercise	0.012774	0.032231	0.692	0.017222	0.02876	0.549
Neighborhood-level predictors						

	Exercise facilities density				-0.0017	0.000846	0.044
	Park/square facilities density				0.001628	0.000932	0.080
	Frequency of use of exercise facilities density				0.011121	0.012474	0.373
	Frequency of use of park/square				-0.01987	0.011232	0.076
Per week exercise time		0.036719	0.01735	0.035	0.031007	0.014831	0.036
	Neighborhood-level predictors						
	Exercise facilities density				0.000655	0.000327	0.045
	Park/square facilities density				-0.00059	0.000364	0.106
	Frequency of use of exercise facilities				-0.00067	0.004923	0.892
	Frequency of use of park/square				0.006285	0.004531	0.166
+P<0.10; *P<0.05; **P<0.01; ***P<0.001							

First, the results of model1 are obtained. Unit type, gender, marriage, education, employment and per week exercise time are significant at the level of P<0.05. Unit type, gender, marriage, and per week exercise time is positively related to the result of BMI while education, employment is inversely related to the result of BMI. Further explanation is that urban units, women, married, and long-term exercisers tend to increase the level of BMI while the increase in education and work can lower the BMI level.

Next, we added the independent variables at the neighborhood level to establish the level-2 regression model to explain the differences between regions. When the regression coefficient of the level-2 variable is the same as the coefficient symbol of the level-1 variable, it indicates that the effect of the level-2 variable on the level-1 predictor is enhanced, and the direction of action is consistent with the direction of the level-1 coefficient. Conversely, the regression coefficient of the level-2 variable is opposite to the level-1 sign, indicating that the level2 variable has a weakening effect on the correlation of level-1.

This paper argues that the number of facilities and the atmosphere in the neighborhood can influence whether people exercise and their exercise time. We get the result of model2. In terms of whether people exercise, park/square facilities and frequency of use of exercise facilities have a strengthening effect on the level1 variable, and the algorithm density and frequency of use of park/square have a weakening effect on the level1 variable. Among them, the exercise facilities density is significant at the level of $P < 0.05$, and the park/square facility density and frequency of use of park/square is significant at the level of $P < 0.1$. The addition of the level-2 variable increases the impact and significance of level-1 on the BMI.

As for per week exercise time, the park/square density and frequency of use of exercise facilities have a weakening effect on the leve-l1 variable, and the exercise facilities density and frequency of use of park/square have a strengthening effect on the level-1 variable. Among them, the performance density was significant at the level of $P < 0.05$.

5. Discussion

Our findings are consistent with previous literature findings that indicate that individual-level and community-level factors have an impact on residents' BMI. The study found that at the individual level, the socio-economic attributes of residents have an impact on BMI. At the community level, the community's exercise facilities, parks, squares, and the frequency with which residents use such facilities also have an impact on the individual's BMI. Our sample-level design refers to the previous literature and shows the advantages of both individual and community levels, but the impact of community-level variables on individual-level variables still requires more research to prove.

Despite this, the study has its own limitations. Our samples come from all over China. The geographical diversity of China is quite different. The living habits and cultural traditions of residents are also quite different. Some key variables affecting BMI may not be measured.

Meanwhile, the limitations of research on the environmental impact of our health outcomes involve the complexity of measures and linkages. This is an inherent feature of the multifactorial nature of the environment, where all aspects of the community can have both positive and negative effects on health. The community environment in which residents choose to live may have been influenced by the socioeconomic attributes of themselves. Prosperous communities may be close to both parks and fast food restaurants that have a negative impact on BMI, and these complex connections are difficult to measure directly. Future research should address many of these limitations.

6. References

A Must and SE Anderson (2006) Body mass index in children and adolescents: considerations for population-based applications, International Journal of Obesity, Vol.30.

Christine M. Hoehner, Peg Allen, Carolyn E. Barlow, Christine M. Marx, Ross C. Brownson*, and Mario Schootman (2013) Understanding the Independent and Joint Associations of the Home and Workplace Built Environments on Cardiorespiratory Fitness and Body Mass Index, American Journal of Epidemiology, Vol.178.

CM Kitahara, AJ Flint, A Berrington de Gonzalez, et al. (2014) Association between class III obesity (BMI of 40–59 kg/m2) and mortality: a pooled analysis of 20 prospective studies, PLoS Medicine, Vol.11.

Daphne P Guh, Wei Zhang, Nick Bansback, Zubin Amarsi, C Laird Birmingham and Aslam H Anis (2009) The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis, BMC Public Health, Vol.9 (March).

Ells L, Cavill N. (2009) Preventing childhood obesity through lifestyle change interventions, A briefing paper for commissioners. Oxford: National Obesity Observatory.

Giles-Corti B, Macintyre S, Clarkson J, et al (2003) Environmental and lifestyle factors associated with overweight and obesity in Perth, Australia. AMERICAN JOURNAL OF HEALTH PROMOTION, Vol.18.

Gordon-Larsen P, Nelson MC, Page P, et al. (2006) Inequality in the built environment underlies key health disparities in physical activity and obesity. Pediatrics, Vol.117.

Jennifer Wolch, Michael Jerrett, Kim Reynolds, Rob McConnell, Roger Chang, Nicholas Dahmann, Kirby Brady, Frank Gilliland, Jason G. Su, Kiros Berhane (2011) Childhood obesity and proximity to urban parks and recreational resources: A longitudinal cohort study, Health & Place, Vol. 17.

McLaren L, Kuh D. (2004) Women's body dissatisfaction, social class, and social mobility, SOCIAL SCIENCE & MEDICINE, Vol.58.

Mobley LR, Root ED, Finkelstein EA, et al. (2006) Environment obesity, and cardiovascular disease risk in low-income women, AMERICAN JOURNAL OF PREVENTIVE MEDICINE, Vol.30.

Raudenbush SW, Bryk AS. (2002) Hierarchical Linear Models: Applications and Data Analysis Methods. 2nd ed. Thousand Oaks, CA: Sage

Sobal J, Stunkard AJ (1989) Socioeconomic status and obesity: a review of the literature., Psychol Bull, Vol.105.

Van Der Leeden R (1998) Multilevel analysis of repeated measures data. Qual Quant, Vol. 32.

World Health Organization (2013) Obesity and overweight, World Health Organization.

Research Paper

The Spatio-temporal Disparities in Healthy Food Accessibility: A Case Study of Shanghai, China

Mengqi Zhong, Tongji University; China

Yifan Yu, Tongji University; China

Abstract

The supply of healthy food is distributed unequally in city. The accessibility of healthy foods is affected by both locations and traffic conditions. This paper examines spatio-temporal disparities in healthy food accessibility in Shanghai communities. Firstly, we choose all communities in Shanghai and use python as a crawling tool to collect healthy food store POI (e.g. agricultural markets, vegetable markets, fruit markets, aquatic seafood markets, supermarkets and comprehensive markets) from Gaode Map and get 23,436 points to calculate the amount and density of healthy food store in various communities. Secondly, after comparing Baidu Map and Gaode Map, leading platforms of Web GIS services in China, we choose Baidu Map to collect data to study the spatio-temporal difference in accessibility by using network analysis and developing a crawling tool to collect different travel time (e.g. walking and public transportation) for each community to the closest healthy food store at each time of day (0:00-24:00). Thirdly, we set up a variable to see at what time are people in the communities able to reach their nearest healthy food store in 15 minutes and the ratio of the above-mentioned time to the whole day is calculated so that we can evaluate the temporal disparities of healthy food accessibility. Additionally, we use global and local spatial autocorrelation to analyze the spatial patterns of the temporal disparities of healthy food accessibility, based on the Moran's index and the local indicator spatial association (LISA) index. Finally, on the basis of the research above, the food desert map is drawn. The results of this analysis identify the communities in Shanghai with the greatest need for improved access to healthy food stores and the variance of accessibility affected by the traffic in different times will be taken into account. Ultimately, this study explores a more complete and realistic condition of healthy food accessibility in Shanghai and the corresponding improvement strategy is proposed.

Keywords

healthy food accessibility, spatio-temporal disparities, food deserts, spatial autocorrelation

1. Introduction

1.1. Background

Obesity rates have risen sharply in recent decades, and according to the World Health Organization, more than one in ten people in the world are now classified as obese (WHO,2013). The rise in obesity rates is blamed on increased consumption of sweet and energy-dense foods (WHO,2002). A series of studies have shown that diet can affect health and unhealthy dietary intake is associated with a higher incidence of multiple adverse health outcomes (World Cancer Research Fund/American Institute for Cancer Research, 2007), including many major causes of death such as heart disease and various types of cancer (Jamie Pearce et al.,2009). High density of fast-food restaurants and corner stores that offer prepared foods is always related to unhealthy dietary intake, while easier access to healthy food stores, like fruits and vegetables stores, should improve the residents' diet nutrition and subsequently enhance their well-being and health(key,2011; Kent and Thompson, 2014, Story et al., 2008, Taylor, 2015).It's important to choose healthy food for health promotion, while there are many factors that influence people's choices. Factors affecting dietary intake have been well-explained at the socio-economic level including educational level, employment status, income and cultural differences (Dowler, 2001). As research progresses, scholars are paying more and more attention to the supply of healthy foods in the community. People tend to make food choices based on the food access in their immediate neighborhood (Furey et al., 2001),which suggests that factors in the built environment play a key role in people's diets (Morland et al., 2002b; Rose and Richards, 2004) .

However, the number and types of healthy food stores are not evenly distributed in the city, which may lead to disparities in accessibility of residents to healthy food stores. Studies have proved that low-income areas have a lower density of healthy food stores and higher food prices compared to higher income areas (Hendrickson et al., 2006).

The uneven distribution of healthy food stores in city may result in the lack of healthy food accessibility for some community and the formation of food deserts can be observed. Food desert are commonly defined as areas with restricted access to healthy and affordable foods as well as a variety of other nutritious options (USDA ERS, 2013), which is more likely to be observed neighborhoods where disadvantaged groups concentrate (Black et al., 2014). In order to reduce the food desert and promote better access to healthy food for the people of the city, the neighborhood food environment should be emphasized.

1.2. methodologies of accessibility measurement

Accessibility measures how easy it is from the origin to the specified destination (Widener & Shannon, 2014). Previous literature often uses GIS to calculate the accessibility of healthy foods based on the location of residential areas. Some early studies measure the accessibility of residents to healthy foods by the service radius of food stores based on the Euclidean distance, but it ignores the impact of the actual environment on accessibility of healthy foods. Recent literatures often use a road network-based approach and begin to study the situation of people's actual healthy food accessibility in the city. However, they don't consider the differences associated with the use of different travel methods. Some scholars have found that private vehicles play a key role in improving access to health foods in western countries (Wang et al., 2014). The situation is different in China that residents

often get health foods by walking or public transits. We should consider the impact of residents' transportation patterns in the actual food acquisition process. Meanwhile, food access is not only geographically restricted, but also subject to time constraints (Chen and Clark, 2013). Travel time is affected by traffic conditions, and we should calculate the travel time and the time spent on waiting (Farber, Morang, and Widener, 2014). Differences in time costs can also affect accessibility of healthy foods.

2. Methodology and data

2.1. Research scale and method

The 2018 edition of "Urban Residential Area Planning and Design Standards" stipulates that a 10-minute living circle should be equipped with a vegetable farm. Therefore, this paper takes the community level corresponding to the living circle as the research scale, and studies the community of Shanghai as a research object, with a total of 5432 communities.

Our method is comprised of 3 stages: travel time estimation, accessibility metrification, and spatial autocorrelation. In the first stage, we calculate travel time (e.g. bus and walking) from each community in Shanghai to its nearest health food store. In the second stage, these travel times are converted into measurements of accessibility and temporal variability. In the third stage, we calculate the community's average travel time and analyze the global and local spatial autocorrelation in Shanghai.

2.2. Data

The research data is divided into three parts: community, health food store and travel time. First, the data and location at the community level are from the sixth census in Shanghai. Second, the health food store mainly obtains its geographical location. The study is based on the map of Gaode. Platform, crawling Shanghai POI data in 2018, and screening various stores that provide healthy food, including vegetable shops, fruit shops, seafood seafood markets, supermarkets and farmer's markets, etc., screening a total of 18,526 data; third, travel time is mainly Based on the Gaode map platform, climb the real-time bus route planning time and collect the changes in travel time from each community to the health food store.

3. Community-level healthy food reachable time

3.1. Status of Shanghai Health Food Store

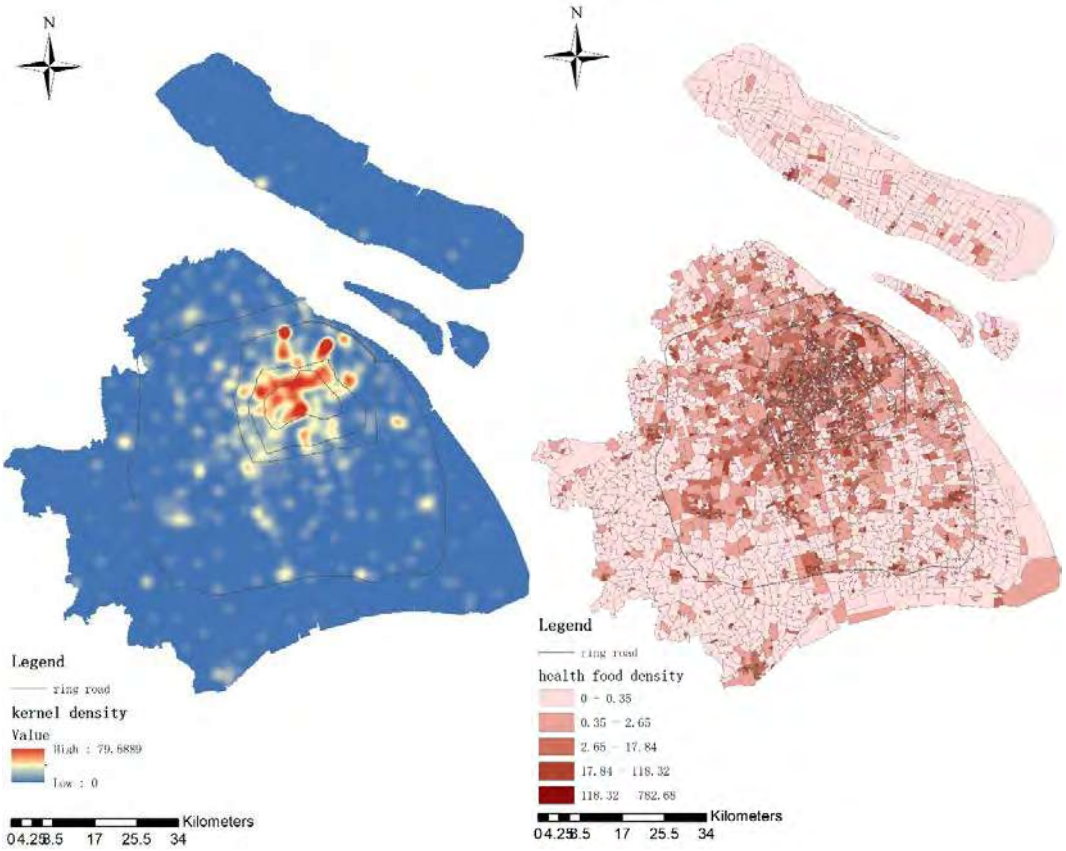


Figure 1 the kernel density of healthy food store

Figure 2 the density of healthy food store

There are a total of 18,526 health food stores in Shanghai. The concentration level of healthy food store in Puxi is significantly higher than that in Pudong. There are four loop lines in Shanghai and the density of healthy food store is highest in inner ring road. The northern part of the middle ring road to the inner ring road is relatively high concentration, and this area has radioactive extension to the outer ring area. There are fewer healthy food stores outside the outer ring line, which are distributed in spots. In the community level, there are no healthy food stores in 1879 communities, one healthy food store in 806 communities, and two health food stores in 589 communities. The Jixiang community in Hongkou District has the highest density of healthy food stores-782.0 per square kilometers.

3.2. Measurement of travel time

The Gaode Map (https://www.amap.com/) is China's leading electronic navigation platform. It uses the door-to-door method (Salonen & Toivonen, 2013) to find the shortest travel route in the road network and based on real-time traffic information (including traffic volume, speed, sidewalk, one-way and restricted turns), It can provide a more realistic travel time calculation. The Gaode Map is employed to calculate the travel time of the community to the health food store.

The specific way is as follows: first, we use ArcGIS to calculate the geometric center of all communities in Shanghai. Based on the Shanghai road for network analysis, we use these community geometric centers as the origin, all healthy food stores in the city as the

destination and calculate the travel time of a community to all health food stores. Later, we select the nearest travel time for a community and pair the community with the nearest healthy food store. Second, we develop a crawling tool to harvest the daily travel time from each community to each healthy food store during 6:00–22:00 every 20 minutes on the 14th June 2019. The crawling tool is written by Python from the web pages of Gaode Maps. The travel time collected includes the time of walking to bus station, travel time, and waiting time. The data of 5380 communities in Shanghai is collected, however, 52 communities cannot be located in network analysis, so the data is missing. Considering people's shopping habits, bus and health store business hours, the data collection period is determined. During the data collection process, when the community is close to the nearest healthy food store, the public transportation time will be converted into walking time, which is more in line with the real situation to measure the actual shopping behavior of the residents.

3.3. Average travel time and changes in the community

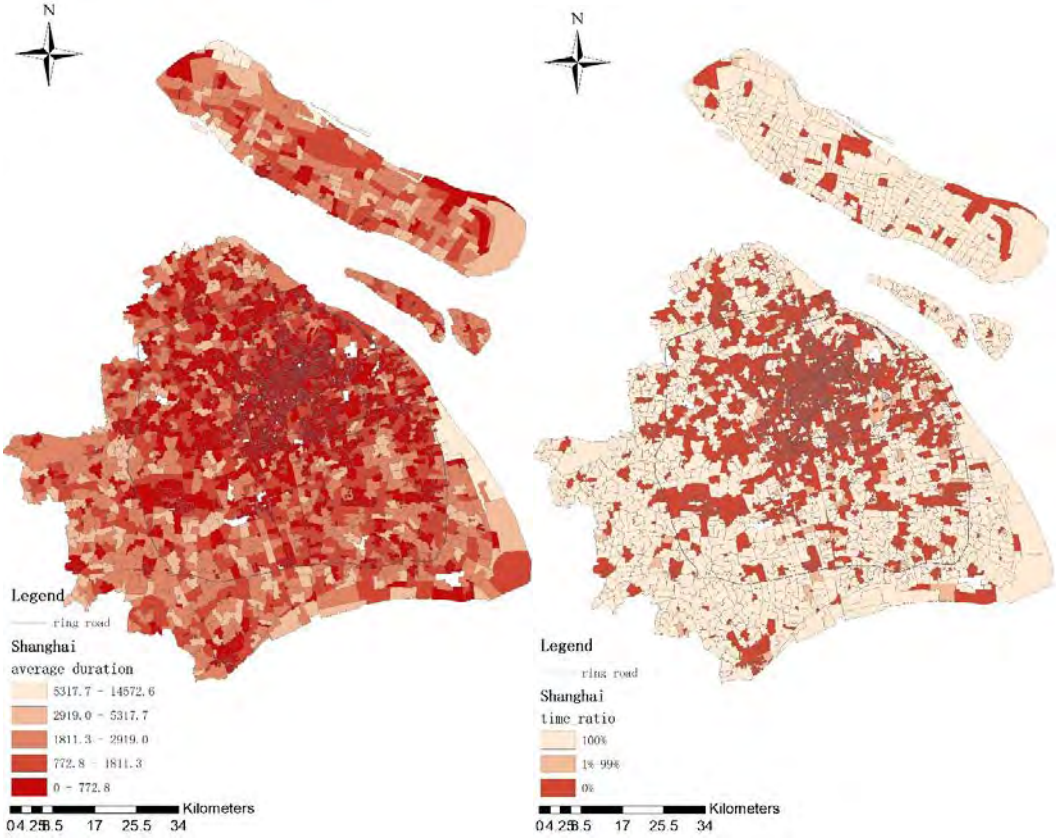


Figure 3 average travel time for healthy food in the community

Figure 4 the percentage of time that the community gets healthy food within 15 minutes

We calculate the travel time collected throughout the day to measure the accessibility of communities to healthy foods. The shorter average travel time is, the higher the accessibility of the community is. The results show that the average travel time of residents within middle ring road is shorter, and the accessibility to healthy foods is higher.

The accessibility of the south and east part of the area between the outer ring road and the middle ring road is good, and the accessibility of some communities in the north is slightly

poor. From the suburban ring road to the outer ring road area, the travel time of the community has gradually increased, and the accessibility has gradually weakened. However, there are still some plaque-like communities with good accessibility of healthy food. The community outside the suburban ring road has a longer average travel time, and the accessibility of healthy food in these communities is poor, especially in the eastern coastal areas of Pudong District and the northern part of Chongming County.

Based on the 2018 edition of Urban Residential Area Planning and Design Standards, the concept of a fifteen-minute living circle plan is proved. We measure whether community residents can reach the nearest healthy food store within 15-minute travel and calculate the percentage of time that residents can reach the nearest health food store within 15 minutes during the day in order to measure the accessibility from a time perspective. The average city community in Shanghai has a healthy food travel time of 738.0 seconds, which basically meets the requirements of the 15-minute living circle for the vegetable market planning. Specifically, there are 3,885 communities in the city that can reach healthy food stores in 15 minutes, and the proportion of time that 114 communities reach healthy food stores within 15 minutes is between 0-1. However, 1381 communities can't reach the health food store in 15 minutes all day, which affected by both long-distance and poor traffic conditions in this part of the region.

3.4. Community case

The travel time from the community to the healthy food store changes with the variation of traffic volume. We take the following six communities as examples to draw a travel time change chart for one day. It can be found that the travel time of the Gaoxiong Road community is short travel time and doesn’t change. However, the travel time of other communities have some change during the day. Some communities have shown an increase in peak travel time in the morning and evening, which is consistent with the traffic pressure.

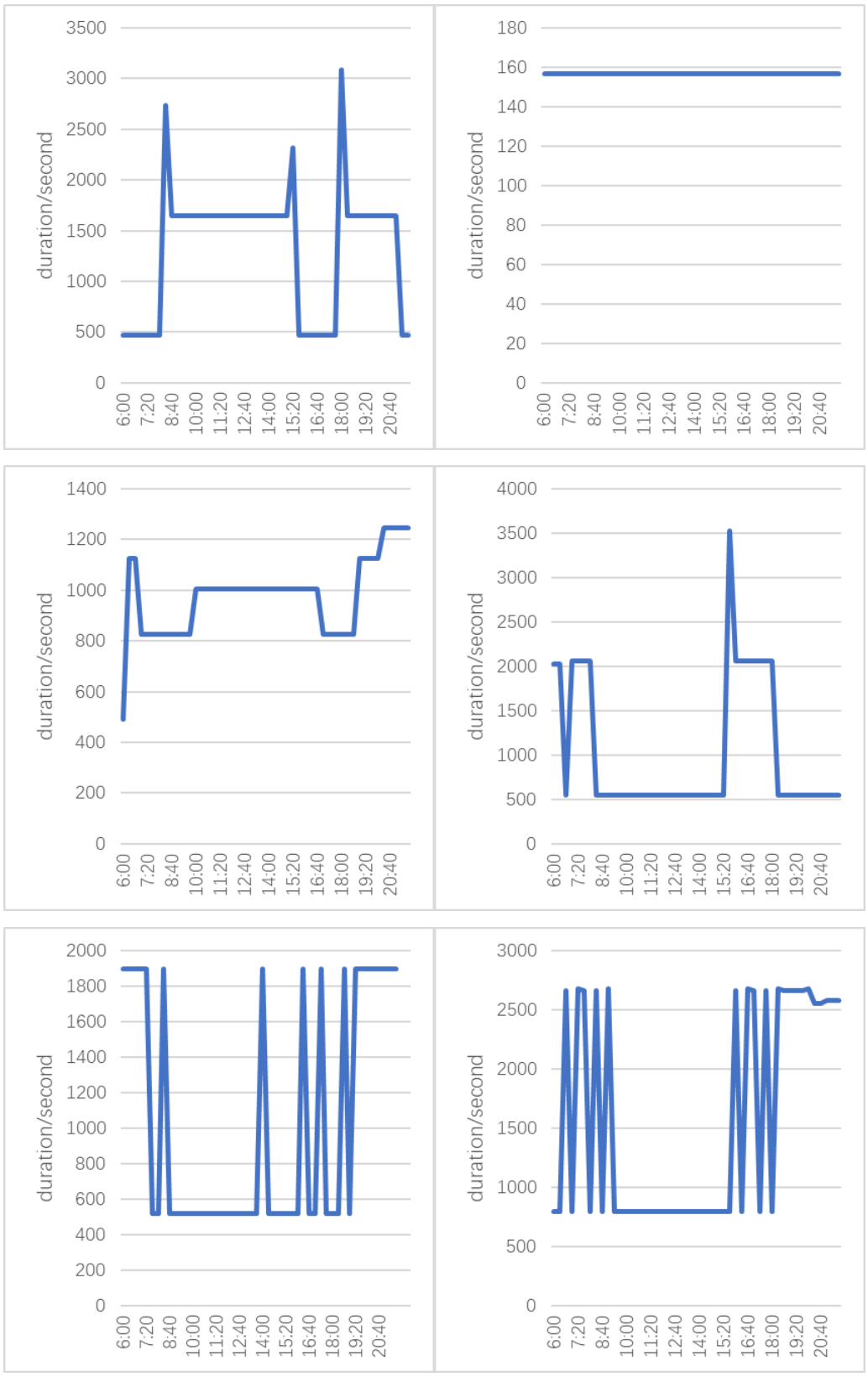


Figure 5 Travel time 1) Dongsenhanbi community, 2)Gaoxiong Road community, 3)Huakang community, 4) Xinmeigonghe community, 5) Shiwan community, 6)Gonghe villiage.

As for the travel time during the day, the Gaoxiong Road community in Huangpu District is the shortest, and the proportion of time is 100% that healthy food store can be reached within 15 minutes of the day. The Dongshenhanbi community in Yangpu District and the Xinmei Gonghe Community in Jing'an District are both close to its nearest healthy food store, however, travel time is greatly affected by traffic conditions, and the proportion of time is also affected that healthy food store can be reached within 15 minutes of the day.

Table 1 Case community travel time

community	district	Average travel time	Proportion of time that healthy food store can be reached within 15 minutes of the day
Dongsenhanbi community	Yangpu District	1319.4	66.7%
Gaoxiong Road community	Huangpu District	156.8	100%
Huakang community	Xuhui District	979.2	66.7%
Xinmeigonghe community	Jing'an District	1020.5	29.2%
Shiwan community	Pudong District	1035	37.5%
Gonghe villiage	Minhang District	1563.3	41.7%

4. Spatial autocorrelation

4.1. Method

Spatial autocorrelation is a measure of the correlation of the same variable in different spatial locations. Since the spatial autocorrelation is attributed to the geographical location, the closer the spatial location is, the more similar it is (Lin Jinyao, Li Xia, 2014). Using the spatial weight matrix, the similarity of the position is measured. Based on the average travel time of healthy foods in the community, the spatial autocorrelation of healthy food accessibility in Shanghai community is studied. We use the GEODA software to construct the spatial weight matrix of the data through the Queen method. Spatial autocorrelation is further divided into global spatial autocorrelation and local spatial autocorrelation and we combine the two method to study.

1) Global spatial autocorrelation

The global spatial autocorrelation can measure the overall distribution of the elements and determine whether this phenomenon exists in the space with agglomeration characteristics. The Moran's I reflects the similarity of the spatial unit properties of spatially adjacent regions.

The Moran's I is used as the global autocorrelation statistic, and the value range is [-1, 1]. At a given level of significance, when the Moran's I is significantly positive, there is a significant positive correlation between the observations, and high (low) observations tend to cluster with high (low) observations, presenting a pattern of high agglomeration and low agglomeration. When the Moran's I is significantly negative, there is a significant negative correlation between the observations, and high observations tend to be clustered with low observations, presenting a spatially dispersed pattern (Xie Zhengfeng, Wang Qian, 2009). The Moran's I is as follows:

$$I = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\sum_{i=1}^{n}(x_i - \bar{x})^2} = \frac{\sum_{i=1}^{n}\sum_{j\neq i}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{S^2\sum_{i=1}^{n}\sum_{j\neq i}^{n} w_{ij}}$$

among them:

$$S^2 = \frac{1}{n}\sum_{i}(x_i - \bar{x})^2 \qquad \bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

It is verified by standardization statistic Z whether there are spatial autocorrelation relations in n regions.

$$Z = \frac{I - E(I)}{\sqrt{VAR(I)}}$$

2) Local spatial autocorrelation

Local spatial autocorrelation is a local indicator that measures the spatial connection of each unit. It is an indicator that describes the degree of spatial aggregation between regional units with significant similar values around the unit. Local metrics for spatial associations of all units are proportional to global spatial metrics. The Moran's I is as follows:

$$I_i = \frac{(x_i - \bar{x})}{S^2}\sum_{j} w_{ij}(x_j - \bar{x}) = \frac{nz_i\sum_{j} w_{ij}z_j}{z^T z} = z_i'\sum_{j} w_{ij}z_j'$$

The local Moran's I is verified by the normalized statistic Z:

$$Z(I_i) = \frac{I_i - E(I_i)}{\sqrt{VAR(I_i)}}$$

4.2. Spatial autocorrelation results

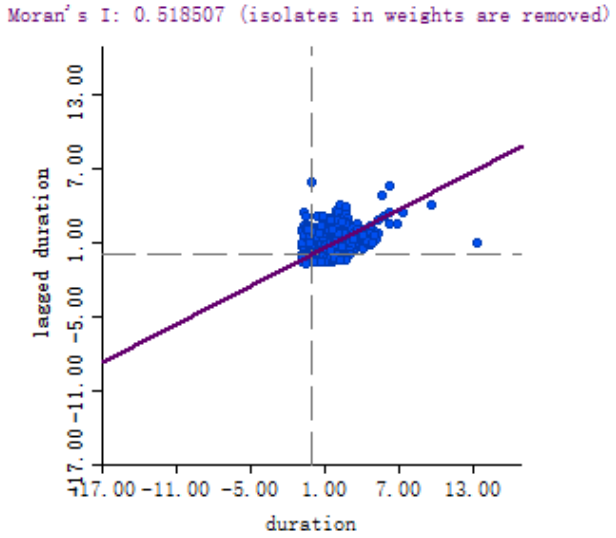


Figure 6 Moran's I of the average travel time of the community.

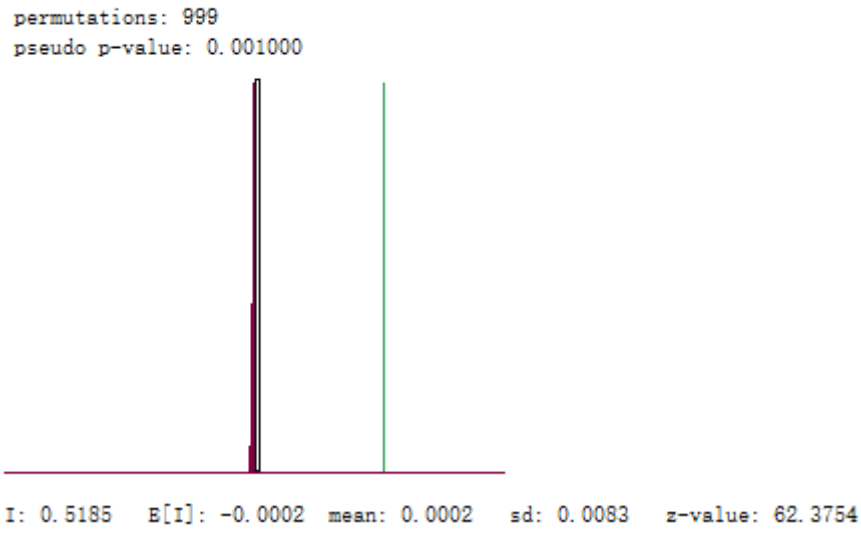


Figure 7 Random test of community average travel time

The Moran's I of the average travel time of the Shanghai community is 0.518507, and the global indicator is 999 tests p=0.001, which is significant in the case of 99.9%. The Z value is 62.3754, which is positive and significant, indicating that the average travel time of healthy foods in Shanghai community is not completely random in space, but shows spatial agglomeration and positive spatial autocorrelation with similar observations. (high or low values) tend to spatially aggregate. That is to say, in Shanghai, the areas where the community has a higher (or lower) average travel time for healthy foods tend to be adjacent to the communities with higher (or lower) average travel time.

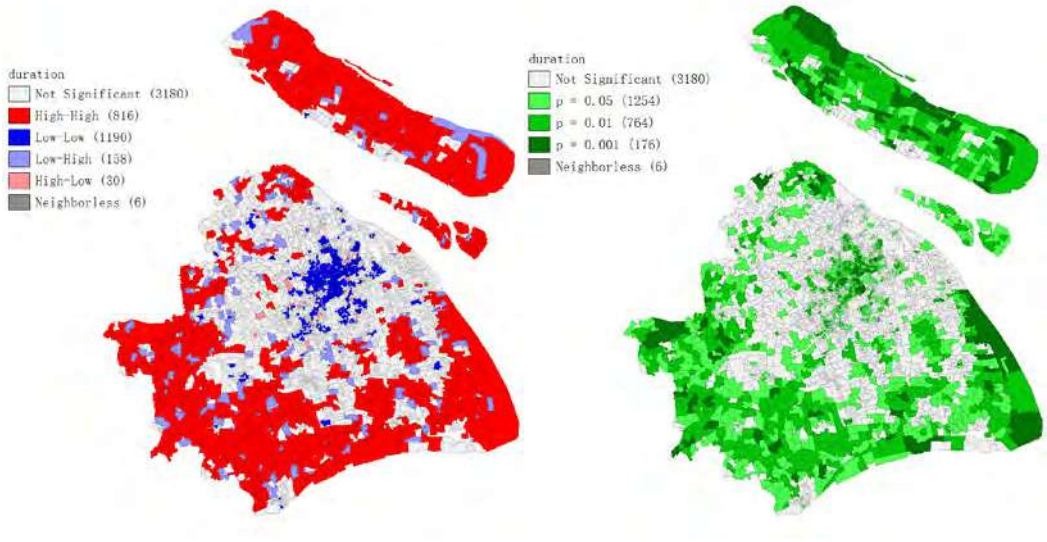


Figure 8 community average travel time local spatial autocorrelation and significance level

Most of the urban core areas within the Shanghai middle ring road are low-low areas. The average travel time of the communities themselves and surrounding communities is low. The spatial difference in this area is small, and there is strong spatial positive correlation. There are a few high-low areas around the core area. The average travel time of the community is higher but the surrounding level is lower and the spatial difference is larger. In fact, this may be due to the overall dispersal and local concentration of health food stores in the suburbs. Most of the areas outside the suburban ring road are high-high areas. The average travel time of the community and surrounding communities are high and the spatial difference is small. There is a strong spatial positive correlation. The level of significance is generally significant in the central and far-suburban areas of the city, and is not significant in the periphery of the city center.

The analysis found that the population density in the central area as well as the accessibility of healthy foods in the community were both high, and the population density in the peripheral areas as well as the accessibility of the community health foods were both low. There was a high correlation that the concentration of the population promotes the increase in the density of health food stores, and the facilities are closely related to the service population under market regulation. The distribution center of the health food store in Shanghai is still very prominent, showing a high center and a low level at the periphery. The centrality of the spatial distribution of health food stores in Shanghai is very prominent, showing a high center and a low level at the periphery, which is also related to the development history of Shanghai. The old city center of Shanghai, like Huangpu District and Jing'an District, has a long development period and has a long history of residents. All kinds of facilities are well-equipped and relatively livable, forming a strong centrality. With the development of Shanghai's urban construction, the central city has been expanding, making population and land development continue to spread to the periphery, and the transportation network is expanding outward. Under the regulation of the market economy, healthy food stores are also opening up with the accumulation of population. The expanding

scope of population agglomeration has led to the formation of a transitional zone with low accessibility, low or non-aggregation areas between urban center and peripheral areas.

In general, the accessibility of community-level healthy foods in Shanghai has a layer structure. The central area has strong accessibility, while the accessibility of the peripheral areas is weak. Meanwhile, both areas have autocorrelation, and also show a certain center-peripheral structure.

5. Conclusions and Discussion

5.1. Conclusions

Healthy eating intake can improve people's health. If cities can better provide healthy food to residents , it can better promote healthy city development. This paper uses multi-source data to analyze the accessibility of healthy foods in Shanghai community residents. Firstly, based on the healthy food store POI, we use the ArcGIS software to analyze the basic situation of the city's healthy food stores, and find that there are a large number of healthy food stores in the core area of the city within the outer ring road. Meanwhile, the density of health food stores in the Puxi area is significantly higher than that in the Pudong area, and the healthy food stores outside the outer ring road are pointy agglomeration. Further, we collect the whole city travel time to the nearest health food store based on the Gaode map platform and get that the average time for the Shanghai community to get healthy food travel time is 738.0 seconds, which meets the requirements for the farm in the 15-minute living circle plan. The overall situation is good, but there are large differences between the regions. The communities within the outer ring road have higher accessibility to health food stores, and the accessibility of peripheral communities is lower. During the day, some of the communities are far away. Travel time is affected by traffic conditions, which causes certain differences in time costs.

Using the community average travel time of healthy foods for spatial autocorrelation analysis, it is found that average travel time is concentrated in the central and suburban areas, and the surrounding areas of the central area are scattered. The average travel time of healthy foods in the downtown area of Shanghai is low, that is, the accessibility of healthy foods is high. The accessibility of healthy foods in and around them is high, and the spatial difference is small. There is strong positive correlation. The accessibility of healthy foods in Shanghai suburbs is low for themselves and the surrounding areas and spatial differences are small. There is strong spatial correlation.

Meanwhile, the degree of accessibility between urban centers and peripheral areas is low. A transitional zone between the city center and the surrounding area that has a low degree of accessibility, high or low, or non-aggregation. This area is close to the central area and is the key area for future urban development and construction. The current conditions are obviously insufficient. It is urgent to take measures to improve the accessibility of healthy food in this area. In the long-term, efforts will be made to improve the accessibility of urban suburban communities, and gradually transform communities with insufficient accessibility into areas with better accessibility.

5.2. Discussion

This paper mainly uses the POI data of healthy food stores. The POI data volume is large and it is easy to reflect the distribution of facilities. However, the POI data can only be expressed in the form of "points" and cannot reflect the service scope, grade, scale and other information of the facilities. It is difficult to conduct a more in-depth analysis. POI data has strong advantages in reflecting the spatial distribution and density of facilities, and can analyze the distribution structure or characteristics of the facilities. However, the in-depth study and discussion of facility accessibility should be further combined with urban population, transportation, land use and other aspects to analyze comprehensively.

This article discusses residents' access to healthy foods and only selects the accessibility of the nearest healthy food stores. It does not take into account other factors that affect residents' choice of healthy food stores, such as: price, healthy food type, consumption habits, etc. Future research should be combined with questionnaires, interviews and other research methods. From a human perspective, let us fully measure the availability of healthy foods.

6. References

C. Black, G. Moon, J. Baird (2014) Dietary inequalities: What is the evidence for the effect of the neighborhood food environment? Health & Place, Vol.27.

D. Hendrickson, C. Smith, N. Eikenberry (2006) Fruit and vegetable access in four low-income food deserts communities in Minnesota, Agriculture and Human Values, Vol.23.

D. Rose, R. Richards (2004) Food store access and household fruit and vegetable use among participants in the US food stamp program, Public Health Nutrition, Vol.7.

E. Dowler (2001) Inequalities in diet and physical activity in Europe [J]. Public Health Nutrition, Vol.4 No.2B.

E.J. Taylor (2015) Fast food planning conflicts in Victoria 1969–2012: Is every unhappy family restaurant unhappy in its own way? Australian Planner, Vol. 52.

H. Wang, F. Qiu, B. Swallow (2014) Can community gardens and farmers' market relieve food desert problems? A study in Edmonton, Canada, Applied Geography, Vol.55J.

L. Kent, S. Thompson (2014) The three domains of urban planning for health and well-being, Journal of Planning Literature, Vol.29

Jamie Pearce, Rosemary Hiscock, Tony Blakely, Karen Witten (2009) A national study of the association between neighborhood access to fast-food outlets and the diet and weight of local residents， Health & Place, Vol.15 No.1.

K. Morland, S. Wing, A. Diez Roux (2002) The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study, American Journal of Public Health, Vol, 92 No. 11.

M. Salonen, T. Toivonen (2013) Modelling travel time in urban networks: Comparable measures for private car and public transport, Journal of Transport Geography, Vol.31

M. Story, K.M. Kaphingst, R. Robinson-O'Brien, K. Glanz (2008) Creating healthy food and eating environments: Policy and environmental approaches, Annual Review of Public Health, Vol. 29.

M.J. Widener, J. Shannon (2014) When are food deserts? Integrating time into research on food accessibility, Health & Place, Vol.30.

S. Farber, M.Z. Morang, M.J. Widener (2014) Temporal variability in transit based accessibility to supermarkets, Applied Geography, Vol.53

S. Furey, C. Strugnell, H. McIlveen (2001) An investigation of the potential existence of "Food Deserts" in rural and urban areas of Northern Ireland, Agriculture and Human Values, Vol.18

T.J. Key (2011) Fruit and vegetables and cancer risk, British Journal of Cancer, Vol.104

USDA ERS. Food access research atlas [online] (2013), http://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx

World Cancer Research Fund/American Institute for Cancer Research (2007) Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective, American Institute for Cancer Research, Washington, DC

World Health Organization (2013) Obesity and overweight, World Health Organization.

World Health Organization (2002) Report of the Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases, WHO Technical Report Series 916. Geneva

Track 4

Knowledge economies and identity

Planning for culture

photo: DAVIDSONLUNA, Unsplash

Case Study / Project

Cultural sensitive approach in water management

for a volcanic river basin of Yogyakarta Metropolitan Area

Vicky ARIYANTI

Abstract

Although there is substantial literature on the implementation of integrated water resources management and multilevel governance of water, less attention is given on how and why cultural values contribute to the integration level of its implementation. Thus, this paper examines cultural ecological knowledge impacts on current water management practices in Opak sub-basin, Yogyakarta Special Region, Indonesia, which is threatened by the volcanic activities of Mt. Merapi in its upstream. Therefore, it uses the research question of " How and why does the cultural ecological knowledge impacting the water resources management in a volcanic river basin?" We used a qualitative approach to the case study of Opak Sub-basin to investigate a comprehensive understanding, with 57 in-depth interviews, three focus groups, and three months of observation (July-August 2016 and January 2018). The analysis was done using Atlas.ti software for axial coding on several concepts used in this paper, such as cultural ecological knowledge, integrated water resources management, disaster risk reduction, and volcanic river basin management. The codings were arranged using multilevel governance theory, which for this case study proposes three phases of volcanic river basin management: Normal (pre-eruption), Disaster (onset eruption), and Normal+ (Post-eruption) within existing governance levels: national, regional, and municipal. The analysis answer the how part of the question by detecting the main activities of actors within the context of water governance, the relationships between actors, and existing boundary spanning operations within the current interaction attempts in multilevel governance. It reveals that cultural boundary-spanning actors (water whisperers) are the answer to the why part of the question. These actors are more active during disaster volcanic river basin management (VRBM) phase. With them, the cultural ecological knowledge was brought into the interaction attempts. This condition contributed to the highest level of integration. Therefore, we argue that the integration level of water resources management is higher when more cultural ecological knowledge is used in the interaction attempts. The paper proposes that an understanding of the cultural ecological knowledge enables a better implementation of integrated water resources management for this volcanic river basin.

Case Study Paper

Inheritance and Development of Traditional Minority Culture in Southwest China:

A Case Study of Miao, Dong and Dai Nationalities

Lin CHEN, PhD candidate of College of Architecture and Urban Planning, Tongji University; China

Abstract

Guizhou Province and Yunnan Province are located in the southwestern part of China, with a large number of ethnic minority areas, of which Miao, Dong and Yi nationalities are important ethnic groups in terms of quantity and distribution. This part of China retains a large number of landscapes and traditional buildings, including terraces, Miao Village, Dong Village and Drum Towers, which are important components of the traditional culture of the Miao and Dong nationalities. Meanwhile, in Zunyi City of Guizhou Province, traditional folk religious culture is still preserved, and the text, language, songs, and utensils have been effectively passed down. Moreover, in Xishuangbanna of Yunnan Province, the traditional wooden structure which is inhabited by the Yi nationalities is still provided with typical national characteristics. And all aspects of clothing, food, housing and transportation are of great cultural characteristics. The entire village has a large number of intangible cultural heritage. This paper introduces the inheritance and development of traditional cultural changes in Guizhou, Yunnan Province in southwest China from the perspective of anthropology. The minority learners mentioned in this paper retain the essence of culture, but also attract more people to understand traditional culture and inherit and develop traditional culture. Otherwise, government, media and residents, including encouraging tourism, increasing cultural and tourism projects, publicizing intangible cultural heritage to attract people to understand and disseminate traditional culture, and making Chinese traditional culture develop in the new era. Chinese traditional culture has a long history and it has been passed down from ancient times to the present. The ethnic minorities in the southwestern region have retained their independent and complete national culture because of their geographical location and traffic. Therefore, they are highly recognizable. In short, Chinese traditional culture has great national characteristics and is the essence of Chinese culture. It is also an important part of world culture.

Keywords

Anthropology, Southwestern China, Traditional cultural, Inheritance,Development

1. Introduce

Guizhou Province is located in the hinterland of southwestern China. Meanwhile it's a world-renowned mountain tourism destination and a mountain tourism province. It's also a national ecological civilization pilot zone, and an inland open economy experiment area. Guizhou Province is a multi-ethnic province[i]. Yunnan Province is located in the southwestern border of China, and the east is connected to Guizhou Province. Yunnan is the province with the largest ethnic group in China. In addition to the Han nationality, there are 25 ethnic minorities with a population of over 6,000. Among them, 15 ethnic groups are unique to Yunnan. Otherwise, Yunnan ethnic minorities are staggered, showing large mixed living and small settlements[ii].

2. Traditional Cultural Types of Minorities in Southwest China

2.1. Architectural culture

The traditional architecture of ethnic minorities has a long history. Due to the influence of the natural environment and the characteristics of the nation, its rich architectural culture also has very distinctive characteristics, which fully reflects the living habits, thinking concepts and religious beliefs of ethnic minorities. It also makes the traditional architectural culture of ethnic minorities an important part of national culture. Among them, the Pile Dwelling is a typical representative of the Miao nationality architecture, the Drum Tower and the Wind and Rain Bridge are typical representatives of the Dong nationality architecture, and the Dailou is a typical characteristic building of the Dai nationality. Most of the these structures are selected from the nearest material, and the shape and the characteristic are harmonious with the natural environment, which have the cultural connotation of their own nation.

Figure 1 Guizhou Dong people's wind and rain bridge stone monument(Photo by Chen Lin)

Figure 2 Guizhou Dong people's wind and rain bridge(Photo by Chen Lin)

Figure 3 Guizhou Dong people's Drum Tower(Photo by Chen Lin)

Figure 4 Yunnan Dai people's traditional Dailou(Photo by Chen Lin)

2.1.1 Practical concept according to local conditions

Since ancient times, the residents living in Guizhou Province have mostly lived in agriculture, while Guizhou Province is located in the mountain plateau. There are very few plains. In order to preserve the farmland to the greatest extent, the residents use mountainous and sloping land that is not suitable for use as cultivated land. On top of it, a traditional structure, the Pile Dwelling ,with Guizhou national characteristics is built. This type of construction not only destroys the natural environment in a large amount, but also makes full use of the non-cultivated landforms, minimizing the deforestation and waste of cultivated land. The rear half of the Pile Dwelling is placed against the rock above the ground, and the front half is supported by wooden columns. Because the second and third floors of the structure and the eaves are beyond the perimeter of the structure, a suspended sling posture is formed, which is called the " Pile Dwelling "[iii]. From the longitudinal section, the shape forms a unique landscape. When observing these hanging structures, it is natural, especially in the Miao Village, which is surrounded by mountains and rivers. The slinged structures is like a eagle flying high in the Miao Village with a sense of nature[iv].

Figure 5 Guizhou Miao pelple's Pile Dwelling（Photo by Chen Lin）

2.1.2 Building materials sustainability concept

In Guizhou and Yunnan Province, the building materials used in traditional structures in ethnic areas are mostly adapted to local conditions and locally. Soil, stone, trees, bamboo, straw, etc. can be used as materials for building houses [iv]. For example, the Miao people's Pile Dwelling , the Dong people's the Drum Towers and the wind and rain bridges use wood, stone and mud as the main building materials in the nearby forests. The Dai Lou in Yunnan Province use wood and bamboo. These materials are obtained from the surrounding environment and are often more adapted to the local climate, geography and other conditions. The people living here use the resources given by nature, and they also know how to give back to nature. Plants are often planted near their homes, which not only increases the comfort of living, but also maintains the local soil and water, reflecting their respect for nature and endless belief. For example, the Buyi people are used to planting bamboo and other plants around the village, which is named "Zhailin" by Buyi people [iii].

Figure 6 Yunnan Xishuangbanna traditional thatched cottage（Photo by Chen Lin）

Figure 7 Yunnan Xishuangbanna traditional thatched cottage（Photo by Chen Lin）

Figure 8 Yunnan Xishuangbanna Dailou uses wood and bamboo raft as building materials （Photo by Chen Lin）

2.1.3 Diversified functional culture

The drum tower and the wind and rain bridge, which are public structures in the villages of southwestern Guizhou Province, play different functions in their respective national cultures.

The drum tower is mainly made of wood, with many eaves and columns, which are mainly used for placing cowhide drums, while the drum tower and drums form important public buildings and cultural things of the Dong people. In addition, the wind and rain bridge breaks through the single function of the bridge, and integrates the styles of bridge, pavilion, gallery and leaning. There is a roof on the bridge, which can be used for people to rest on the benches on the side of it (Fig. 9). Meanwhile, there are Dong people's folk paintings ,flower and bird landscape paintings on both sides of the bridge (Fig. 10), making the wind and rain bridge more artistic and ethnic. The whole bridge pavilion is connected by wood, which is integrated into one. It not only has the basic functions of the bridge, but also has functions for pedestrians to rest, watch the scenery, avoid the wind and rain. During the festival, the wind and rain bridge also gathers the Dong men and women to hold entertainment and religious activities on it [iii]. As a residential structures, the Pile Dwelling is generally divided into three layers. The lower tier store debris, stack firewood, and store production tools such as plows and hoes for easy access. The middle tier lives to make people live off the ground, avoiding the attack of insects and beasts, and protecting people from the influence of moisture; the upper layer of grain storage can not only avoid food moisture, but also can be used at any time [iv].

Figure 9 Guizhou Diping Twon wind and rain bridge(Photo by Chen Lin)

Figure 10 Paintings on the wind and rain bridge(Photo by Chen Lin)

2.2. Religious culture

Religious belief is a series of spiritual worship concepts, behavioral patterns and ritual systems produced by people in their production, life or entertainment, which are hopeful, praying for happiness and maintaining psychological security. The content is very rich. In the Daozhen Miao and the Gelao Autonomous County of Zunyi City, Guizhou Province, people have the religious beliefs of the the Gelao people. Ancestor worship, heaven and earth worship, sun and moon star worship, wind and rain and lightning worship, mountain water and fire worship and animal and plant worship are the basic contents of the original religion of the Gelao and the Miao people in Guizhou Province. The original inhabitants of the Gelao people considered themselves to be descendants of the bamboo king, who was their ancestor. Up to now, the legends of the bamboo king and the custom of revering bamboo have been widely spread among the Gelao people in various places. For example, in the Meijiazhai country, Daozhen Gelao and Miao Autonomous County, when the first boy was born, parents should bury their placenta and some egg shells in the bamboo forest to pray for the protection of the bamboo king. During the Spring Festival, every household must go to bamboo forest to offer bamboo king money. There are quite a few places where bamboo wares are used to worship the ancestors or to harvest. Moreover, the Gelao people in Guizhou Province are full of worship for the sun, the moon and the stars. They regard the sun as a spiritual thing, and they are called "the sun bodhisattva" and are enshrined in the temple. The Gelao people believe that the representatives of Thor and justice should enjoy the incense of human sacrifice. Many places have built a Thor temple, dedicating to the Thor Buddha. The Gelao people in Guizhou Province also believe that the earth and rock are

closely related to human life. People believe that life comes from the land, and the land can bring peace to the people. The mountains, rivers and the gods of the land give sacrifices. Therefore, build a temple for setting the mountains and rivers, the land of the gods, to give sacrifices. Some strange shapes of landstone and stalactites are also regarded as spiritual objects. Stone buddhas, stone pigs, and stone goddess in the Gelao area can be seen everywhere. People devoutly put on red cloth and scented candles. Animal and plant beliefs and worship are worshipped by animals and plants or fantasy animals. The Guizhou Gelao people think that they may bring their own gospel or threat, so they are awe-inspiring and sacrificed[v].

During the field investigation in Daozhen Miao Autonomous County, Zunyi City, Guizhou Province, the author found that the Gelao people still retain relevant words and symbols (Fig. 11) and the molds for making these characters and symbols (Fig. 12). The transcripts record some eulogy and songs about religious ceremonies. Some residents also retain the crafts of making religious utensils and personally make some utensils used in religious ceremonies (Figure 14-15). On special religious anniversaries, local residents will still carry out some religious activities to sacrifice their ancestors and worship the gods. This tradition has been passed down to the present day.

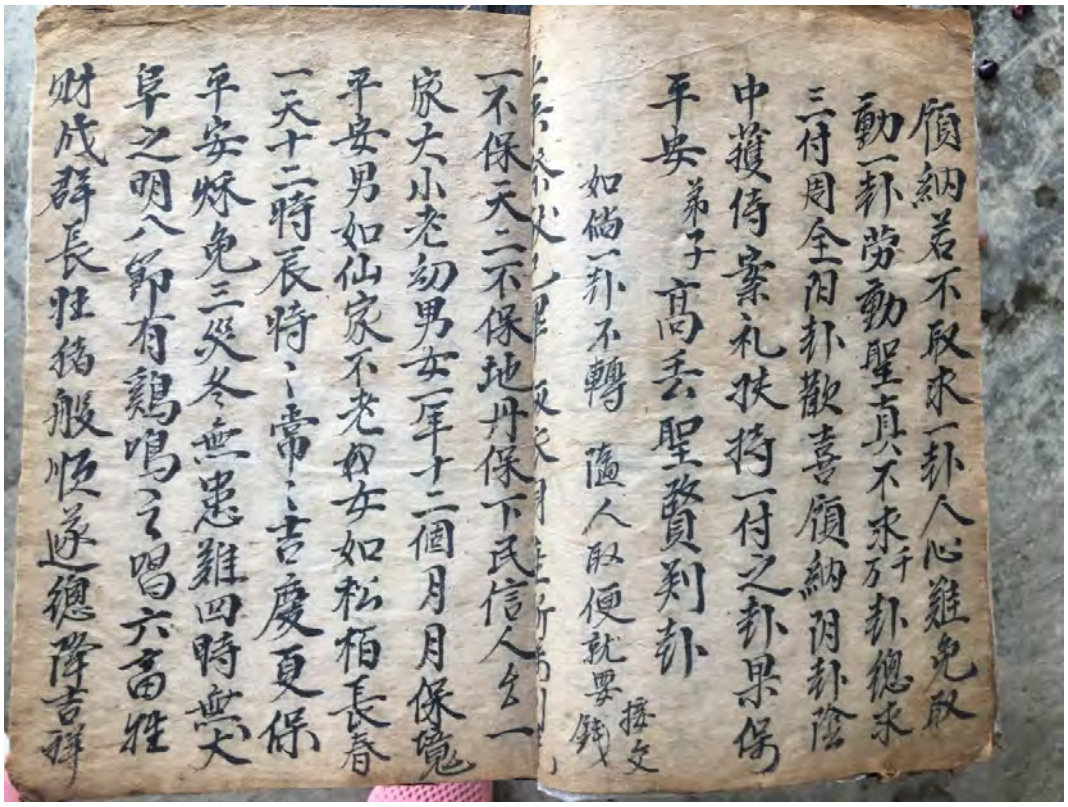


Figure 11 The text recorded by the Gelao people(Photo by Chen Lin)

Figure 12 The mold for making text, symbol by Gelao people(Photo by Chen Lin)

Figure 13 Utensils used in religious ceremonies of Gelao people(Photo by Chen Lin)

Figure 14 Homemade mask of Gelao people(Photo by Chen Lin)

Figure 15 Gelao people wear masks(Photo by Chen Lin)

2.3. Intangible Cultural Heritage

There are a large number of intangible cultural heritages in Guizhou and Yunnan Province. According to the statistics of relevant departments, more than 30 projects in the Yunnan-Guizhou ethnic minority area have been included in the list of national intangible cultural heritage, including folk oral literature, folk festivals, folk music and folk dances, as well as

folk crafts[vi]. In Xishuangbanna, Yunnan Province, people's clothing, food, shelter and transportation all have national characteristics, reflecting people's hard work and wisdom. The Dai people nationality Zhang Ha, the Dai people ethnic brocade skills, the Dai people drum production skills, the Dai people traditional umbrella craft, the Dai people bamboo building construction skills, Xishuangbanna minority tea customs, etc. are listed as intangible cultural heritage.

Figure 16 Dai people bamboo building construction skills(Photo by Chen Lin)

Figure 17 Dai people dance performance(Photo by Chen Lin)

Figure 18 Dai people ethnic brocade skills

3. The way of inheriting and developing traditional culture in Southwest China

Under the background of globalization, traditional culture has been greatly impacted in the contemporary era. But as the essence of culture that has been handed down for thousands of years, it should be scientifically passed down and developed in the contemporary era. On the one hand, these valuable cultural wealth can be passed down from generation to generation, on the other hand, traditional culture can be developed into a culture that meets the spiritual needs of the contemporary people in the new era. With the joint efforts of the state, society and residents, the traditional culture of Southwest China has been effectively passed down and developed through the following three methods.

3.1. Development tourism

The development of tourism has a positive effect on the return of local culture, traditional culture, the highlight of national identity and the expansion of the traditional living space of ethnic traditions[vii].Nowadays, people like to see different landscapes and experience different human relationships through tourism. They can also interact with human landscapes in the process of tourism. People from different regions and cultures can exchange cultural information in this process and directly experience the cultural enjoyment that traditional culture brings to people. In Guizhou Province, many villages in the form of tourism invite visitors to participate in their lives, experience the authentic Dong people's life. So the visitors can understand the traditional customs of the traditional culture of the Dong people and carry out deep cultural tourism. The author was fortunate to participate in the local Dong people's wedding during the field investigation in Diping Township, Liping City, Guizhou Province. The local marriage still retained the traditional customs, and the groom needed to marry the bride before dawn. The bride's dowry also retained the traditional customs of several categories of essential items, and the traditional way of carrying accompanied to her husband's family. The day before the wedding, the villagers gathered together to prepare food for the next day wedding banquet. On the wedding day, with the method of open-air banquet to welcome all the guests, visitors can also join in with sincere blessings and feel the local culture. This kind of cultural experience of direct participation often reminds people of the time, and can appreciate the charm brought by traditional culture. It is more conducive to the inheritance and development of traditional culture. Tourism has become an effective way for people to understand and inherit traditional culture. The direct economic benefits brought by tourism can improve the living standards of local residents and promote local economic development. Under the premise of meeting basic living needs, people have more time and energy to participate in the traditional culture construction, so that the local traditional culture can be better developed.

Figure 19 Villagers in Dongzhai prepare food for the wedding(Photo by Chen Lin)

Figure 20 Villagers in Dongzhai prepare food for the wedding(Photo by Chen Lin)

Figure 21 Tourists take a group photo with the bride and groom(Photo by Chen Lin)

3.2. Cultural communication

Because the southwestern region is located in the middle of the mountain, the traffic conditions are not very convenient. So in the long period of time, it was in a relatively closed state. But it is precisely because of this environment that the local traditional culture is more preserved. In such an era of information, on the one hand, we guarantee the traditional culture is not affected by the impact of the cultural globalization, more keep its characteristics. On the other hand, it spreads the traditional culture of Southwest China and makes more people to understand traditional culture. Inheriting and developing traditional culture is the responsibility given to us by the times. Nowadays, in many villages, digital intangible cultural heritage databases and museums have been built digitally, such as the “Miao Nationality Costume Database” of the Guizhou Provincial Museum, the “Taijiang Miao Nationality Embroidery Museum” in Taijiang County, and the "Suojia Miao Nationality Ecological Museum" jointly built by the Kingdom of Norway and Liuzhi District of Liupanshui City[viii]. The museum enters the village to establish a real ecological or “live” museum, recording and inheriting local traditional culture with modern means of communication. As an important window for propagating national culture, carrying forward the national spirit and inheriting national civilization, the museum plays a pivotal role in the protection of the national cultural heritage. Moreover, as a working mode or a means, the object of protection should be a fresh cultural whole. It requires itself not only to protect the static culture, but also to protect the dynamic culture; It is necessary not only to protect the status quo of culture, but also to accept the facts of cultural change and development, thus maintaining the dynamic development of culture in the historical process. In fact, what

intangible cultural heritage really needs is the display and inheritance of living state, as well as the self-survival ability to make it live state and inheritance[ix].

While traditional culture brings us spiritual pleasure, it is also indispensable that people play the role of the media. The essence of traditional culture often takes time to consolidate. It needs to be taught orally and passed down from generation to generation. The inheritance of such culture is usually handed down by teachers and apprentices of folk organizations or family inheritance, which requires people to participate in either way. Therefore, we must pay attention to the cultivation of the "inheritors". The government encourages the younger generation to systematically study traditional culture and skills. When necessary, professional colleges and universities can cultivate professional talents in the form of joint construction to ensure the inheritors' talent reserves.

3.3. Increase the number of cultural tourism projects

The cultural tourism project is a clear market positioning form, which mainly combines local characteristics to form a cultural brand effect and form a new cultural industry. It promotes the development of tourism and other related industries, and ultimately promote cultural and artistic exchanges between ethnic groups. In 2005, Guizhou Province held the “Colorful Guizhou” series of competitions and introduced the relevant content of intangible cultural heritage through the competition project. Explore continuously, sort out and restore the intangible cultural heritage of ethnic minorities through the development of ethnic tourism, and reproduce the minority traditions. Thus, revitalize and carry forward the intangible cultural heritage of ethnic minorities. People can understand the history and culture of ethnic minorities in entertainment. "Colorful Guizhou" has become the representative of ethnic minority tourism industry in Guizhou Province, and it has become a model for the protection and development of intangible cultural heritage of ethnic minorities in China [vi] . Open a folk museum, publish a series of books and brochures to publicize traditional folk customs, and make people understand the folk culture in traditional culture through the reproduction of original scenes, traditional national costumes and artifacts.

The cultural tourism project generally pays more attention to people's participation. Through some specific activities, people are involved, such as inviting people to participate in the production process of ethnic dishes, visiting the production process of Miao people silver jewelry, and opening up some self-service farmhouses to let people experience the country life themselves. Such a collision of different national cultures not only promotes the spread of traditional culture, but also brings new vitality to its development. In addition, Miao Village ,Dong Village and Dai Village not only have deep traditional culture to attract people, but also have beautiful natural landscapes such as terraces, mountains, streams, and ancient trees. It is the best choice for tourists to commemorate and also become a base for various artists to create art and collect art styles. Artists create artistic creations here, and integrate natural landscapes and human landscapes into their works. These works are the most authentic records. With the spread of the works, traditional culture is also deeply rooted in the hearts of the people.

Figure 22 Terraced fields in Daozhen County, Zunyi City, Guizhou Province(Photo by Chen Lin)

Figure 23 Tourist photo of hundreds years of Bodhi tree in Xishuangbanna, Yunnan Province(Photo by Chen Lin)

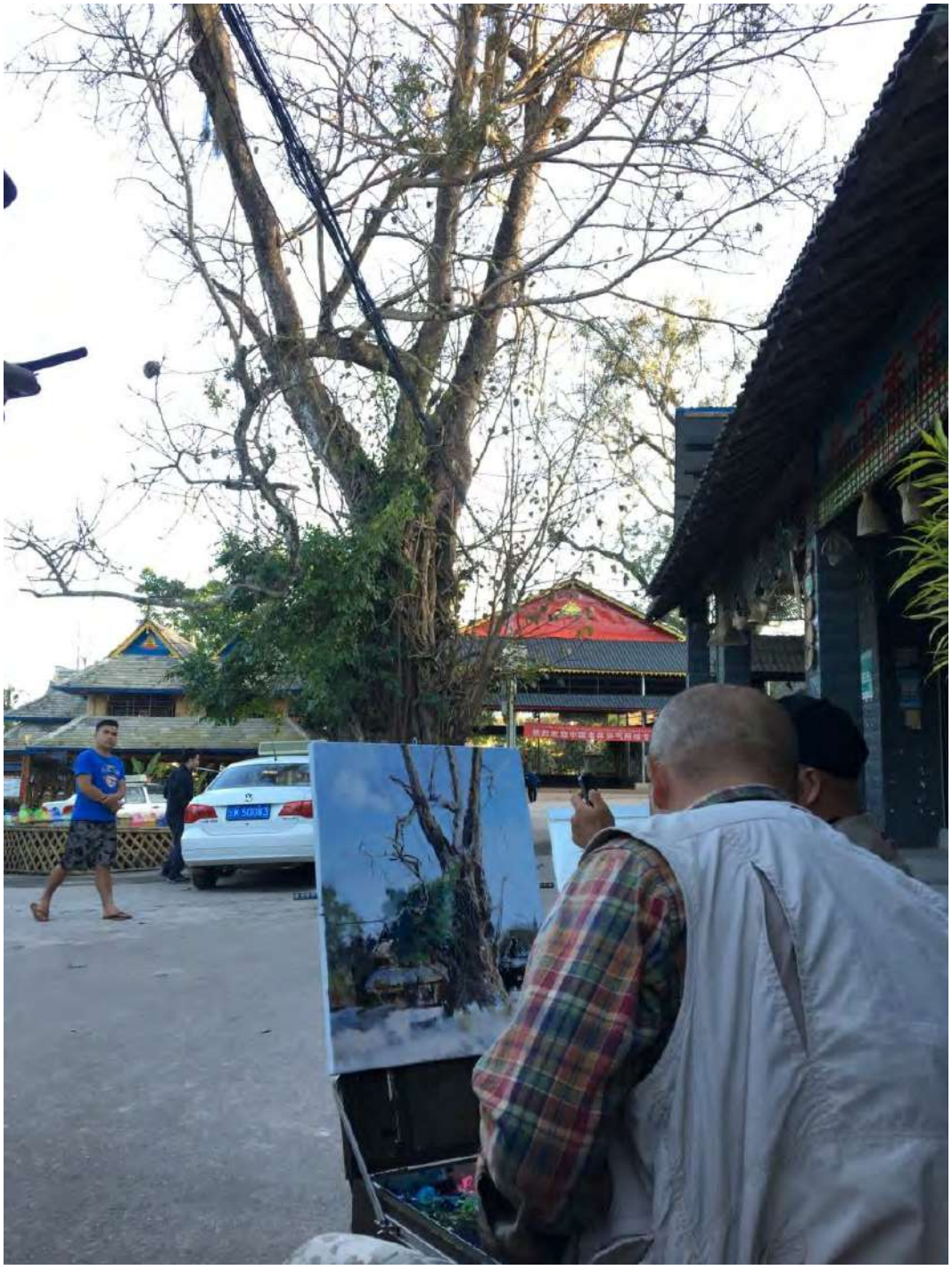


Figure 24 The painter is making paintings in Xishuangbanna, Yunnan Province (Photo by Chen Lin)

4. Summary

The Yunnan and Guizhou provinces are the ones with the largest concentration of ethnic minorities in China. And the traditional culture of ethnic minorities represented by the Miao, Dong and Dai ethnic groups is very distinctive. There are a large number of intangible cultural heritages in all aspects of clothing, food, housing and transportation. The intangible cultural heritages pass down from generation to generation through teacher-apprentice teaching or family inheritance mode. Meanwhile, The the drum towers, wind and rain bridges of the Dong nationality, the Pile Dwelling of the Miao nationality, and the Dai Lou of the Dai nationality are representative of the traditional architectural culture and have been developed in the inheritance of the past. The Miao, Dong and Dai residents living in the village still retain the traditional customs of marriage and funeral. In the context of the contemporary era, combined with the development of tourism, cultural and tourism projects will be vigorously developed with the joint efforts of the state, society and residents, so as to attract people from different ethnic groups to experience local culture here.

5. References

[i] https://baike.baidu.com/item/%E8%B4%B5%E5%B7%9E/37015?fr=aladdin

[ii] https://baike.baidu.com/item/%E4%BA%91%E5%8D%97/206207?fr=aladdin

[iii] Cai,Fei(2012)“Research on the Changes of National Traditional Architectural Culture under the Background of New Countryside Constructio-Taking Guizhou Ethnic Areas as A Case”, Theoretical Frontiers,NO.5(May).

[iv] He,Biao;Wang,Bo-cheng(2012) “Protection of Traditional Architectural Culture in the Reconstruction of Dangerous Buildings in Rural Areas of Guizhou”, Journal of Guizhou University for Nationalities (Philosophy and Social Science), Vol. 134 No. 4 (August).

[v] Zhang, Xin(2017) “ On the Traditional Religious Culture and Its Modern Values in Guizhou”, Journal of Zunyi Normal College, Vol. 19 No. 4 (August).

[vi] Luo, Lai-ming(2017), “Study on the Development of Ethnic Minority Tourism Economy in Yunnan and Guizhou Region Based on the Development of Intangible Cultural Heritages”, Guizhou Ethnic Studies, Vol. 38. No. 192(February).

[vii] Sun, Jiu-xia; Bao, Ji-gang (2004) “Tourist Anthropology Analysis on Community Participation— A Case Study of Dai Village in Xishuangbanna”, Journal of Guangxi University for Nationalities(Philosophy and Social Science Edition), Vol. 26 NO. 6(November).

[viii] Zhu,Wan-chun(2012), “Based on the Perspective of National Characteristics of Ethnic Intangible Cultural Heritage Tour ism Study on Sustainable Development”, Guizhou Ethnic Studies, Vol. 33 No. 147 (July).

[ix] Zhao,Shi-lin;Tian,Jing(2010) "The Protection of the Guest and the Heritage of the National Cultural Heritage—Taking the protection of the national intangible cultural heritage of the Dai nationality as an example" ,Journal of Yunnan Nationalities University (Social Sciences) Vol. 27 No. 5(September).

Research Paper

Revitalizing historic urban quarters by Cityscape-control plan

The case of Xi'an, China

Xiaoxiao DENG, SHANGHAI TONGJI URBAN PLANNING &DESIGN INSTITUTE CO., LTD; China
Dihao ZHANG, SHANGHAI TONGJI URBAN PLANNING &DESIGN INSTITUTE CO., LTD; China
Shuang YAN, Administrative Committee of Qujiang New District, Xi'an; China

Abstract

In globalization ear, a large number of cities around the world are losing their features with the impact of powerful alien culture. Furthermore, China has been experiencing rapid urbanization. Full speed construction calls for the standardization instead of the uniqueness, which have brought threat to characteristics of cities. Homogeneous images of cities can be seen everywhere.

Local cityscape, as the identity of the indigenous culture, is becoming increasingly scarce resource and competitive power for city in the field of global competition. Cities in China, who have realized the importance of history and culture in recent years, started to preserve and improve local cityscape by the tools of urban planning and design.

Taking the historic urban quarters around the Daming Palace National Heritage Park as an example, the Cityscape Control Plan is researched as a method to preserve and optimize the cityscape in the historic area during the process of urban regeneration.

The project is located in Xi'an, a megacity with more than 9.6 million population. Daming Palace used to be the imperial palace of the country in Tang Dynasty (AD634-896). Quarters around it has become a decayed area with squatter settlements nowadays. The municipality tries to bring in new opportunities for the area with a Cityscape Control Plan, which offers a possible solution to combine global and modern function with local and historic cityscape.

Learning from the theories of city image, urban morphology and typology, the concept of cityscape and Cityscape Control Plan are defined theoretically.

Secondly, an integral cityscape structure for the area is constructed and several spatial guidelines are created in terms of morphology，street interfaces, building heights, architectural styles, architectural colours, etc. All the guidelines are integrated and detailed to specific form codes for each blocks, which can be used as an administrative tool to restrict all the related construction activities.

With these efforts, the historic features and innovative features are combined to identify a unique cityscape in this area, bring in a "glocal" (global-local) solution for the revitalizing of the historic mega city as Xi'an.

Keywords

Cityscape Control Plan, local culture, urban regeneration, historic urban quarters

1. Background

In the age of globalization, cities are located in the opening network of global capital, information, science and technology, which triggers the assimilation of cultural value. The mainstream culture in advanced countries has become the dominant culture all around the world, leading to continuous interweaving and conflicts with the indigenous cultures. During this process, as the material carrier of culture, cities are unavoidably impacted by alien cultures, and the original difference of cityscape expressed due to regions, nations and history gradually disappears, which has become a worldwide problem.

On the other hand, China is in the process of rapid urbanization. Full speed construction calls for the standardization instead of the uniqueness. As a result the traditions and features of cities give place to standard and simple modern architectural style, the pleasant urban space shaped by history is eroded, the cityscape all around the world is increasingly homogeneous day by day.

Facing the similar cityscape here and there, people start to introspect how to rebuild the sense of identity of their hometown by preserving culture and features of cities. The fierce competition of cities in globalization also let the administrators realize the importance of unique cityscape, which can add up the vitality, attract talents and bring investment and chances for their cities.

Therefore, Cityscape control plan as a tool to combine global and modern function with local and historic cityscape has been paid more attention. Each city that is situated in the global network is seeking for a possible solution, which is “how to become modern and to return to sources; how to revive an old, dormant civilization, and take part in universal civilization.” (Paul Ricoeur, 1965)

2. Concept definition

2.1. Historic urban quarters

The preservation of the historic city has experienced a long process. The protecting objects start from individual landmarks, monuments and sites (International Charter for the Conservation and Restoration of Monuments and Sites, 1964) to historic areas (Recommendation concerning the Safeguarding and Contemporary Role of Historic Areas, 1976), and then to historic towns and urban areas (Charter for the conservation of Historic Towns and Urban Areas, 1987). To sum up, the definition of historic urban quarters is increasingly enlarged and deepened, which includes not only physical environment but also social cultural structure, and consists not only buildings but also the continuous ensemble of the surrounding environment.

2.2. Cityscape

Cityscape is not an academic word in the field of urban plan. It originates from a literary concept, expressing the physical form of cities and the potential cultural connotations. Therefore, cityscape includes two parts: the visible part consists of the natural environment and the artificial environment of cities; the invisible part includes the social-cultural features that affects urban developing process, for instance, religion, history, ethic and law, etc. After it is applied into the planning field, the meaning of cityscape is enriched in a further way. It is

influenced by the trends of society, economy and culture, and made up of the several contents, including the construction of physical environment, the display of cityscape, the creation of urban culture and the extraction of urban spirit.

2.3. Cityscape control plan

As a new planning category, Cityscape control plan hasn't shaped a mature and systemic standard (Duan, Dezheng; Wang, Liyuan; Wang, Jin; 2013). In China, cityscape control plan is generally regarded as an assistant research tool for master plan, or as a special type of plan independently. In terms of content, it not only includes the overall cityscape of whole city on the macro level but also specific cityscape for each block on the micro level. In the practice of planning, the cityscape control plan on the macro level emphasizes more on blueprinting and qualitative description, which is hard to be used in implementation and management (Dai Shenzhi, Liu Tingting, 2013). On the other hand, the micro level's cityscape control plan has not formed mature planning method and the content of it is always confused with urban design. In this background, the paper attempts to explore an experimental planning method for the cityscape control plan based on the practice of the historic urban quarters around the Daming Palace National Heritage Park.

3. Case research

3.1. Introduction

The project is located in Xi'an, a megacity with more than 9.6 million population. Daming Palace used to be the imperial palace of the country in Tang Dynasty (AD634-896). The palace covers an area of about 3.2 square kilometres, whose size is 4.5 times of the Forbidden City in Beijing. The spatial structure of the palace is grand, and the architectures are exquisite. It is referred to as "the peak work of Chinese palace architectures." As Tang Dynasty declined, Daming Palace became a heap of ruins in a fire (896 AD). After the changes of several dynasties, Daming Palace quarter had been covered with farmland for a long time, until it became squatter settlements for displaced person in World War II. The narrow alleys, the crowded houses, the dirty sanitation and the high crime rate made up of the first impression that the decayed area. Since 1970s, the area started a regeneration project. Later on, the construction of the National Heritage Park (2010) and the reconstruction project of the railway station north square (2015) brought new vitality and tourists to the area.

The renewal of the urban quarters around the Daming Palace National Heritage Park is continuing. There are still about 0.75 square kilometres land to be updated, the old function (the place used to gathered large urban markets of building materials) cannot satisfy the diverse needs of residents and tourists, the declined landscape of the block is incompatible with the long-standing and elegant heritage park, and the messy streets and the squatter buildings cannot bring the sense of belonging for the neighbourhoods.

Figure 1 Land renewal proposal of the historic urban quarters around the Daming Palace National Heritage Park

3.2. Research framework

There are two main tasks concerning the cityscape control plan of Daming Palace area: Firstly, how to revive a historical area without architectural remains (there are only rammed earth ground foundation sites in Daming Palace National Heritage Park), and awaken sense of identity of communities. This area plays a significant role for the city and even the country, it stands for the cultural peak of Han civilization, and it is also an important tourist destination of the city, attracting a large number of domestic and foreign tourists every year. The municipality and planning experts are trying to seek for the cityscape that can represent the characteristics of this area, not only coordinating with the historical context, but also adapting to the diverse modern functions in the future.

Secondly, there remain a variety of old city quarters formed in different periods; for instance, the remains of Palace, the squatter settlements, the building material markets and the industrial zone. Although not every history period is enjoyable, as a unique memory of the city, they should all be respected, and we hope to keep all these remains and integrate them into the city life in a positive way in the future.

The regeneration system consists of two parts, that is function updating and cityscape improvement. Several specific guidelines and strategies are raised step by step, resulting to the planning documents that can be effectively implemented in macro to micro level.

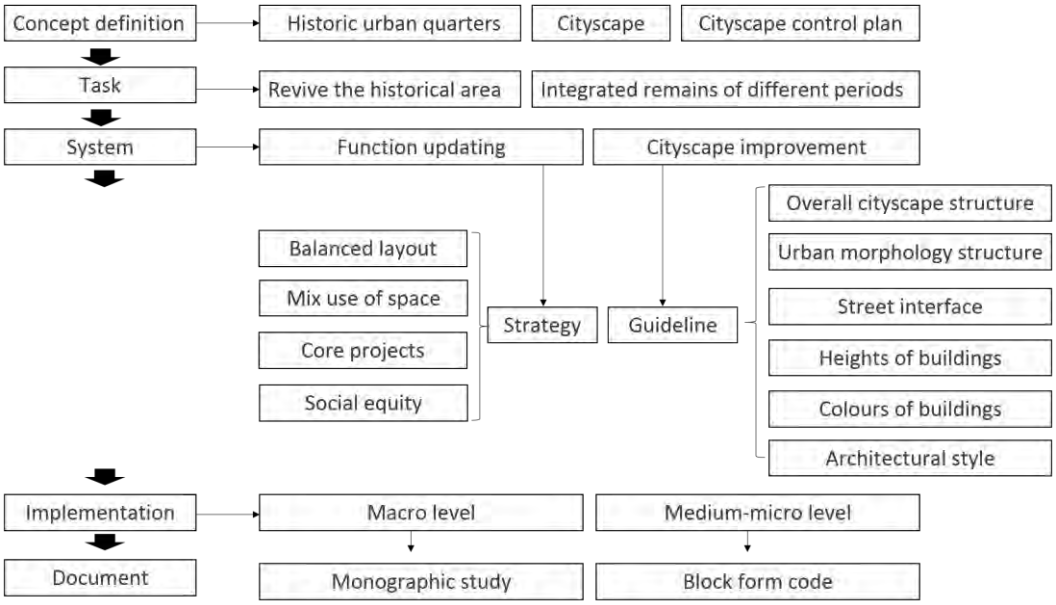


Figure 2 Research framework

3.3. Function updating

At the present stage, the dominant function of the historic urban quarters around the Daming Palace are building materials market and the residence. There are also a few cultural leisure and tourism service activities. According to the master plan, this area will become a comprehensive area where business, tourism and culture are combined together. According to the research, though the total squares of culture and commerce spaces in the area can meet the needs of tourists and commercial people, there are still four problems. First of all, the location of each domain determined by the master plan is too concentrated, which goes against the balanced development and continuous public space; secondly, the degree of mixed land-use is low, which has negative effect on the urban vitality; thirdly, there are insufficient flagship projects to driver the development of surrounding neighbourhood; last but not the least, how to avoid the gentrification influence brought by function replacement during the regeneration process.

Four corresponding strategies are proposed. Firstly, the balanced layout, it refers to disperse the centralized commercial, cultural and office space moderately, forming a pattern of concentrate partial and disperse generally. The second strategy is the mix-use of space, which means to mix the function of the blocks and buildings in three-dimension, creating more dynamic possibilities. The third strategy is to take transformation of industrial zone, northern art block, and the upgrading project of building materials market as three dominant projects, to combine commerce, culture, hotel, catering, leisure, entertainment together. In addition, rich activities such as design show, artistic performance, forum, history lectures, and signing sessions are planned, aiming to form a dynamic and comprehensive centre for the region and promote tourism and business as well. The fourth strategy is to make sure of sufficient living space, to build a variety of new apartments for different groups, including SOHO apartments for young graduates, social apartments for middle-income people, and serviced apartment for tourists etc., meanwhile, equal and friendly public space for the neighbours are constructed, such as museums, cultural palaces, squares, streets etc.

According to research, it will provide about 2500 residences and 20000 job positions for the society during the regeneration process.

3.4. Cityscape improvement

There are many factors that affect cityscape, and the decisive factor lies in the physical form of the city. Referring to the theory of morphology, M. R. G. Conzen (1960) divides urban form into three basic objects, they are town plan, building fabric and land utilization. Saverio Muratori refers city as urban organism, it includes city, block, architecture and detail. In The Image of City, Kevin Lynch (1960) classified physical forms of city into five elements: paths, edges, districts, nodes and landmarks. Based on the theoretical study, we can see that as a comprehensive system, cityscape includes the relationship from the whole to the part. Accordingly a framework for cityscape system from macro to micro level is constructed. In macro level, the structure of overall landscape, morphology of blocks, street interface, and architectural style are guided. In the micro level, the layout of the open spaces, the interface of street and the facades of buildings of certain block are regulated in detail, consisting the specific form codes for each blocks that can be applied to implementation and management of the plan.

3.5. Guideline for the overall cityscape structure

The overall structure of cityscape refers to the comprehensive of elements of cityscape in the form of point, line and surface (Fang Haojie, Zhou Yubin, 2012). The structure of the historic urban quarters around the Daming Palace National Heritage Park is mainly affected by the interaction relationship between the nodes of the heritage park, the metro station, the train station and the surrounding blocks. It is composed of 80% general blocks, 20% node blocks and three main street interfaces. The general blocks are regulated with strict guideline, in order to construct a coordinate and consecutive morphology. The node blocks adopt the way of flexible guidance, which emphasizes innovation and vitality, aiming to create attractive landmark space.

Figure 3 Overall cityscape structure

3.6. Guideline for the urban morphology structure

Morphology is the basic element of cityscape, which determines the texture and spatial form of the quarters. As the historic urban quarters around the Daming Palace have a long history, and the difference historical period left different urban formation. The quarters are regarded as sediment accumulated level by level; the building type and fabric unit of each stage are overlaid. Each block was matched with corresponding morphological module according to its original spatial fabric and updated function. There are five morphological modules in this area: traditional block with small courtyard, cultural block with building groups, shopping mall transformed from big volume market buildings, modern business building and residential apartment.

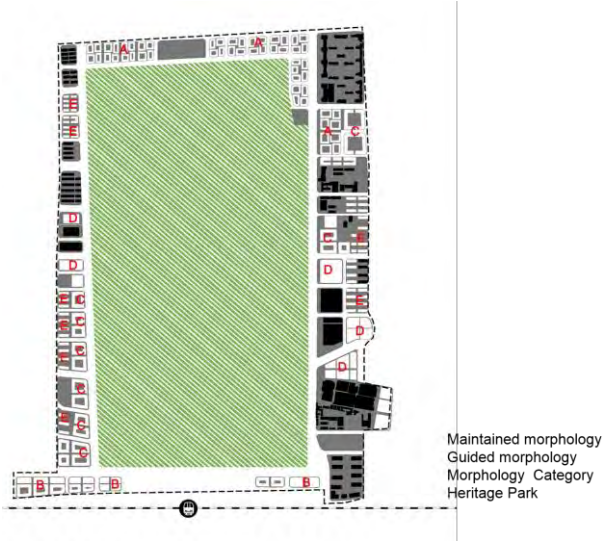


Figure 4 Urban morphology structure

Table 1 Urban morphology Modules

	A	B	C	D	E
Category	Traditional block	Cultural block	Office & Business	Commercial complex	Residence
Space	Block with yard	Building groups	Block with yard	Mall	Apartments
Height	1-3 stories ≤15 meters	3-5 stories ≤24 meters	4-9 stories ≤36 meters	4-9 stories ≤36 meters	12 stories ≤36 meters
Dimension	40-100m 40-100m 6-15m	60-120m 15-25m 60-120m	80-150m 80-150m 15-25m	80-150m 80-150m	80-150m 80-150m

3.7. Guideline for the street interface

The land utilization rate around Daming Palace National Heritage Park is relatively low, some part of the land is blank and the layout of the buildings is scattered. As a result, the interfaces of streets are relatively fragmental. Street as linear open space has a rich tradition in western countries and the façade of street is always supposed to be highly continuous as the displaying stages of city life and the security monitoring of the public activities. In

Oliveria's (2013) view, higher uniformity of architectures will bring higher urbanity, which means a form to promote urban activities. He put forwards a concept "alignment of buildings" as an assessing parameter of urban form. Harvey (2014) explains "Street wall continuity" as one of twelve streetscape skeleton, which means proportion of edge intersecting buildings on the more /less continuous side of the street.

On the other hand, the traditional Chinese wooden architectures and the unique concept of "set of etiquette" pay more attention to the architectural complex than the interface of the blocks and streets, making the façades of the street wall sporadic (Zhou Yu,).

In order to meet the requirements of the continuous wall facade in modern streets and respect the tradition of Chinese architectures at the same time, the continuous street façade only focus on the bottom part of the building below 15 meters, which is decided by the perspective of the pedestrians. This part of building corresponds to the form of rammed earth stylobate of the traditional Chinese buildings, and they will form a continuous street façade by controlling "Build-to-Line Rate", that refers to the percentage of the continuous building façades in the whole street length.

The upside parts of more than 15 meters, corresponding to the main woody bodies of the traditional Chinese buildings, encourages flexible composition of buildings; and the unique streetscape comes into being consequently.

Table 2 Build-to-Line Rate

Build-to-Line Rate (R) =continuous building façades length (B) /whole street length (L) *100%

Road	Build-to-Line Rate
TAIHUA Road	90%
XUANWU Road	80%
JIANQIANG Road	80%
ZIQIANG Road	80%
TAIYUAN Road	75%
PIJIU Road	75%
YINHEFANG Road	75%
HANYUAN Road	75%

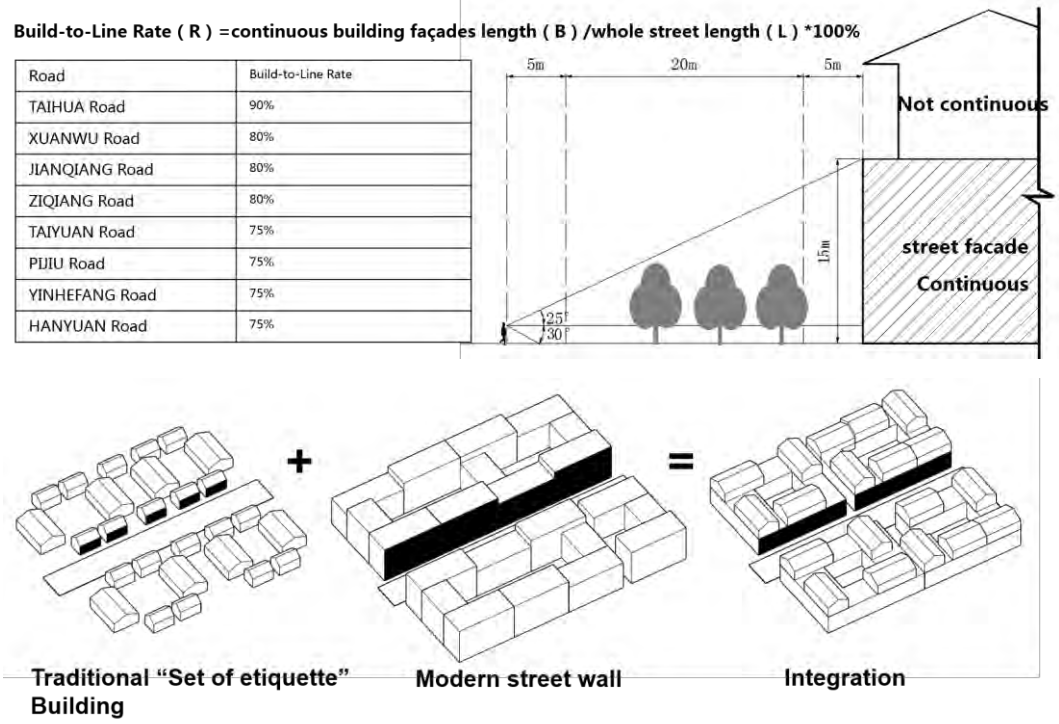


Figure 5 Combination of street wall and traditional "Set of etiquette" Building.

3.8. Guideline for the height of building

The height of building is the key factor that influences the transformation from the plane layout to three-dimensional space of city. The studying area is a part of the heritage protection control district of Daming Palace, so the cultural heritage protection department

authorize strict height control guideline for the surrounding buildings. Based on this, a further research of building height was made with hierarchical control method and viewshed control method. The hierarchical control method divides the height of buildings into the first level, the second level and the third level according to their distances to the heritage park, referring to the height of heritage in the National Heritage Park and the function, the land value of the surrounding blocks. The viewshed control method selects the important sight corridors in the surrounding area and limit the maximum height of the buildings with the principle that all the buildings in viewshed should not block the important sight line. The two methods are overlaid to control the maximum height for all the buildings in the area.

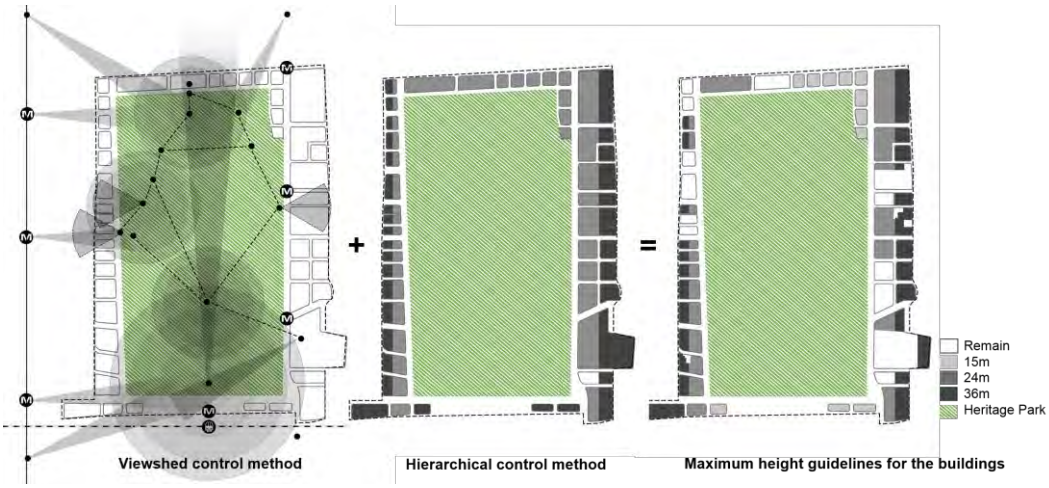


Figure 6 Maximum height guidelines for the buildings

3.9. Guideline for the colour of building

Researches in terms of urban colour planning have long-term practice all around the world. Miechael Lancaster (1996) raised the concept of colorscape firstly, referring it as the important carrier of historic, cultural and aesthetic information of city. Turin's Colour Database, Paris's Colour Gene and Tokyo's Tokyo Urban Colour Planning all played an important role for the harmonious urban building environment. The main controlled object of building colour in the area is divided into basic colour, sub colour and embellishment colour. During the research, 500 sampling colour points were measured and the sampling data are converted into the Munsell colour system by software. Then the harmonious range of colours was analysed and digitize by three values of hue (H), value (V) and chroma (C). The basic colour range of the buildings in this area is concentrated in 5 ranges: non-chroma, low-chroma and low-value, low-chroma and high-value, mid-chroma and high-value, mid-chroma and low-value. A detailed colour atlas was made correspondingly as the standard of data control.

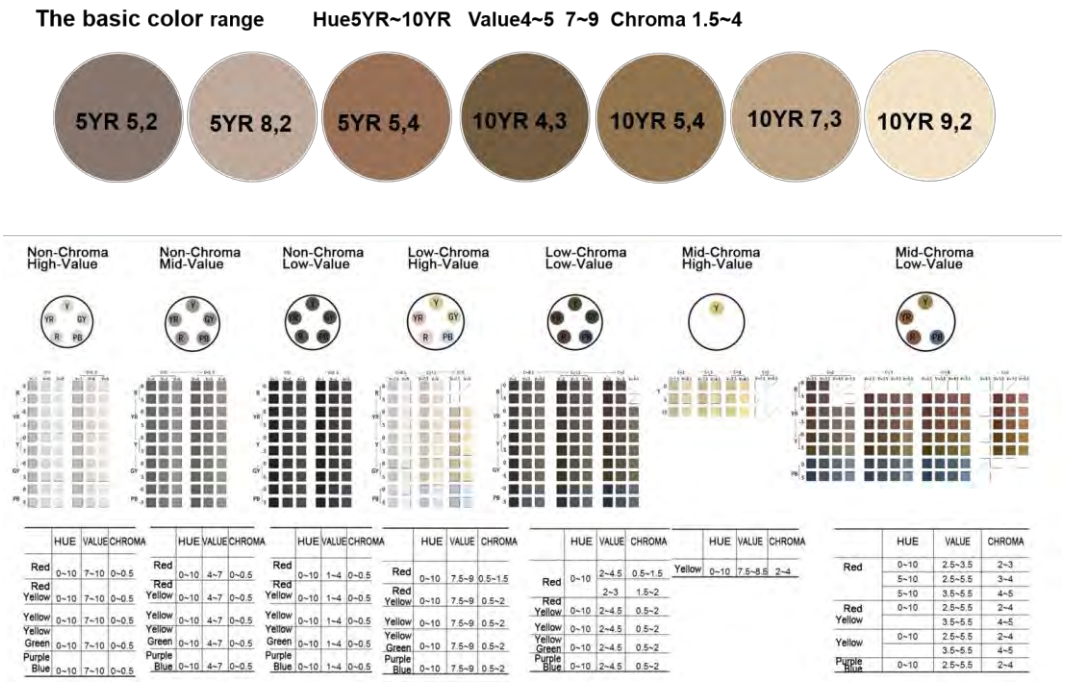


Figure 7 Basic colour ranges of the buildings

Since there is no architectural heritage in Daming Palace National Heritage Park, the research about the colour of traditional buildings in the area is based on historical document and fresco of Tang Dynasty. It can be seen that the architectures in Tang Dynasty is relatively bright-coloured (high chroma and high value), red and green are used massively, which is not harmonious with the forms of modern architectures. In order to inherit the elements of the traditional style in Tang Dynasty, meanwhile, meet the aesthetic and functional needs of modern architecture, the typical colours of architectures in Tang Dynasty were picked as the sub and embellishment colours and used in the design of architecture details, such as entrance space, roof, column, doors and windows, etc.

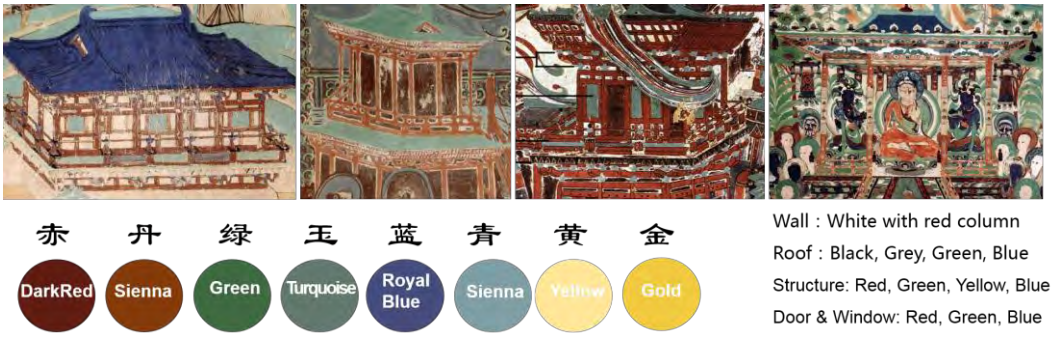


Figure 8 Sub and embellishment colours of the buildings

3.10. Guideline for the architectural style

Architectures are the leading elements of urban space, which determine the first impression of cityscape, and the appropriate architectural style could be the most obvious demonstration for the indigenous history and culture. Caniggia and Maffei (2001) emphasized that the architectural and urban texture types, which represented cultural and spiritual connotations of historical cities should be consecutive on time and space. A difficult problem was raised in research: what kind of architectural style should be encouraged and

commanded in the future in this area with profound history and culture but lacking in antique building remains. As wooden buildings are difficult to survive in war and historical changes in thousands of years, there is no architecture heritage in the whole historical area, and other contemporary architectural relics such as industrial factory buildings, construction materials markets and squatter settlements showed very fragmented architectural style. It is impossible to rebuild the area as it used to be in the history, as the reconstructed antique buildings are veracious and unworthily when they cannot match with the modern lives. While according to the questionnaires and interviews, it is difficult for modern architectures to satisfy the sense of belonging and identity of local residents. What's more, totally modern style of architecture is not benefit to the development of tourism, as tourists prefer to see a cityscape that can reflect the historical and cultural characteristics of Tang Dynasty around Daming Palace.

Therefore, the architectural style of this area was identified as contemporary -Tang style, which is to deconstruct the characteristic elements of architectures in Tang Dynasty as "style genes", and combine them with the practicability of modern architecture. Above all, the dominating feature of Architecture in Tang Dynasty was summarized, including the symmetrical spatial form, the three-section architectural façade (roof, wall and rammed earth stylobate), and the enormous and gentle roof form. Then the characteristic detail elements of Tang Dynasty building were extracted as the "gene bank" of architectural, which were strongly suggested into further architectural design in regional regeneration.

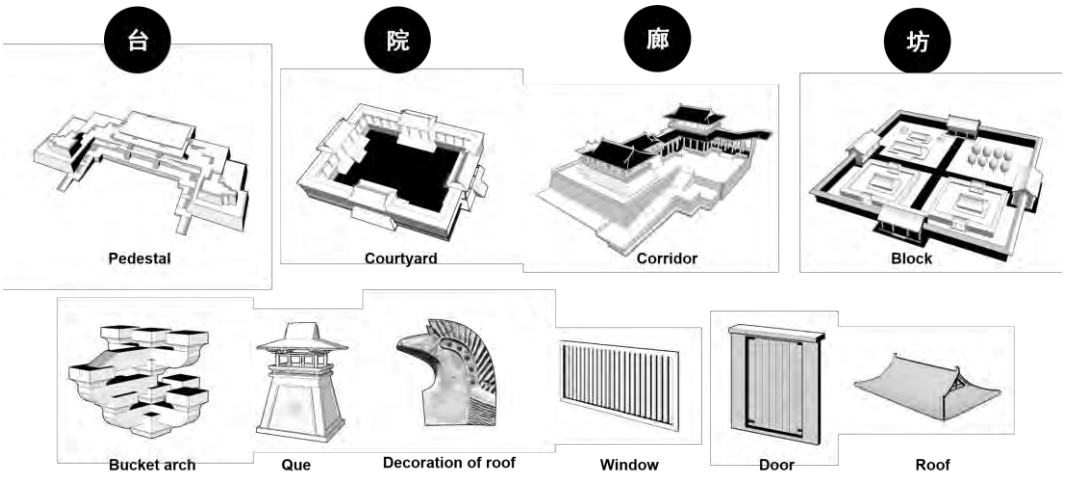


Figure 9 "Gene bank"of architectures in Tang Dynasty

Concerning how to combine these architectural genes of Tang Dynasty with modern architectures, a great deal of designing experiences in China and Japan are studied. In general, there are 4 types of contemporary -Tang style architectures: the Antique type, the Reform type, the Integration type and the Iconic type. The Antique type refers to imitate the traditional Tang-style wooden buildings entirety, all the volumes, materials and facades are built as the same way as the antique buildings. The Reform type means to inherit the basic shapes and overalls outline of the traditional architectures, keep the "three-section architectural facade " with the stylobate, the wall and the roof, while use the modern materials and structure. Instead of complete traditional facade, the Integration type is integrated of modern facade and the traditional facade innovatively, and the strict compositions and geometry ratio of traditional building are break and transformed into more freedom style. The Iconic type is the method of decorative art; it is based on modern

style and decorated with Tang-style architecture details, such as the doors, windows and columns etc. The first form are generally used in architecture groups of tourist attractions or museums, the other three forms are more suitable to the comprehensive modern functions, so they are recommended as the architecture styles in the regeneration procedure of the historic quarters around Daming Palace.

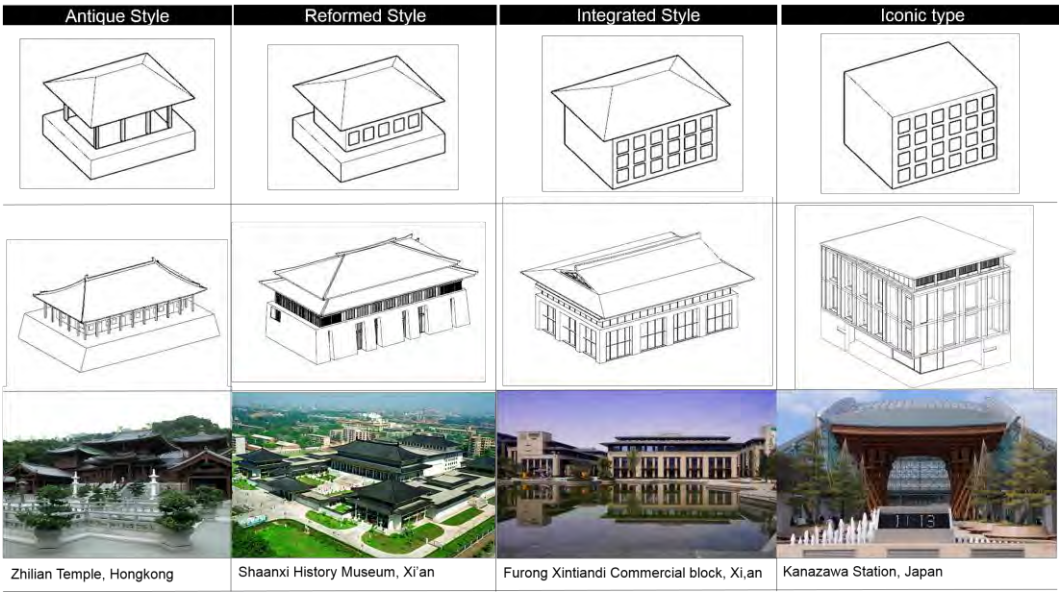


Figure 10 4 types of contemporary -Tang style architectures

3.11. Plan implementation

The practice of cityscape control plan includes two levels, the macro level and the medium-micro level. On the macro level, the plan works as the monographic study of master plan or a subject Plan independently. It decides the cityscape orientation of the city, forming the important cityscape systems, such as spatial structure, morphology, building style, etc., all the systems were regulated with specific guide documents, which would inherit into the relevant detailed plan of the area as important reference.

The medium-micro level transfers all the macro-level systems guideline to detailed, quantitative controlling index, and create legal block form codes for all the quarters without dead angles. In the form codes, the boundary and capacity of block, the location and node of open space, the morphology and style of architecture were controlled and regulated in detail. The form codes will be used to restrain the construction activities in the regeneration process after it is approved. When the land is transfer from municipality to developers, the guideline of cityscape can be attached as a subsidiary documents, and in this way the cityscape of the historic quarters were guided and preserved generally.

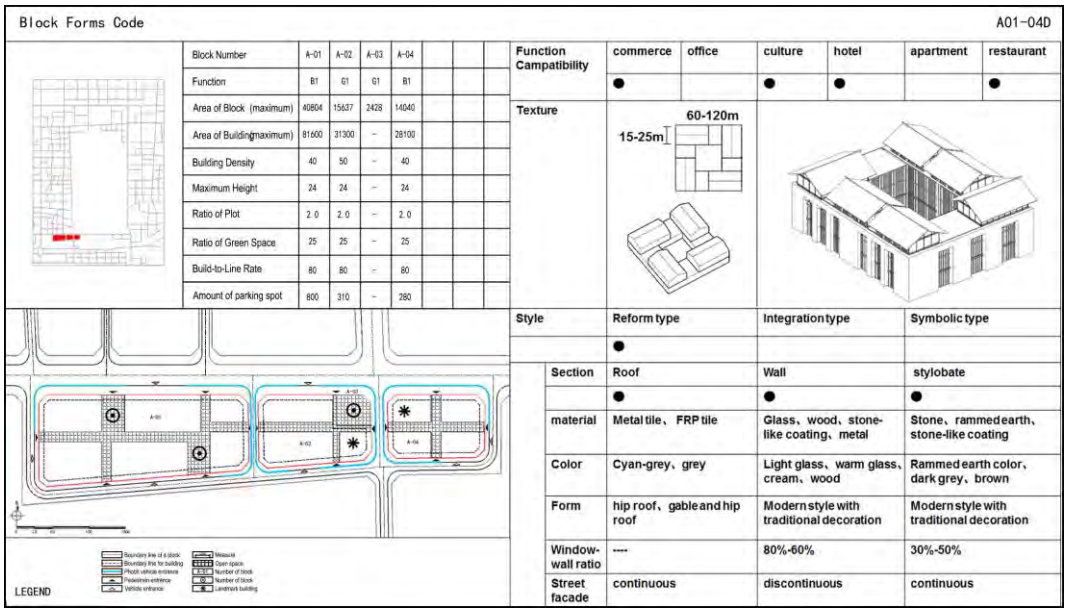


Figure 11 Block form code

In every stage of plan implementation, a coordinate a system of the relative groups are organized, including administrative officers, experts, estate developers, and public representatives, who participated through discussion and communication. The planning contents are altered in time with all the feedbacks and suggestions to make sure of the practicality of the plan.

4. Conclusion

The distinction and uniqueness of a city are the products of complex spatial evolution and the social process, representing the features of specific regional culture. In globalization ear, faced with the invasion of powerful alien culture and the spread of urbanization, the global cities are losing their traditional characteristics. The diversity of urban cultures and cityscape were increasingly declining. Historic mega city as Xi'an calls for a more farsighted GLOCAL solution, which can not only suits to the globalized demand of modern global cities, but also protect the traditional local culture.

During the regeneration process of the historic urban quarters around the Daming Palace National Heritage Park, cityscape plan is used as a tool to integrate mixing urban function and physical environment with indigenous characteristics. Inheritance and innovation are combined to revitalize a region with "glocal" (global-local) cityscape, and motivate sense of belonging for neighbourhood and attraction for the tourists.

Of course, the cityscape control plan of historic urban quarters around Daming Palace is just an experimental project towards specific historic urban quarters under the certain context, and the plan is in process. The study of revitalizing global mega city by Cityscape-control plan needs more research practice.

5. References

Ricoeur, Paul (1965) 'Universal Civiliztion and National Cultures', in History and truth, Evanston, IL: Northwestern University Press.

Duan, Degang; Wang, Liyuan; Wang, Jin (2013)" Research of Cityscape Control Oriented at Implementation: A Case Study on Baoji", City Planning Review, VOL.37 NO.4 (April).

Dai, Shenzhi; Liu, Tingting (2013); "A study on Cityscape Planning System and Planning Methods from the View of Administration and Implementation", Urban Planning Forum, VOL.9 NO.4 (May).

Conzen,M. R. G. (1960) Alnwick, northumberland: a study in town-plan analysis, Transactions and Papers (Institute of British Geographers).

Lynch, Kevin (1960) The Image of City, Mit Press.

Fang, Jiehao; Zhou, Yubin (2012) "Introducing Regulatory Plan Guidelines into Cityscape Planning: The Case of Fulaerji Cityscape Plan", Urban Planning Forum, VOL.2 NO.4 (June).

Oliveira, Vitor (2013) "A Methodology for Assessing Urban Form", Urban Morphology, VOL.17 NO.1 (September).

Harvey, Chester Wollaeger (2014) "Measuring Streetscape Design for Livability Using Spatial Data and Methods". Burlington: University of Vermont.

Zhou, Yu (2016) "Exploration on 'Build-To-Line Ratio' in Urban Planning Control on Street Interface", City Planning Review, VOL.40 NO.8 (August).

Lancaster, Michael (1996) Colorscape, London: Academy Edition.

Gianfranco, Caniggia; Gian, Maffei(2001) Architectural Composition and Building Technology: Interpreting Basic Building, Firenze: Alinea Editrice.

Research Paper

Healthy City versus Resilient Planning Paradigm

Case Study of New City Centre in Lodz, Poland

Małgorzata Bronisława HANZL, Lodz University of Technology; Poland
Lia Maria BEZERRA, Warsaw University of Technology; Poland

Abstract

In the current article, we are looking at some of the challenges of planning for healthy and resilient cities with a focus on the features of the physical structure. In order to examine the physical structures, we use qualitative assessment based on the comparative framework and the typo-morphological approach. We look for criteria of assessment based on the already existing indexes of health measurement. The above attempt is illustrated by the case study of the city of Lodz, Poland. We are looking at the best solutions which would enable healthy lifestyles and climate-resilient development. Our discussion refers to optimal models of mixed-use development and streetscapes of a central part of Lodz, namely focused around so-called New City Centre of Lodz, indicating possible alternative paths of its redevelopment. The methodological approach is supported by background research into the fields of resilience and healthy lifestyles.

Keywords

healthy city, lifestyle, urban form, streetscape, resilient planning

1. Introduction

This paper looks at some of the challenges of planning for healthy and resilient cities with a focus on the features of the physical structure. We examine desired densities and open spaces proportions, green areas, as well as the role and extent of transportation networks. In order to examine the physical structures, we use qualitative assessment based on the comparative framework and the typo-morphological approach. The above quest for the balance is illustrated by the case study of the city of Lodz, Poland. Initially, the model of development which has been prepared for the whole area within administrative borders of the town, with the special focus on the central areas is based on the typological classification. It includes the detailed analyses of a variety of the 19th-century neighbourhoods, with the special attention on their morphological development. The actual picture is further joined by the presence of open spaces related to transportation land uses, as numerous open parking lots. Taking into account the property structure, the elimination of some of these parking lots may be partially done through temporary use policies and recently introduced rehabilitation regulations. We analyse the potentials behind the presence of these large open spaces and define

future path options for their reuse in this paper. We are looking at the best solutions which would enable healthy lifestyles and climate resilient development. The Lodz municipality has addressed the problem of preparing the analyses and proposing strategies to redevelop some of the areas as green spaces, which we include in the paper. Based on the analysis of the case study, we attempt at the research of relationships between the fields of urban studies: resilience, planning for healthy urban environments and quality of life. Our discussion refers to optimal models of mixed-use development of a central part of Lodz, namely focused around so called New City Centre of Lodz, indicating possible alternative paths of its redevelopment. The methodological approach is supported by background research into the fields of resilience and healthy lifestyles. The relationships between the culture of usage of space and the urban forms have already been discussed extensively in similar research (for instance Thomson, Newman 2018, Fisher-Kowalsky et al. 2019). In conclusion, we summarise the discussion by providing the assessment and reasoning of the development methods.

2. Healthy cities versus climate change

2.1. Relationships between the domain of climate change planning and healthy city paradigm

Cities are major foci of production and consumption and its inhabitants rely on resources and services that are secured from areas outside of the city perimeter. Cities are not independent, but rather depend on their local, regional and global systems to function. Cities form complex systems, where climate change impacts not only the blue, green and grey infrastructure but also basic surrounding resources that guarantee the life in cites, from water and food supply to waste disposal, energy production and transportation, which draws severe consequences to the well-being and health of also those that live in the city.

Due to its individual characteristics, potential climate change impacts will be different, but can be generalised into mainly flooding, water scarcity, and heat island effect, which generates primary and secondary impacts, each having their own influence on the city system and the health of its inhabitants. Urban dwellers live in a higher concentration inside urban perimeters, which exposes them to contagious diseases that are prone by crowding, as epidemiological outbreaks by viruses, bacteria but likewise of rodent and vector-borne diseases. The current urban lifestyle also exposes dwellers to diseases related to noise, water and air pollution and other unfolding complications associated to vulnerability, causing violence and inequality.

Climate change impacts the health of urban dwellers in many ways and is often distributed unequally among more vulnerable segments of society (UN-Habitat 2014). Poorer urban inhabitants often suffer due to their informal or risk-prone dwelling condition and overall sensitivity, limitations on reactions to climate change impacts. Within poorer communities, women and girls are impacted more severely due to their traditional roles in the community. When analysing age and gender solely, the elderly and the young suffer with the direct and indirect impacts associated with climate change, as they're less able to sustain injuries or illness, but also women suffer differently than men. A World Health Organisation (WHO 2014) study found more supporting evidence that despite climate change-related disasters impact the health of both men and women, on average, natural disasters

kill more women than men, which is proportional to the harshness of the disaster and effect women the most in countries where they have lower social, economic and political status.

Studies (Elmqvist et al. 2013, Hardin and Jensen 2007, Bowler et al 2010) have confirmed that green and blue infrastructure can reduce some of climate change's health impacts within cities through focused design. The placement of vegetation and water can help in alleviating extreme temperatures locally. The studies show that heat can be absorbed by water areas while greenery reflects solar radiation and aids in diminishing temperatures locally by shading and evapotranspiration. Urban greenery has the additional quality of being able to reduce air pollutants primarily nitrogen and Sulphur oxides (Hartig et al 2014). The combination of blue and green infrastructure can contribute with reducing flood-related health risks, by stabilising the soil and reducing the risk of landslides, while the design of water areas can also provide planned areas to hold off excessive rainfall or water surges complementing future-proof drainage systems. Vegetation and urban green areas as parks and gardens can contribute to alleviating noise pollution while providing areas for relaxation, de-stressing, physical activity and community encounters.

The potential impacts that climate change can have on urban dwellers' health could be partially reduced by city planning. In what it relates to the physical characteristics of an urban area, mitigation strategies that include careful green area design, vegetation protection, diminishing urban heat islands, improving the air pollution management, future-proofing water management can have a positive impact on the amelioration of urban dwellers health undergoing climate changes.

2.2. Urban Health Indicators

The measurement of urban dwellers' health is linked to various characteristics and circumstances, physical settings, living and working conditions, environment, quality of services, community organisation, among many more. The interest in population health is not recent but has increased with the growing worries that come with future proofing our settlements. Measuring and correlating such vast themes is far from a simple task, however, once established it aids the understanding of the current status of urban health and is capable of strengthening governance within the area (Doyle 1999), and aiding decision makers and planners to make better choices for the future. The mapping of urban health and its application can link planning inputs, health outcomes and economical benefits, becoming in itself a resource in the community (Green et al 2009).

One of the most prominent measurements that take into consideration health within a given urban geographical boundary is WHO's Urban Health Index (UHI). The UHI provides insights on various health indicators that enable the temporal and geographical comparison (WHO 2014b). The index separates its themes under five main umbrellas – health, environment, geography, economics and social demographics – where each are then subdivided firstly into relevant domains, and secondly indicators, which are catered to the data available in the analysed area. The UHI itself has the flexibility to adapt to the specificity of the local context, while keeping a solid measurement capable of being compared throughout different localities.

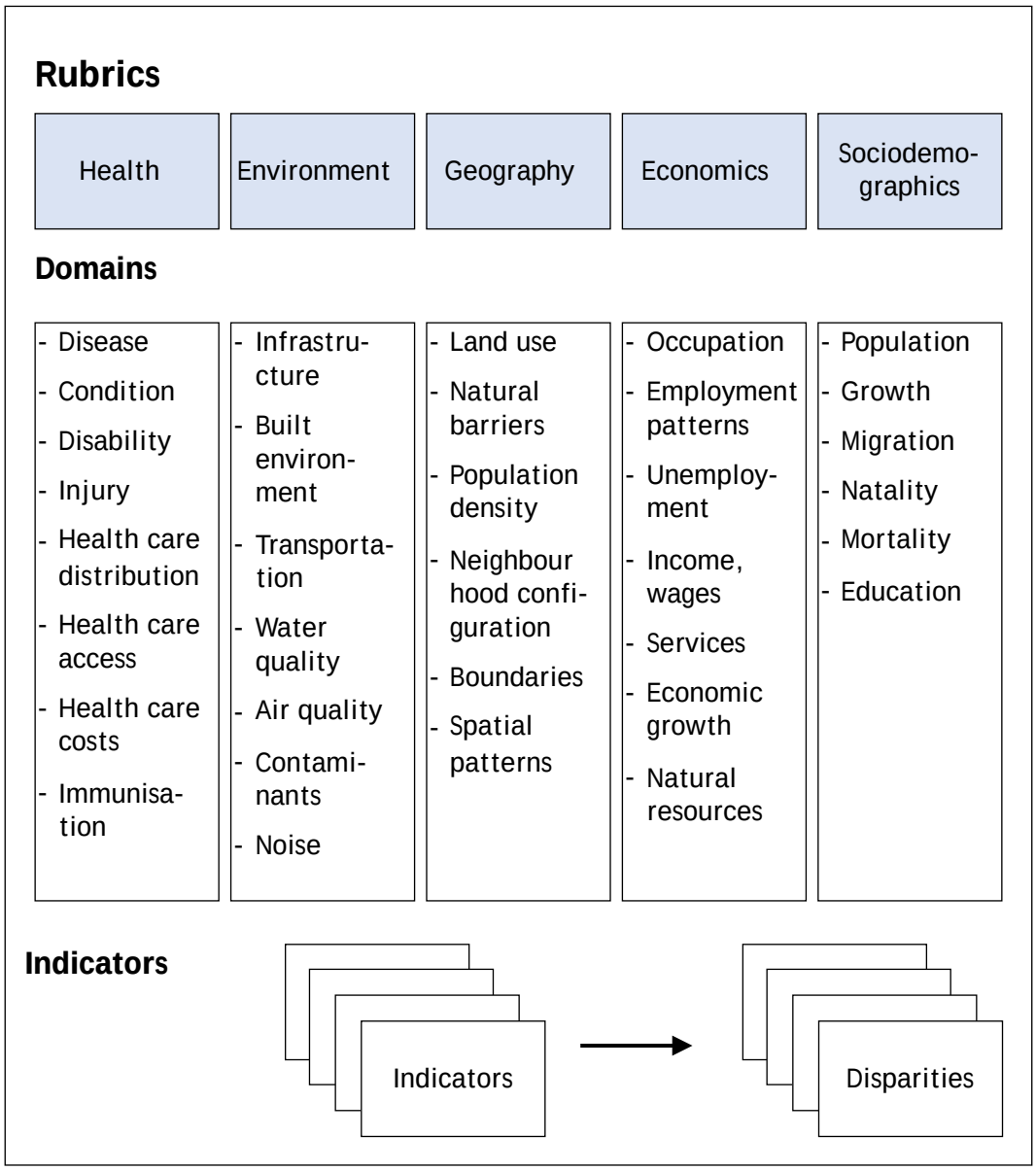


Figure 1 Framework for Classifying Measures of Urban Health, redrawn after: WHO (2014b, Figure 2)

The five main umbrellas over which UHI is based upon has been similarly used in its predecessor Health Cities Indicators (HCI) in 2012: health, health services, environmental indicators, social economic indicators. The HCI is designed in 2012 is a review of a set of indicators selected in 1998, which is a succession of improvements on the analytical framework (WHO 1998, Webster et al 1996 in Webster 2012). These can be grouped in 3 main groups: health, environment and social economics.

Table 1 presents two sets of health assessment factors based on two recognised elaborations (Webster and Sanderson 2012; WHO 2018). The list of indicators by Webster and Sanderson (2012) is of more normative character. The UHI (WHO 2018) offers a choice of collections of measures which might be applied based on the data availability.

Table 1. Two frameworks for assessment of urban health

Index	**Healthy City Indicators**	**Urban Health Indicator**
Abbreviation	HCI	UHI
Year	2012	2018
Author	Webster P. and Sanderson, D.	WHO
Application	Europe	Urban Areas
Themes/indicators		
Group 1 HEALTH	Health	Health
	mortality	disease
	main causes of death	condition
	low birth weight	disability
	Health Services	injury
	city health education programs	health care distribution
	immunization rates	health care access
	inhabitants per primary health practitioner	health care costs
	inhabitants per nurse	immunization
	percentage of population covered by health insurance	
	availability of services in foreign languages	
	health debates in city council	
Group 2 ENVIRONMENT	Environmental indicators	Environment
	air pollution	infrastructure
	water quality	built environment
	sewage collection	transportation
	household waste treatment	water quality
	green space	air quality
	derelict industrial sites	contaminants
	sports and leisure facilities	noise
	pedestrianization	Geography
	cycle routes	land use
	public transportation access	natural barriers
	public transportation range	population density
	living space	neighborhood configuration
		boundaries
		spatial patterns
Group 3 SOCIALECONOMICS	Socioeconomic indicators	Economics
	percentage of population in inadequate housing	occupation
	homelessness	employment patterns
	unemployment	unemployment
	poverty	income, wages
	availability of child care	services
	age of mothers at time of birth	economic growth
	abortion rate	natural resources
	employment of disabled people	Sociodemographics
		population
		growth
		migration
		natality
		mortality
		education

3. Methodology of assessment

3.1. Qualitative assessment

In the current paper, we would refer to a set of factors which might help evaluate the urban environment on a neighbourhood scale. We propose a simplified framework which might contribute to the assessment of the specific urban design solutions. The evaluation refers to physical urban structures and their relationships with specific lifestyles. The framework covers some normative components of sustainable urban design, including mobility and transportation, greenery and natural environment, promotion of social capital through public spaces and social participation, preservation and reuse of old structure, mixed-use development, compact development and appropriate densities. These postulates repeat in documents since Agenda 21 (UN 1992); they contribute a commonly recognised assessment framework for sustainable urban design. In our proposal, we looked for similar normative axioms in urban health framework and examined their interrelations. Then we combined the principles as a single assessment matrix and applied to the chosen study.

3.2.Typo-morphological approach

Further, we apply the typo-morphological approach to the analyses of open and unused spaces. These spaces are, for the most part, responsible for the perception of the urban settings. In this category, there are both spaces which serve the recreation and public life - public squares and parks, and these which are subordinated to the transportation needs - first of all, streets. The urban landscapes might be classified (Newman and Thompson 2018, Marshall 2005) into groups related to the primary development of various modes of transportation: pedestrian, based on public transportation, cycling or based on individual, car transportation. The modes of transportation contribute an explicit relationship with various types of lifestyles; the widespread presence of individual car-based transportation proves the dominance of unhealthy sedentary lifestyles, whereas the presence of comfortable pavements and cycle paths offers the opportunity for more active lifestyles.

3.3.Analyses of planned conditions

Further, we applied the typo-morphological approach to the analyses of planned, built structures. The reading of densities, the contribution of mixed-use development, the Green Area Ratio let us explore the future conditions of urban environment. Specifically useful proved the GAR, which is expressed through the parameter of *'biologically active area'* defined by the Polish building code (RMI 2002) as:

- *'area with soil surface arranged in a way which assures natural vegetation,*
- *50% of the surface of terraces and decks, if they are arranged as permanent lawns or flowerbeds with such surface - their size cannot be smaller than 10m2,*
- *surface waters'.*

This parameter strongly affects both local safety and stability of functioning of urban environments thanks to the management of the water retention and, at the same time, it is responsible for the urban heat island (UHI). In the current situation of climate change, the UHI, and desertification together with flash floods are next to strong winds, the three principal challenges for central Poland.

4. Case study - New City Centre of Lodz

4.1. Background information

The New City Centre of Lodz project extends next to the redeveloped railway station Łódź Fabryczna (Hanzl 2011). It contains several heritage post-industrial edifices and 19th-century tenement residential structures which used to accommodate social housing. The redevelopment plans cover circa 90 ha which spreads between streets Sienkiewicza, Narutowicza, Kopcińskiego, Tuwima. The railway station has been hidden underground to provide fast railway connection between Warsaw and Wrocław. The undertaking involves stakeholders at various levels who orchestrate their efforts to rehabilitate a large central area located in the direct proximity of the town's main street Piotrkowska. The project, which started in 2007, when the City Council approved the project and in 2008 when a culture institution EC1 was established (Wycichowska 2008), assumed more specific forms along with the approval of two local plans of urban development by the City Council in Lodz: III/40/14 and III/41/14. Parallel to the construction of the new Fabryczna railway station which replaced former terminus, the several new streets were built.

4.2. Qualitative assessment

The health aspects of the urban environment tend to be assessed against a framework which refers to the more holistic scale - such a research has been also performed for Lodz, without however selecting a specific neighbourhood ((Kaleta, Makowiec-Dabrowska, Jegier 2004). In case of a single location, more normative features apply. In order to be able to evaluate the current case study, we have chosen some of the elements which refer to the local environment and characterise with more normative aspects. Table 2 contains a full list of the assessment criteria, along with the case study assessment performed for a given list of features.

In order to propose a framework of assessment of urban health (UH), we have picked up the factors referring to the environment from the lists of Healthy City Indicators (Webster & Sanderson 2012) and Urban Health Indicators (WHO 2018). We then completed the framework adding the most commonly listed features of Sustainable Development (SD), as discussed above. It is clear that the project of the New City Centre of Lodz still needs many adjustments in order to satisfy the criteria, both for urban health and sustainable development. The provision of open green spaces, leisure facilities, recreation and organised public space is for now very low. Instead, there are many open spaces of large roads adjusted for the needs of car transportation. Whereas there are pavements and some cycling infrastructure is also present, they are mostly in the open air, and the users of them have to deal with strong winds and high insolation in summer. Streets' greenery is still to be planted, however not everywhere the space for it has been satisfied. The parks approved in the local plans of urban development have not been organised so far, and their spaces have been taken by automobile infrastructure. The positive aspects refer to the development of mass transportation - tramways and buses - connected with the station which after the construction of the underground connection between the two main railway stations in Lodz: Fabryczna and Kaliska, has got a chance to become a primary hub of public transport in the city.

Table 2 Qualitative assessment based on the proposed framework which refers to the categories of sustainable development (SD) and urban health (UH).

	Activities/ Goals	SD	UH	Case study Assessement
UH	Air pollution - low levels	X	X	-
	Green space availability	X	X	-
	Sport and leisure facilities	X	X	-
	Pedestrianisation	X	X	+/-
	Public transportation access	X	X	+
	Living, social space	X	X	-
	Low levels of noise	X	X	-
	Balanced population density	X	X	+/-
	Protection against UHI and draughts	X	X	-
SD	Compact development/ appropriate densities	X	-	+/-
	Preservation of old structures and their reuse	X	X	+
	Sustainable transportation/ mobility	X	X	-
	Promotion of social contacts through better social spaces	X	X	+/-
	Promotion of citizens' participation	X	X	+/-
	Protection of natural environment	X	X	-
	Mixed-use development	X	-	+/-

4.3.Typo-morphology of the streetscapes and planned development

The streets' system in the area went through a major transformation. Several new streets have been built, other altered significantly. Some streets designed in the plans still wait their turn. Summarising the process of transformations we might notice the typological shift from more equal distribution of 19th-century multi-use street layouts to more specialised segregation including streets adjusted to performed specific roles. In this group the major share (12% of the site) is taken by the automobile roads. This category would be the most prone to changes in future along with the shift to more pedestrian/public transport oriented city. They require planting of trees and adjustments to enable constructions along. Another emerging category are pedestrian streets, which offer a valuable residential environment, they are however scarce (2% of the site). Besides other types include: tram way integrating streets, traditional streets and interior streets. Figure 2 shows profiles of the largest group of automobile streets in the area.

Figure 2 Car oriented streets, total area: 111 147m2, 12% of the area of the area covered with the local plans of urban development under consideration.

The analysis of the planned development has focused on the Green Area Ratio parameter (Figure 3) and enabled counting of the runoff from the site. The analysis proves that there is still a lot to be done to satisfy the needs for proper organisation of water management in order to reduce the negative impacts of both flash floods and urban heat island; both of these phenomena have a major impact on urban health conditions.

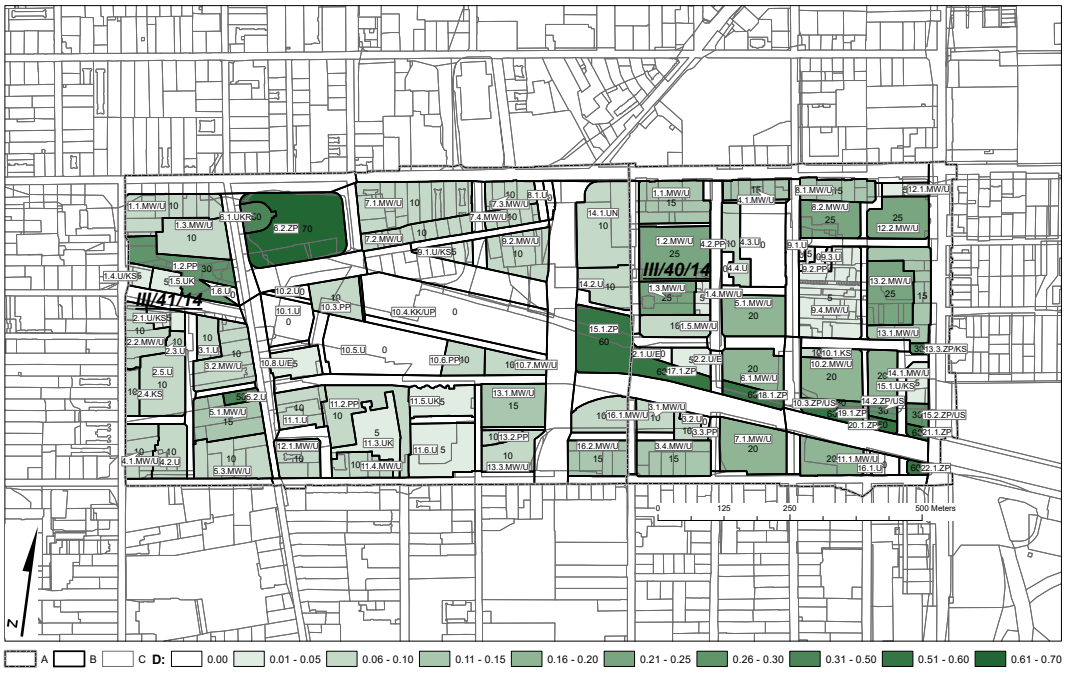


Figure 3 Green Area Ratio values for the local plans of urban development (III/40/14 and III/41/14).

5. Conclusions

In the current paper, we propose a method of evaluation of urban design interventions based on the normative frameworks of sustainable development and urban health assessment. The latter used the already predefined methods with a particular focus on the relationship between lifestyles and forms of the urban environment, notably streetscapes. We compared the three frameworks: of sustainable development, urban resilience and urban health looking for overlaps and mutual relationships. In the next step, we applied the method to the case study of a large-scale urban redevelopment project of New City Centre in Lodz. The project occurs to fail to fulfil many of the criteria of the proposed research frameworks.

The typo morphological analysis shows the transformation of the street network from the traditional, 19th century one into the hierarchical layout with pedestrian streets and car subordinated roads. The latter category dominates, which makes explicit the dominance of a car as a principal mode of transportation. This is associated with the predominance of sedentary lifestyles and creates threats for citizens' health. Still, some new streets which integrate tramways have been constructed, which improved the integration of public transportation system.

The preliminary analysis of the transformations of the area so far proves the need for more green infrastructure; the current levels of GAR remain very low. The focus on the development of GI is needed to improve the water management and to diminish the impacts of urban heat island (UHI). The assessment criteria enable benchmarking of the project strategies so far and look to adjust the strategy in future.

The study confirms the role of urban voids: open public spaces (including streets and parks) which influence the quality of urban life. Methods to assess their relationships with urban health have been developed. This current study proved that an attempt at the methodology for analyses and assessment may become a useful tool for urban design. The current experience gave us the initial thoughts on the conditions which have to be fulfilled to apply the method to a project. Further steps include the application of a similar methodology to other case studies, including larger scale ones.

6. References

Bowler D.E., Buyung-Ali L., Knight TM, Pullin AS (2010) Urban greening to cool towns and cities: a systematic review of the empirical evidence. Landscape Urban Plan 97:147–155

Doyle Y.G. et al (1999) Practical lessons in using indicators of determinants of health across 47 European cities. Health Promotion Int.1999; 14(4): p.289–299.

Elmqvist T, Barnett G, Wilkinson C (2013) Exploring urban sustainability and resilience. In: Pearson L, Newton P, Roberts P (eds) Resilient sustainable cities. Routledge, New York

Elmqvist T et al (eds) (2013) Urbanization, biodiversity and ecosystem services: challenges and opportunities: a global assessment. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-7088-1_1

Green, G., Acres, J., Price, C. and Tsouros, A. (2009) City Health Development Planning. Health Promotion International, 24, p72–i80.

Hanzl, M. (2011) 'Redeveloping the City Structure–the Case of Lodz "New City Center"', in Schrenk, M., Popovich, V. V., and Peter, Z. (eds) Proceedings REAL CORP. Essen: 803–812.

Hardin PJ, Jensen RR (2007) The effect of urban leaf area on summertime urban surface kinetic temperatures: a Terre Haute case study. Urban for Urban Green 6:63–72.

Hartig T, Mitchell R, de Vries S, Frumkin H (2014) Nature and health. Annual Revision Public Health 35:207–228.

Kaleta D, Makowiec-Dąbrowska T, Jegier A (2004) Leisure-time Physical Activity, Cardiorespiratory Fitness and Work Ability: A Study of Randomly Selected Residents of Lodz. International Journal of Occupational Medicine and Environmental Health 17(4): 457-464.

Marselle, R. M. et al eds (2019) Biodiversity and Health in the Face of Climate Change, Springer.

UN-HABITAT (2014) Planning for Climate Change: A Strategic, Values-based Approach for Urban Planners. Nairobi, Kenya.

Webster P, Price C. eds. (1996) Healthy Cities Indicators: analysis of data from cities across Europe. Copenhagen: WHO Regional Office for Europe, (ICP/HCIT/94 01/PB04).

Webster P, Sanderson D (2012) Healthy Cities Indicators – A Suitable Instrument to Measure Health? in Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 90, Suppl. 1 doi:10.1007/s11524-011-9643-9.

World Health Organization (2014a) Gender, Climate Change and Health. Geneva, Switzerland.

World Health Organization (2014b) The Urban Health Index – A Handbook for its Calculation and Use. Kobe, Japan.

World Health Organization Regional Office for Europe (1998) WHO Healthy Cities—Revised baseline Healthy Cities Indicators. Centre for Urban Health.

Wycichowska, B (2008) A New 'Heart' of Lodz. A Project Worthy of the 21st Century, in Czasopismo Techniczne A, Wydawnictwo Politechniki Krakowskiej z. 4-A/2008, 287-294.

Research Paper

The essence of Urban form and its Relationship with Urban Aesthetics: A case from Rajshahi City, Bangladesh

Ferdous Farhana HUQ, Rajshahi University of Engineering & Technology; Bangladesh
Imzamam Ul Khan Shuvo, Rajshahi University of Engineering & Technology; Bangladesh
Nidalia Islam, Bangladesh University of Engineering and Technology; Bangladesh

Abstract

The identity of a city is visibly recognized by observing its urban form. The development plans of the cities of Bangladesh address land use planning and ignore the aptness of urban form. As a result, the cities of Bangladesh are growing haphazardly and turning into an urban jungle rather than aesthetically pleasing habitable urban space. This study explores the intrinsic nature of the urban form of the major cities of Bangladesh as well as compares the urban form of major cities of Bangladesh with selected cities from around the world. This study conducts Physical Observation on building frontage, elevation, plinth level, footpath, doors and window pattern by employing transect method to acknowledge the character of the urban forms of the selected study area of Rajshahi city of Bangladesh. The findings of the study answer why the urban forms of the cities of Bangladesh look similar irrespective of cultural and geographical context. The findings shed lights on the weaknesses of current building codes regarding the compatibility of the design of the building elements as well as the relationship between building and street which leads to the degrade the urban aesthetics. Based on the findings some strategic and design solutions are provided with a view to improving the look of the city form.

Keywords

Urban form, Urban Aesthetics, Building façade, Building Elevation

1. Introduction

Urban morphology, urban form, and urban fabric are three terms that are highly interlinked with each other. According to Moudon (1997) urban morphology analyses the transformation of a city from its birth to its present state by identifying and dissecting its components. When it comes to the talk of the city's components, the first term comes is the 'physical form' of a city. Several researchers in their study have confirmed that a city can be read and studied by analyzing its physical form (Moudon 1997; Lynch. K 1959; Levy.A, 1999; Lu.S et.al, 2019). Whereas Dempsey.N et al. (N.D) have clearly mentioned that a city's physical characteristic hence physical form is officially termed as 'Urban form'. On the other hand according to Levy. A (1999), 'urban form' signifies the form of 'urban fabric'. Many recent works have disclosed different dimensions of urban fabric (Thompson & Newman 2018, Muller, 2004, Newman and Kenworthy 1999, Newman and Kenworthy 2016). Based on their work the urban fabric can be summarized as a large fabric of urban form that

portrays the essence of physical characteristics of a city. Therefore, the Urban form is the smallest unit of studying urban fabric as well as urban morphology. Dempsey et.al (n.d) in their study have mentioned density, buildings, layout, , and transport infrastructure as the major five elements of urban form, other researchers have generally address four fundamental elements of urban form which are buildings, open space, plots and streets (Moudon.V.A 1997 , Levy.A 1999). Kevin Lynch (1960) in this book discussed the effects of paths, edges, districts, nodes and landmarks on developing the image of the city. Urban aesthetics highly depends on the successful design of physical characteristics or urban form. Qualities of urban form are determined by the qualities of its fundamental elements and quality of urban form influences the human perception and visual complexity (Boeing, 2018). urban aesthetics is highly co-related with 'good visual complexity'. Good visual complexity depends on variety in buildings types, design details, street furniture, signage, human activity, light and shadow, textural details of street trees and urban open spaces. If the design becomes too predictable and controlled, the visual complexity becomes lost. Very few, similar, predictable, or too disordered to be comprehensible urban design produces poor visual complexity. Therefore the elements of urban forms have to be designed by maintaining a balance between order and disorder with unity and variety (Clifton et al. 2008, Elsheshtawy 1997; Gunawardena et al. 2015; Ewing and Clemente 2013; Boeing 2018).

This study focuses on understanding the tangible built environment of Rajshahi city from the perspectives of Urban aesthetics and finds out the influence of the modification of built forms on urban aesthetics.

2. Study Area

Figure 1 Map of the Research Area

Source 1 Author's preparations from Rajshahi Detailed Area Plan (2004-2024)

The study has been conducted at Malopara area located at the heart of Rajshahi which is one of the fast developing cities of Bangladesh. Three roads from Malopara named (1) MoniChootr, (2) Malopara road and (3) Malopara to Mohila college roads are studied for this research. These three roads have some unique buildings dated since 19th to the 20th century

which makes this area different from other areas in terms of urban form as well as urban aesthetics (Field Survey, 2018). formsFor the study, three roads of Malopara has been chosen. On these three roads, many types of uses are found. The lengths of the three roads are 0.14 km, 0.09 km, and 0.41 km respectively. The total length of the study area is 0.64 kilometer.

3. Method of the Study

The method of the research is inspired from the method suggested by Lamas (1993) to understand the city by studying its elements i.e. ground, parcel, buildings, block, façade, vegetation, streets , squares, courtyards, monument, street furniture and larger structures (Lamas 1993 in Monteiro, n.d; Barbosa et.al, n.d). This research chooses Buildings, façade, ground, and street to study as these elements are the most relevant aspects to examine in the study area. To examine, the selected elements of urban forms direct observation method is used. A checklist was prepared to collect the basic information of the buildings. Transect method was applied where selected streets were divided into transects to classify the typical elements of each section (Watson, Plattus, & Shibley, 2004). Three roads were mapped and characterized on the transect map. The panoramic survey was conducted where the photographic panorama of the study area was created to produce a detailed picture of the site (Anderson, 1978). The color, texture, materials, door and window pattern of the buildings were observed and noted as a part of studying the façade of the buildings. Building elevation survey was conducted to identify the elevation of the streetside buildings of the study area as building elevation is considered to be a significant component that explains urban form. Along with buildings elevation, Building's plinth elevation and footpath elevation were drawn by following a similar method. The data collected from the direct observation and field survey were visualized by using AutoCAD and 3d Sketch up the software to develop the findings of the research.

4. Findings and Discussions

4.1. Visual Complexity

The significant finding from three transects of three roads presents the dominance of are mixed-use building, blocked footpath, incoherent shop banner, haphazard electric wire, unmatched window pattern, different plinth level, irrelevant building shape, variety in building height and frontage, unmatched color and materials, few unique character door, window, veranda pattern, unique old buildings, broken dustbin and haphazard electrical wire. Visual complexity depends on the unity in the variety of the mentioned elements (Clifton, 2008, Boeing, 2018). The visual complexity of these roads is found to be high due to the lack of order developed by the construction of the modern building by not considering the design and pattern of neighboring buildings. The new-fashioned typical buildings are destroying the unique and traditional character developed by the old buildings in the study area. Mixed-use buildings in the study area have shops at the ground floor which follow various types of the pattern of their shapes, size, front material, nameplate color and nameplate size which degrade the aesthetics of the area. In a residential area, buildings are different in size, plinth level, height, color, texture, nameplates, door, and windows which

denigrate the balance and harmony of the overall streetscape of the research area.

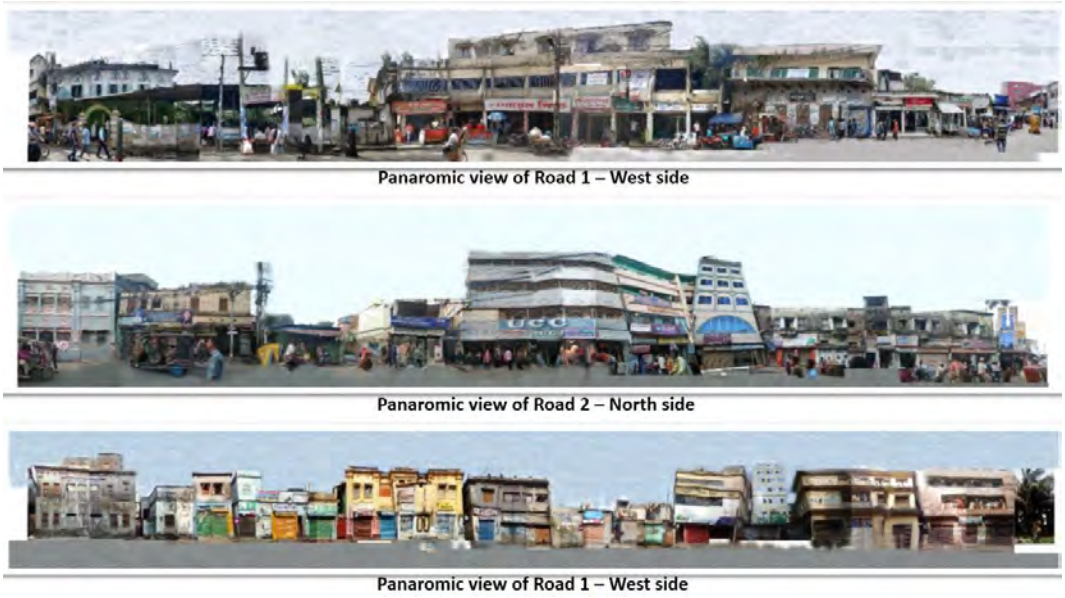


Figure 2 Panoramic Analysis of Research area

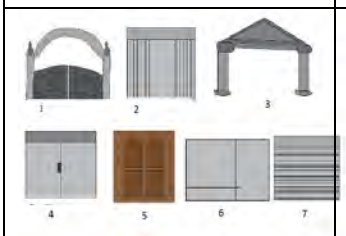
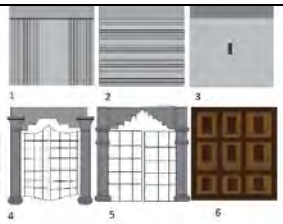
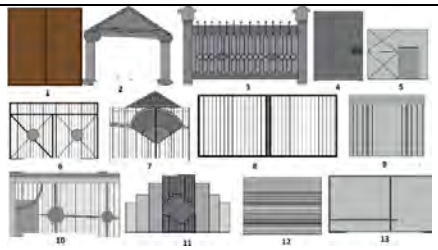
Source 2 Field Survey, 2018

4.2. Façade Scenario

The study area has many old, traditional style historic buildings which form a unique character in the area. But this character is being ruined due to the unconscious development trend. Findings from panoramic analysis approve the findings generated from transect analysis. The panoramic analysis focused on observing the color, texture, materials, plinth level, door, window, and veranda pattern. The panorama of First Street shows the ununiformity on the veranda and shop banner in terms of color and width. Panorama of the second street shows different plinth level of buildings which disturbs the image of the urban form by damaging the edge. The harmony of the building frontage is ruined due to not maintaining the unity in terms of color, texture and window pattern in buildings. According to the third panorama, shops uses different colored gates. Frontage material of the building is different and many buildings are identified using tiles in frontage which violates the unity in urban form hence destroys the urban aesthetics. Some building is found that has no plaster or broken plaster in the facade. Many buildings use different types of veranda and window pattern which has no harmony with the neighboring buildings (Figure 2).

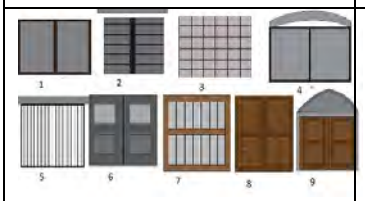
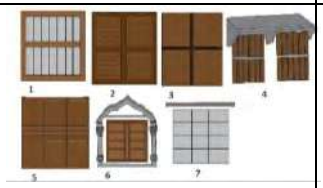
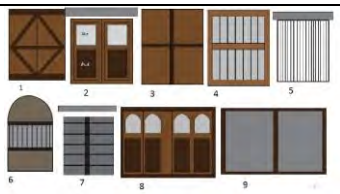
Building Elevation Analysis of the streets suggests that most of the buildings of the study areas are one to three-story buildings. Few 4 to 5 storied buildings have been observed in the study area which is new buildings. Placement of high rise new modern buildings alongside single to double story old traditional buildings without maintaining the color, material and design harmony disturbs the look of the urban form at some points of the street.

Table 1: Gate and door pattern analysis of the study area

Road 1_ Moni Chottor	Road 2 _ Malopara	Road 3_Malopara to Mohila college
		
No of Pattern: 7 Material and phase of style: (1) Steel+concrete, old (2) only Steel (3) Only concrete old, (4) Glass (Modern), (5) Only Wood, old (6) Glass +Steel and (7) Tin, Shutter style	No of Pattern: 6 Material and phase of style: (1) Steel, Local name is ketchi gate, Old, (2) Tin, Shutter style, (3) Glass (Modern) (4) Steel+concrete, old, (5) Steel+concrete, old, (6) Only Wood, old	No of Pattern: 13 Material and phase of style: (1) Only Wood,old (2) Only concrete old, (3) Steel+concrete, old, (4) Steel, Modern (5) Steel (Modern) (6) Tin +Steel (Modern) (7) Steel, Modern, (8) Steel, grill style, modern, (9) local name is ketchi gate, Old, (10) Only Steel (Modern) (11) Steel+concrete (Modern), (12) Tin, Shutter style, (13) Glass +steel (modern).
Remarks: Old types of gates are made with concrete and steel with more sophisticated design quality than the modern gates which are mostly made with steel.		

Source: Prepared by Author

Table 2: Window pattern analysis of the study area

Road 1_ Moni Chottor	Road 2 _ Malopara	Road 3_Malopara to Mohila college
		
No of Pattern: 9 Material and phase of style: (1) Sliding glass, modern (2) Wood+steel, old (3) Glass +Steel modern (4) Sliding Glass , Modern (5) Wood+ Steel, old (6) Glass +Steel, old (7) wood+ steel , old, (8) Only wood , old; (9) Wood+ concrete, old	No of Pattern: 7 Material and phase of style: (1) Wood+steel, old; (2) Only wood, old (3) Only Wood; (4) Wood+ Steel, old (5) Only Wood, old ; (6) Wood + Concrete, old; (7) Glass+steel	No of Pattern: 9 Material and phase of style: (1) Only Wood, old (2) Wood +glass, old; (3) Only wood, old, (4) Wood+Steel, old (5) Steel+wood (Modern) (6) wood +Steel+concrete, old; (7) Steel+glass, old, (8) Wood+glass (9) Sliding glass window, modern

Remarks: In most of the buildings windows are made with a combination of wood, steel, and glass following traditional window pattern. New buildings are using sliding window made with steel and glass. Window pattern of this study area is found to be unique and modern buildings should be guided to use windows inspired by the design and materials from the old buildings of the study area.

Source: Prepared by Author

4.3. Footpath and Plinth Level Analysis

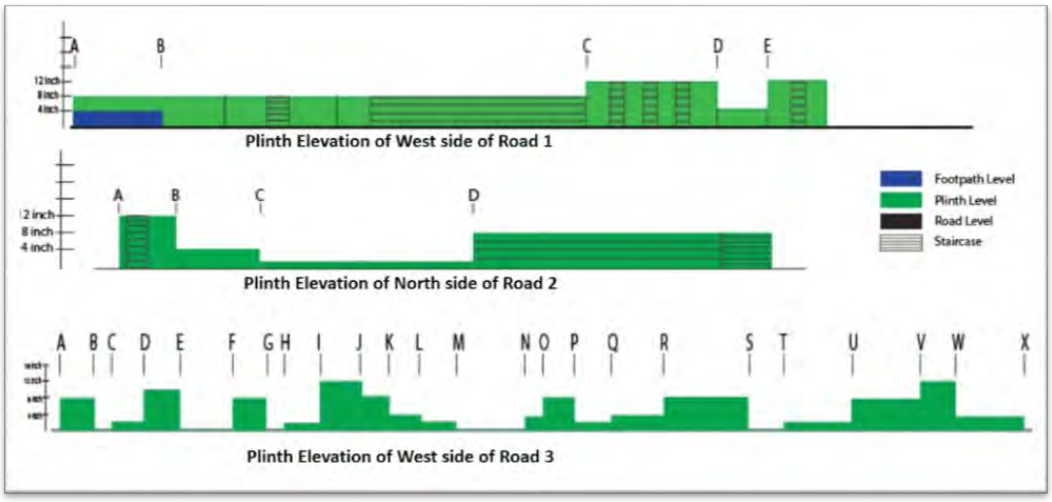


Figure 3 Plinth Level Analysis

Source 3 Field Survey, 2018

Footpath exists only from A to B of road 1 with an elevation of 4 inches from road level. Plinth level elevation is 8 inch from A to C, 12 inches from C to D, 4 inches from D to E and again become 12 inches from E to rest of the road. On the second road, a great variation of plinth level from 2 inches to 12 inches has been noticed. An extreme variation of plinth level elevation is observed at road 3 where elevation varies from 0 inches to 12 inches. There exist no footpath exists in road 2 and road 3. People use stairs to reach plinth level from road level in road 1 and 2. Such variation of plinth level not only destroys unity and harmony in the design of façade but also damages the aesthetics of urban streetscape (Figure 3).

5. Conclusions:

Research findings show the existing trend of streetscape development in Rajshahi city completely ignores the harmony, unity, and complexity of urban form. It is evident that the unique antique streetscape of Rajshahi city is under threat due to the ad-hoc development. To preserve the elegance and grace of this beautiful city we need to introduce some design guidelines for front façade at streetscape level. The guidelines should be able to give user full freedom to use a variety of materials and spatial planning freedom as well as regulate the new development to preserve the unique character of a street. To maintain the basic characteristic of streetscape- plinth height, building elevation, color, materials, scale, and proportion should be introduced to establish the order of urban form. Heritage corridor or streetscape preservation is very common worldwide. In the developed world, design architects, conservation architects, and planners work in a team to prepare a guideline for

areas with unique characteristic and heritage building to prevent random development. This research strongly suggests introducing policy guideline based on the context of the particular area to preserve the beauty and classical aesthetic order of Rajshahi city. Rajshahi City Corporation needs to work on its disordered visual complexity incorporating Architects, Urban planners to establish the harmony of the streetscape.

6. References

Anderson, Hugh. (1978) “Panoramic Photography as a Survey Tool", http://www.hugh360.co.uk/measurement/photographic-intersection/panoramic-photography-as-a-survey-tool/

Barbosa, Eliana Rosa de Queiroz; Patrícia Capanema Alvares Fernandes; Tú, Nguyen Thanh (n.d) “URBAN MORPHOLOGY IN THE SOUTH - SPONTANEOUS AND INDUCED FORM”, Global Development Network - working paper series Urbanization and Development: Delving Deeper into the Nexus.

Barros, Ana Paula; Martinez, Luis Miguel; Viegas, Jose Manuel (2017) “How urban form promotes walkability?”, Transportation Research Procedia, Vol. 27 (September).

Boeing, Geoff (2018) “Measuring the Complexity of Urban Form and Design”, Urban Design International, Vol. 23 No. 4 (October).

Bruno, Giuliana (2007) The Aesthetics of Human Environments, Peterborough, Canada, Broadview Press.

Celik, Deniz; Aciksoz, Sebahat (2017) “Urban aesthetic and urban landscape design guides: A Case study of Bartin, Turkey”, Journal of Environmental Biology, Vol. 38 No. 5 (September).

Clifton, Kelly., Ewing, Reid., Knaap, Gerrit-Jan., & Song, Yan (2008) “Quantitative analysis of urban form”, Journal of Urbanism, 1(1), 17–45 (May).

Dempsey, Nicola; Brown Caroline; Raman, Shibu; Porta Sergio; Jenks, Mike; Jones, Colin; Bramley, Glen (2008) “Elements of Urban Form”, Oxford, UK, Springer.

Elsheshtawy, Y. (1997). “Urban Complexity. Journal of Architectural and Planning Research”, Vol.14 No.04

Ewing, Reid; Clemente, Otto (2013). Measuring urban design. Washington, DC: Island Press, Washington, DC

Field Survey (2018) “Field survey conducted to identify the door window pattern, building elevation, plinth level elevation, panoramic view of Malopara area, Rajshahi”

Gracia-Domenech, Sergio (2015) “Urban Aesthetics and Social Function of Actual Public Space: A Desirable Balance”, Theoretical and Empirical Research in Urban Management, Vol. 10 No. 4 (November).

Gunawardena, G. M. W. L.; Kubota, Yoichi; Fukahori, Kiyotaka (2015) “Visual Complexity Analysis Using Taxonomic Diagrams of Figures and Backgrounds in Japanese Residential Streetscapes”, Urban Studies Research, Vol.2015 (September)

Kashem, Md. Shakil Bin; Chowdhury, Tufayel Ahmed; Majumder, Joydip; Rahman, Md. Asif (2009) "Quantifying Urban form: A Case Study of Rajshahi City", Journal of Bangladesh Institute of Planners, Vol. 2 (December).

Levy, Albert (1999) "Urban morphology and the problem of the modern urban fabric: some questions for research", Urban Morphology, Vol. 3 No. 2 (July).

Lu, Shiwei; Huang, Yaping; Shi, Chaoyang; Yang, Xiping (2019) "Exploring the Associations between Urban Form and Neighborhood Vibrancy: A Case Study of Chengdu", China, International Journal of Geo-Information, Vol. 8 No. 4 (April).

Lynch, Kevin (1990) The Image of The City, Cambridge, Massachusetts, and London, England, Massachusetts Institute of Technology.

Monteiro, Evandro.Z (n.d) "Urban forms in diagrams", 21st International Seminar on Urban Form: Our common future in Urban Morphology

Moudon, Anne Vernez (1997) "Urban morphology as an emerging interdisciplinary field", Urban Morphology, Vol. 1 (March).

Muller, Peter.O (1886) "Chapter 3 Transportation and urban form – stages in the spatial evolution of the American metropolis" *GEOGRAPHY OF URBAN TRANSPORTATION,* United States

Newman, P. and Kosonen, L. and Kenworthy, J (2016) "Theory of urban fabrics: Planning the walking, transit/public transport and automobile/motor car cities for reduced car dependency", Town Planning Review, Vol 87 No 4

Newman, P., Kenworthy, J (1999) "Sustainability and Cities: Overcoming Automobile Dependence", Island Press, Washington, DC.

Özarslan, Dr. Nuray (2003) "Understanding The Historic City", Existics, Vol. 65 No. 391/392/393 (May).

Rezafar, Azadeh; Turk, Sevkiye Sence (2018) "Urban design factors involved in the aesthetic assessment of newly built environments and their incorporation into legislation: The Case of Istanbul", Urbani Izziv, Vol. 29 No. 2 (October).

Sharma, Shashikant Nishant (2014) "Urban Forms in Planning and Design", International Journal of Research, Vol. 1 No. 1 (February).

Shibley, Robert G., Plattus, Alan J., Watson, Donald (2003) "Time-Saver Standards for Urban Design", McGraw-Hill Companies

Thompson, Giles; Newman, Peter (2018) "Urban fabrics and urban metabolism – from sustainable to regenerative cities", Resources, Conservation and Recycling, Vol. 132 (May).

Turk, Ali (2014) "Historical Urban Fabric of Isparta City, Its Problems, Solution Offers, and Sustainable Urban Development", Journal of Engineering Sciences and Design, Vol. 2 No. 2.

Verdi, Laura (2014) "Aesthetics in urban space: architecture and art for sustainable cities", Social Space Journal (July).

Research Paper

Improving the identity of historic city by considering hydraulic infrastructure (the case study: Qazvin city)

Nasim IRANMANESH, Islamic Azad university west Tehran branch,
department of Architecture; Iran

Abstract

Recently the importance of maintaining of historic identity of the cities is an obvious matter in restoration of a city. Each city depends on its cultural perception and its wealth, tries to reserve and repair its cultural heritage.

This matter has been done in many cities in the world and many historic urban fabrics have been restored and rehabilitated to be visited by many tourists to enjoy their atmosphere and physical and spiritual features.

Iran is a country with limited water resources but in spite of this fact there are many ancient civilizations and old cities with valuable urban fabrics in them which have intellectual irrigation.

The water of most cities of Iran mostly harvested from underground water by a technic which is called Qanat which irrigate city and farms. Water supplement in urban fabric and locating the hydraulic structure in cities had an important effect in forming the city which this impact shouldn't be ignored in repairing or rehabilitation of urban fabric.

In the other word hydraulic infrastructure of historic cities of Iran in hot and dry region is an important factor which shouldn't forget during planning for rehabilitation. The route of water either underground route or surface water and also hydraulic structures which have been located in the path of water should be preserved.

The case study is Qazvin city which its historic hydraulic infrastructure and hydraulic structures had an important effect in forming the city.

Keywords

hydraulic infrastructure, urban restoration, cultural heritage, Qanat

Introduction

Iran is an ancient country with an old civilization. Most parts of this country have hot and dry climate with a limited source of water. But Iranians have overcome with this problem by harvesting underground water and irrigate their settlement by this water. In Iran water harvested mostly by an intellectual technique which is called Qanat. Qanat brings water of alluvial fans from far distances to settlements. The water supplement in these city followed from the underground or surfaced net of water. The historical water supplement of Qazvin city had an important and direct effect on morphology of city. In the other word the morphology of city was formed according the water resources of this city and placing the hydraulic structures obeyed the path of water in cities as well. This paper discusses about the effect of water supplement on physical form of the historic area of city and deduces that how any rehabilitation planning can't be success without considering the its historic supplement of water in Qazvin city.

1. A brief explanation about Qazvin city and its water resources

The case study of this research is Qazvin city a historical city in Iran with a rich traditional urban planning and architecture which have been shaped during different eras.

1.1. Qazvin city and his historic water supplement

Iran has been located in hot and dry region and limitation of water is always a big problem of this country. In spite of this serious problem Iran is an old country with an ancient civilization which can be survived by harvesting underground water by an intellectual technique which is called "Qanat" or "Kariz".

Actually in most parts of Iran there is a "Karizian civilization "which has been appeared and survived by this technique of harvesting water.

Qazvin city is an Iranian city which has been located nearly in north of Iran. This city is an ancient city with a rich history but with few sources of water. This city was the capital of Iran four hundred years ago and after that it was an important city in commercial activities so during these eras Qazvin needed more water and harvested this water by Qanats.

Water resources of Qazvin included two main seasonal rivers and some wells which earned underground water, after growing the city and its population water was earned by Qanat which some of them are still alive and have water.

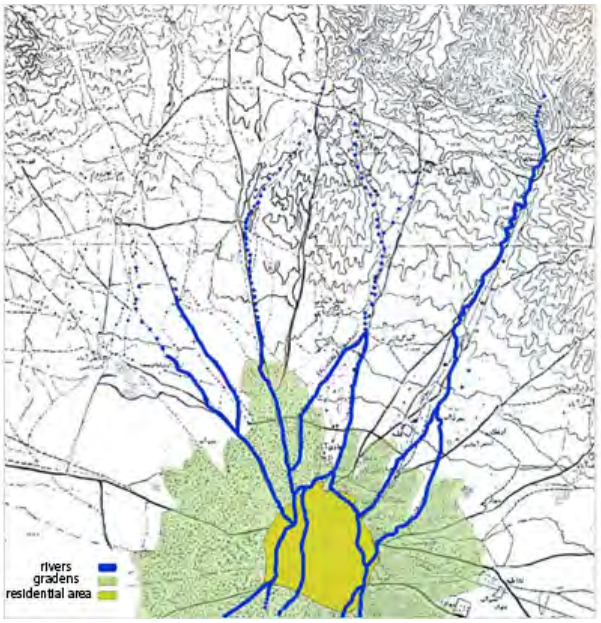


Figure 1 -Old location of Qazvin city (ancient garden whole around the city and seasonal rivers)

The system of Qanat included a horizontal corridor which brings water of alluvial fans toward the settlements. The structure of Qanat consists of a mother well which digs in an aquifer and transfers the water of this well by a horizontal corridor to the destination. To build this horizontal corridor a series of wells is needed to help digging the corridor and be able to maintain the Qanat (figure 1).

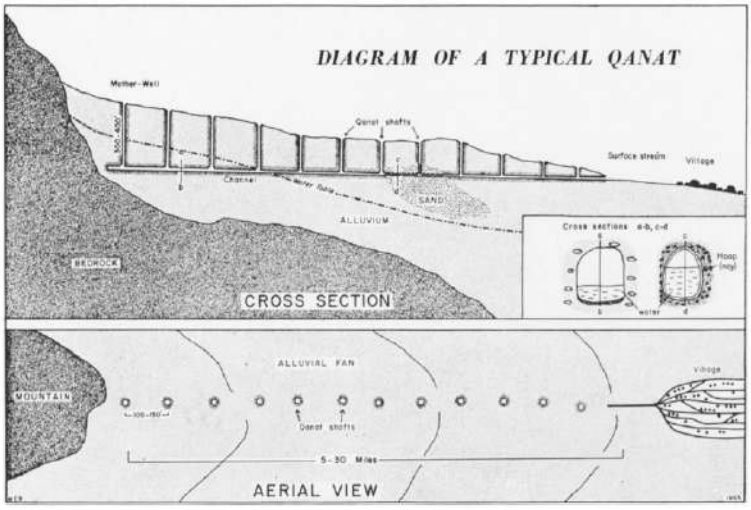


Figure 2: the section and plan of Qanat (source: English)

2. Traditional hydraulic structures in Iran

Water was used in cities for various purposes such as drinking, washing and irrigation. There were several hydraulic structures to meet each function, Iranians built bathes, water reservoirs, ice houses and other buildings that each of them was used for saving water or washing. Hydraulic structures of Iran were built very intellectually and these structures were mostly similar in most parts of Iran (dry and semi dry region of Iran). Here is the brief explanation of hydraulic structures of Qazvin city.

2.1. Historical hydraulic structures in Qazvin city

Traditional hydraulic structures in Iran were mostly included different structures such as: Traditional bath, water mill, ice house, wash house, water reservoir and "Payab" or "Akhoreh"

The brief explanation of each structure is:

a- ***Traditional bath***: Iranian society has a great consideration for individual cleaning and bath because of the religious belief. Qazvin city had numerous bathes because of this reason as well.

b- ***Water mill***: as it was mentioned Qazvin has two main seasonal rivers which 27 watermills were located on them to provide flour for the citizens.

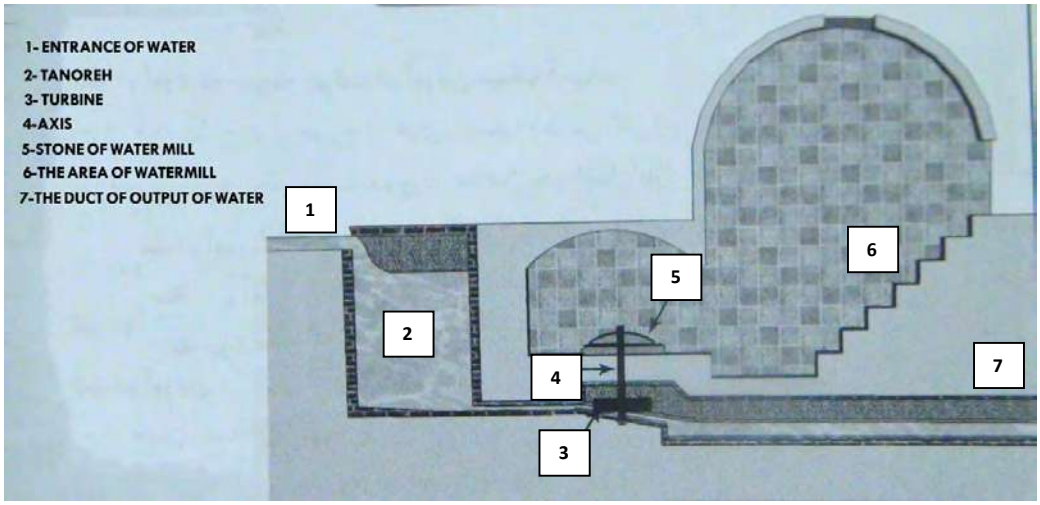


Figure 3. section of a watermill in route of Qanat (source:Semsar Yazdy)

c- ***Natural ice house***: in past time ice was produce by a special technique, it means that water was frozen in shallow pools in winter and the provided ice was stored in huge structures which nearly were similar with water reservoirs and during summer this ice was taken from these reservoirs and was consumed.

d- ***Wash house***: citizens needed water to wash their cloth and dishes and there were two wash houses in Qazvin for women to wash cloth or dishes.

e- ***Water reservoir***: water in Qazvin was very limited and fresh water should be saved in public or private water reservoir. Public water reservoir were huge buildings which its tank was dug in the earth and covered by a doom or vault.

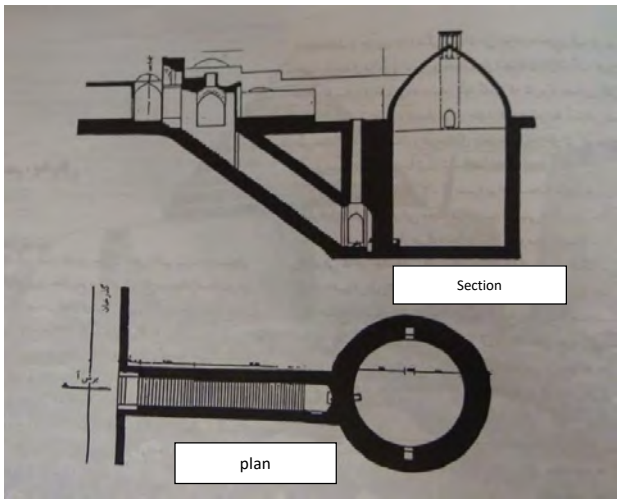


Figure 4: section of a water reservoir in Kashan city (source: Ghobadian)

f- ***Payab or Akhroh***: this structure is an access way to reach the underground water of Qanat. Actually it is a stepped way that reach to the water of Qanat which flowed underground. In Qazvin city people called it “Akhoreh”.
All the mentioned structures were irrigated by the water of Qanat and location of them were determined by the path of water of Qanat.

This structures were located directly on the path of Water which flowed on the ground or underground. In some case water were lead to these structures by a stream or by pipes and a person who was called “Mirab” was responsible to be supervisor on diving water between hydraulic structures and houses and other buildings.

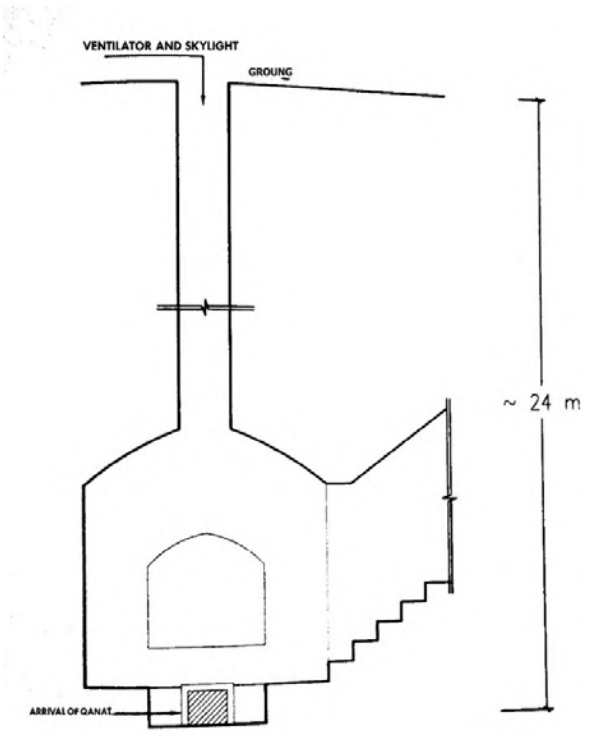


Fig 5. Section of a Payab (source:semsar Yazdy)

2.2. The effect of traditional water supplement in historical fabric of Qazvin

It is obvious that the traditional water supplement in historic area of Qazvin had an important effect in its morphology.

Qazvin is surrounded by flourish gardens which has more than one thousand years. This gardens are irrigated once or twice in a year by two seasonal rivers Dizaj and Aranzak.

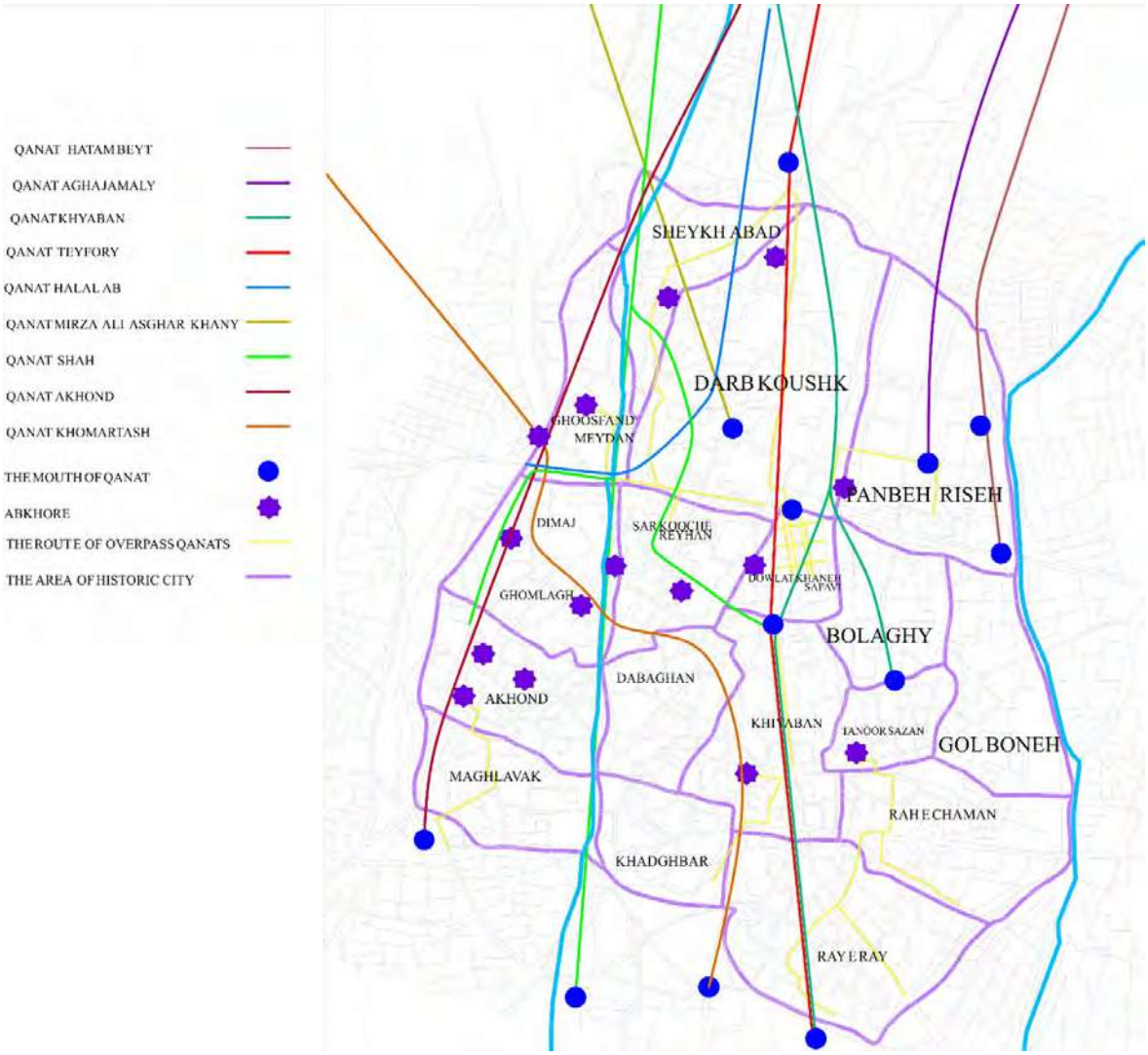
City of Qazvin was irrigated by eight Qanats which mother well of all of them are in the north of city.

The path of underground water and surface water mostly determined the net of roads and lanes in cities. Water flows in lanes because it was mostly belonged to all citizens and a person who is responsible for dividing water (in Persian "Mirab") distribute water between citizens according their ownership of water.

Location of hydraulic structures were determined according the path of water as well. Water reservoir, bath, ice house, wash house,"Akhoreh" and so on were located according the path of water of Qanats or rivers.

For example, the location of great mosque was determined in a way that an "Akhoreh" can been built for people to be able to wash and to be ready to do religious porpuses.

So the priority in locating the great mosque was the accessibility of prayers to the water of Qanat. This role was for the other hydraulic structure as well. Their locations were according the path of Qanats.



Map 1: The route of water in districts of Qazvin city

3. Conclusion

Water is the main factor in forming a settlement in hot and dry region of Iran. Iranian harvested this valued element from underground aquifer and build their

cities and villages. Water infrastructure in such cities has the main role in morphology of city again.

Water flowed mostly in common lanes in cities and hydraulic structures and other buildings were placed according the path of water. This fact has an important effect in morphology of cities. Actually it should be said that initially the road network had been formed and after that its land use and then lots and its dimensions were determined during the forming of cities and villages.

So if we want to have any restoration activities or rehabilitation or any similar activities in reviving identity of historical cities of Iran we should consider water infrastructure of them first or at least simultaneously. In the other word in historic cities water infrastructure can't be ignored in rehabilitation activities and if we aim to revive the real identity of these cities water infrastructure and its features is a main element in that cities.

But unfortunately this fact mostly neglected by architect and urban planners during restoration activities in historical cities of Iran.

But this aspect (traditional water supplement) is an important part of the identity of an Iranian historical city in hot and dry region. Carful and technical restoration of water infrastructure and hydraulic structures of a historic city causes a more real historic city with its real features and can attract tourists which are interested to an Iranian city with its amazing characteristics.

4. References

1- Alehashem ,Ayda (2018) "Rethinking the multidimensional integration between water networks and urban structures in Iran" , International workshop water and city hydraulic systems and urban structures , Yazd , Iran

2- Beaumont, Peter (2003) The qanat : a means of water provision from groundwater sources , The Middle East Center , school of oriental and African studies

3- Bonine , Micheal (2003) Qanat , Kariz and Kattara , The Middle East Center , school of oriental and African studies

4- Bonine , Micheal (1979) TheMorphogenesisof Iranian cities , Annals of the Association of American Geographers, Vol. 69, No. 2 ,Jun.

5- English, Paul Ward (1988) Qanats and Lifeworlds in Iranian Plateau Villages, University of Texas, Austin

6- English, Paul Ward (1968) The origin and spread of Qanats in the old world, Proceedings of the American Philosophical Society, Vol. 112, No. 3 (Jun. 21,)

7- Liliey , Keith (2000) Mapping the medieval city: plan analysis and urban history , urban history no.27,1 , Cambridge university press

8- Noghsan Mohammadi, Mohammad Reza (2018) The influence of the underground water system on the urban morphology of traditional city of Yazd, International workshop water and city hydraulic systems and urban structures, Yazd
9- Oliveira vitor (2016) Urban morphology an introduction to the study of the physical form of cities, Springer
10- Roaf, S (2003) settlement form and qanat routes in the Yazd province, Qanat , Kariz and Kattara , The Middle East Center , school of oriental and African studies
11- Semsar yazdi , Samira Askarzadeh (2007) A historical review on the Qanat and historic hydraulic structures of Iran since the first millennium B.C , International History Seminar on Irrigation and Drainage , Tehran-Iran May 2-5
12- Whitehand.J.W.R (2001) British urban morphology : the conzenian tradition , urban Morphology

Research Paper

Study on Urban Morphology Optimization Based on the Construction of Urban Memory Structure

Take Dazhi Street in Harbin as an example

Sai Liu, School of Architecture, Harbin Institute of Technology,Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Haixuan Zhu, School of Architecture, Harbin Institute of Technology,Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Abstract

In the late 1970s, China began the process of rapid urbanization. With the continuous expansion of urban scale and the rapid increase of urban population, the trend of urban homogeneity is deepening. Some problems, such as the lack of urban characteristics and the destruction of urban memory, are becoming more and more prominent. For this reason, urban construction also lacks the cultural deposits. Therefore, in order to make up for the lack of urban characteristics in rapid urbanization, the establishment of urban memory structure and the strategy of urban morphology optimization have become the current issues that should be concerned and discussed. Based on this, this paper takes Dazhi Street in Harbin as the research object, combs the historical evolution and development context of Dazhi Street by reading relevant historical documents and collating and comparing several versions of urban planning drawings in Harbin. The combination of questionnaire survey and field research is used to study the architecture, street interface, public space and overall spatial form of Dazhi Street in Harbin. Therefore, through the study of Dazhi Street, firstly, we construct a relatively complete urban memory structure. Based on the urban memory structure and the current development situation, we put forward five aspects of urban morphology optimization strategy: the continuation and display of historical context characteristics, the unity and symbiosis of architectural style along the street, the coordination and improvement of urban street functions, the optimization and promotion of urban Street landscape, and the improvement and integration of urban street facilities to further highlight Harbin's urban characteristics. It also provides some reference for other cities with rich historical heritage and prominent cultural characteristics to construct urban memory structure and further enhance their locality and uniqueness.

Keywords

Keyword 1, keyword 2, keyword 3 (3-5)

1. The Significance of Constructing Urban Memory Structure

1.1. Highlighting Urban Characteristics and Promoting Urban Sustainable Development

The development of a city reveals its long history and profound connotation, and urban memory is a continuation of this development process, which is the continuation of the continuity and uniqueness of urban development through collective memory. It is precisely because of the existence of urban memory that the evolution of urban material structure and social culture is influenced by this continuous memory, which makes the physical form of the city have continuity and shows unique features and images different from other cities. Nowadays, many cities in China are lack of urban characteristics, which is due to the destruction of the historical context of the city, leading to the interruption of urban memory. Through the construction of urban memory structure, we can clarify the context of urban development and find the consistent important elements in urban memory, which is of great significance for the continuation of urban history, highlighting the characteristics of the city, improving the status quo of urban convergence and promoting the sustainable development of the city.

1.2. Strengthen people's sense of identity and belonging to the city

Memory transforms the city from instantaneous to eternal, from limited to infinite. In urban history, the activity of memory has never stopped. Everyone, everything is in memory, but also in the process of being remembered (and re-remembered). It can be said that cities exist by memory[1]. Morever,"cities are places for people's collective memory[2]".This collective memory is based on the common histories to produce the emotions and common will. The most important element that makes people identify with themselves and others as a collective is the common history. These common histories condense into precious memory space, and also leave people a unique city memory, reposing people's feelings and sense of belonging to the city. Establishing urban memory structure can make people's memories have roots to follow and traceable, and connect them with the current life, so that the historical and cultural connotations and humanistic values of the city can be widely transmitted and deepened, and people's sense of identity and belonging to the city can be enhanced.

1.3. Shaping the Spirit and Culture of the City

Cities are an organic whole of the interaction between human beings and the environment. In the process of the formation of urban material form, the most important thing that can not be ignored is the impact of human beings on cities. Cities are constructed by people's subjective initiative. For cities, memory is a key factor in the formation and development of cities. It reflects the relationship and interaction between people's subjective consciousness and external physical environment. The city memory constitutes the spirit and soul of the city. With the development of the city, the city memory is constantly concrete and deepened in the process of its development. Culture includes both material and conscious factors. It is a unique way of thinking, attitude towards life and accumulated civilization in the course of history developed by the social community. It is also a bridge between individuals and collectives, and between future generations and previous generations. Through culture, people of different nationalities and times transmit, continue and develop their ideas about

life. Culture is closely related to the city. It is the product of the collective construction and identity of the city and is directly related to the spirit of the city people. Globalization and modernization make cities develop at a high speed and standardize, which leads to cultural convergence. This situation not only causes the similarity of the external image of cities, but also relates to the convergence of people's life style, behavior and psychology in cities. Therefore, the construction of urban memory structure has far-reaching historical and practical significance to embody the city's personality and vitality, inherit cultural traditions, enhance the charm of the city, and promote the development of the city.

2. Establishing Urban Memory Structure

2.1. Elements of Urban Memory Structure

The reason why urban memory has become a collective memory is that although each individual memory is not the same, they all take the city they live in as a reference, thus producing urban memory. All the material elements in the city, such as urban spatial pattern, geographical landscape, buildings and structures, as well as some non-material historical events and cultural traditions, are the carriers of preserving and transmitting urban memory, which can arouse people's memories related to it. Different memory individuals in different times realize communication and dialogue in the time-space staggering through urban memory carriers. In addition, the elements of urban memory also contain the content of vertical time. From its emergence to its continuous development, cities have gone through different times and stages of development, during which all intangible memory elements are retained in the physical form of cities in various explicit or implicit ways. "With durable buildings and institutionalized structures, as well as more durable symbolic forms of literature and art, cities connect the past, the present and the future." Thus, urban memory is a complex dynamic system, which involves not only the material and non-material elements of the city, but also the subjective consciousness and emotion of people. Therefore, urban memory is a process that incorporates the vertical elements of time and is gradually constructed in the social system through the collective creation and identification of cities.

2.2. Urban Memory and Urban Morphology

In a broad sense, urban form includes not only the material form composed of physical externalization factors such as geographical region, natural environment and material structure, but also the intangible and immaterial form categories related to human behavior psychology and urban society, such as politics, economy and culture. The overall image and characteristics of a city are determined by both. The evolution and development of urban material form reflects the function of city as the material carrier of history and preserving city memory. The urban spatial pattern and buildings record the social life and events in different historical stages of the city, which solidifies and precipitates the urban history in the form of materialization. Compared with the urban memory of language and writing, the urban material space form is more directly influenced by political, economic and social reality, so it can more vividly reflect the changes of the times and the occurrence of important historical events. Although in different periods of urban development, the material space form of the city will be adjusted or changed on the basis of the original city because of the need of urban construction at that time, in order to show the political and

economic characteristics of the city at that time, in this process of continuous evolution, there are always some parts that can be preserved, so that the city can be preserved. The material form of the city still maintains its connection and continuity in the process of change. Therefore, urban physical form is also one of the most effective ways to arouse urban memory. The material traces of the city and the information contained in the material form constitute the familiar life background of the citizens, which enables them to maintain a sense of security and belonging psychologically. By analyzing the material form of the city, people can not only read the history of the city clearly, sort out the clues of the city memory, so as to construct the structure of the city memory.

2.3. Classification of Memory Elements in Urban Morphology

Memory elements in urban form include not only visible material elements, but also invisible non-material elements such as major events in the city, daily life stories of the city, which together constitute the ideological and cultural traditions contained in all memory carriers of the city. At the same time, as a perceptual experience of the environment, urban memory should also be based on the cognitive basis of the urban spatial form. In this paper, the elements of urban memory in urban form are divided into the following categories.

(1) Natural elements: refers to the overall natural environment, which is the basis of memory generation and function;

(2) Artificial elements: all buildings and structures that provide shelter for human beings and their functions and activities;

(3) Humanistic elements: tangible and intangible elements such as human culture created by urban people that are worth remembering and inheriting;

3. Analysis of Memory Elements in Dazhi Street

3.1. Artificial Elements

3.1.1 Spatial pattern

（1） The influence of western planning thoughts

Dazhi Street is located in the new city (today's Nangang District), which was planned by the Russians at the end of the 19th century. The planning reflects the traditional European urban planning ideas and has obvious Baroque city characteristics. The history of Baroque city began in Rome in the 17th century. It has the characteristics of openness and dynamic, and pays attention to the overall visual effect of urban space. In Baroque city, single building becomes a part of the system, space gains new importance and becomes the real part of the whole city. Baroque city also emphasizes the role of urban focus, which constitutes the city's landscape system. Therefore, as the focus of the city, the architecture must have obvious spatial characteristics. Therefore, the dome of the church, the Obelisk and other important monumental buildings with spatial significance are arranged in the focus of the urban system. The elements in the city interact and submit to a dominant focus, and radiate many broad straight streets from the focus plaza, connecting these focus points[3]. The urban planning of modern Paris, Washington and Petersburg were all carried out under the influence of Baroque thought. As one of the most representative Baroque cities, Paris had a far-reaching

impact on the planning and construction of many cities in the world. Both Napoleon I and Napoleon III devoted themselves to the improvement of Paris by Baroque technique and implemented their respective Paris plans. During Napoleon III, Osman's Paris reconstruction plan focused on the construction of a number of boulevards, including Rivoli Avenue, Sebastopol Avenue and Saint-Michel Avenue, which are the arteries connecting east and west and north and south through the center of Paris，constitute the basic frame of the city. After the reconstruction of Paris, the major cities in many European countries took Paris as a model for urban planning in the second half of the 19th century.

（2）Spatial pattern characteristics of Dazhi Street

The new city chose the highest position in Harbin, which laid the foundation for Harbin to become the geographic environment, administrative management and social and cultural center. In the planning and layout of the new urban area, the greatest feature is to use Baroque techniques, strengthen the form of composition, and use the spatial form of urban planning to express the colonial ruler's will and political ideas [4].The overall layout of the new city takes the form of grid, radial road network and circular square. The planning combines the topography with the direction of railway lines, and the overall spatial pattern develops East-West along the terrain and railway. At the same time, the highest terrain is chosen as the main street of the new city, named Dazhi Street, for key planning and construction [5]. Dazhi Street is the main axis of the East-West development of the new city, with a design width of 43M. It is called " The backbone of Harbin ". It is vertically intersected with the Chezhan Street of the North-South Axis (today's Hongjun Street). These two axes constitute the main space skeleton of the new city. At the intersection of Dazhi Street and Chezhan Street is St. Nicholas Central Cathedral. Five radiation roads are formed from the church square, which becomes the center of the new city and echoes with the Harbin Railway Station on the Chezhan street.In addition, with the square as the demarcation point, the new city is divided into East and West parts. The western part is the administrative office area and the railway staff residential area. With the office building of the Middle East Railway Administration as the core, a large number of buildings related to the Middle East Railway System are arranged, such as Railway clubs, men's and women's business schools, railway technical schools, residences of senior railway staff and residences of railway workers; the eastern part is a commercial district and a national Consulate area, with national consulates, shopping malls, cinemas, post offices, churches and squares on both sides of the street.

The spatial pattern of Dazhi Street reflects the distinct planning idea, people's social life and urban development, and the historical and cultural significance of Harbin. In the development of more than one hundred years, the spatial pattern of Dazhi Street has been constantly self-renewed, which is more closely related to the people living in it and more deeply integrated with the development of the city.

3.1.2 Historical Architecture

The historical buildings formed and preserved in the course of historical development are witnesses of the history of urban development, and also the essence of urban architectural culture. These historic buildings show ingenious design and flexible construction wisdom in adapting to local environment and satisfying functional requirements. At the same time, they also reflect the living habits, local customs and religious beliefs of the time in

architectural style and architectural type, and play an important role in the continuation and development of architectural culture. It also provides an important basis for the construction of urban memory structure.

The unique historical process makes Harbin show the characteristics of blending Eastern and Western cultures.As early as the 1920s, Harbin has been known as "Oriental Moscow" and "Oriental Little Paris", and a large part of this city image comes from the unique buildings in the city. The formation of urban architectural style in Harbin is closely related to its natural environment, geographical location, technical conditions and social and historical conditions. Firstly, in terms of natural environment conditions, Harbin is located in a cold area, and buildings need good thermal insulation, so Russian style buildings which are basically similar to the natural environment can be well integrated and adapted. Secondly, because Harbin is located in the Middle East Railway Transportation Hub, it can provide convenient conditions for the transportation of building materials [1]. At the beginning of the 20th century, Harbin initially formed a whole new system of western architectural types, which laid the tone of urban architectural style with Russian style, New Art Movement, eclecticism and other styles as the main style. The buildings in Dazhi Street are mainly of these styles, which can be divided into administrative office buildings, residential buildings, religious buildings, cultural and educational entertainment buildings and residential buildings according to the types of use.

(1) Administrative office architecture

The administrative office buildings in Dazhi Street are mainly divided into three categories: the Middle East Railway System Office Building, the consulates of various countries, and the office buildings of urban administrative agencies at all levels. The Middle East Railway Administration Building, built in 1902, is the largest and most important administrative office building in early Harbin. It is the seat of the Leadership Center of the Middle East Railway and the political center of early Harbin.

Figure 1 Middle East Railway Administration[6]

Figure 2 American Consulate[6]

Table 1 Historic Architectures of Administrative Office Type in Dazhi Street Area

Architectural Name	Construction time	Architectural style
Middle East Railway Administration	1902	Art Nouveau Architectural Style
Command of Amur Military Region outside Russia	1904	Russian Architectural Style
Middle East Railway Authority Office	1910	Eclectic architectural style
Soviet Consulate General	1924	Russian Architectural Style
American Consulate	1907	Renaissance Architectural Style

(2) Residential building

Private residence occupies a very important position in the development history of Harbin architecture. At the corner of the intersection of Yaojing Street and Garden Street, the most luxurious villa was built, which was the official residence of Holwart, who became Director of the Middle East Railway Administration in 1903.But he did not choose to live here, so the building was temporarily used in the Middle East Railway Club and its library during 1907-1910; after 1911, it was used as the Russian Consulate-General, which had been the office building of the Soviet Consulate-General in Harbin from the mid-1920s to the end of the Patriotic War. At that time, many luxury villas in Harbin were converted into public welfare places or office places after the owners left. For example, the Afanasiev Villa, located at the corner of Dazhi Street and Yaojing Street, became the largest railway Library in the Far East. Most of the residences of railway staff are located in residential areas not far from the office building of the Railway Bureau and the Railway Club building. They are distributed in Garden Street, Hegou Street, Jiaotong Street, Haiguan Street, Central Street (now Shenyang Street), Beijing Street, Jianzao Street (now Haicheng Street), Gongsi Street, and a part of them are located in Dazhi Street [6]. The soil in Harbin was fertile enough to be fired in large quantities

into bricks and used as building materials. At that time, Russian architects used a large number of these building materials, so most of the residences of workers in Harbin Middle East Railway were built of bricks. On the one hand, the cost of materials was low. On the other hand, the cold climate in winter in Harbin required higher thermal insulation performance of buildings. Building thick brick exterior walls can play a strong role in resisting cold. In addition, the building uses herringbone wooden roof structure to form a single-storey double-slope roof, and the clear water is painted with a uniform beige color, which makes the overall style of the residential community harmonious and unified.

Figure 3 Middle East Railway Senior Staff Residence

Table 2 Residential Historic Architectures in Dazhi Street Area in Dazhi Street Area

Architectural Name	Construction time	Architectural style
The residence of the deputy director of the Middle East Railway Administration	1900	Art Nouveau Architectural Style
Middle East Railway General Auditor's residence	1904	Art Nouveau Architectural Style
Middle East Railway Senior Official Residence	Early 20th century	Eclecticism architectural style
Middle East Railway Senior Staff Residence	Early 20th century	Eclecticism architectural style
Middle East Railway Russian Workers'Housing Complex	Late Qing Dynasty and Early Republic of China	Russian Architectural Style

（3）Religious architecture

Harbin city is very characteristic of those religious buildings belonging to different denominations, churches have become an important symbol of Harbin[7]. Foreigners and Chinese people in Harbin, religious beliefs including Orthodox Church, Catholicism, Christianity, Judaism, Islam, Buddhism and so on, formed the coexistence of various religious buildings in Harbin. In terms of quantity and scale, the Orthodox Church is the most prominent. In 1899, St. Nicholas Cathedral laid its foundation in the new city and was completed in December 1900. It has existed for more than 60 years since then. St. Nicholas Cathedral is located at the intersection of Dazhi Street and Chezhan Street (today's Hongjun Street), the commanding heights of the city, in the heart of the new city. The plane of the building is symmetrical along the axis with the Greek cross layout in the North-South direction.The building is Russian style, the facade is made of log overlay, the wooden roof at the entrance has three "onion roof" decorations, the main part of the roof is unequal hexagonal, the top also has "onion roof" decoration [8]. In 1908, the Sabbath Church of the

Virgin Mary was built in Harbin's new cemetery (in today's Nangang Cultural Park) and has been preserved to this day. There are also several non-external churches in Harbin, among which the small church of business school is perhaps the most distinctive one of the similar churches. Since the October Revolution of 1917, a large number of exiled Russian emigrants have entered Harbin, which has set off an upsurge in church construction. As a result, since the 1920s, a large number of new churches have appeared in Harbin, mostly brick structures. he Notre Dame Church was moved to East Dazhi Street in 1930. It is built in Byzantine style with brick and wood structure. With the construction of Harbin city, a cemetery appeared in the suburbs of the city, later known as the old cemetery.In June 1941, not far from St. Nicholas Cathedral in Dazhi Street, a monument to the victims of the war against the Communist International was established, which is a typical architectural style of Russian churches in the 17th century.In addition, due to the national upsurge in Harbin, a number of traditional Chinese religious buildings have been built, including the Confucian Temple, the Jile Temple, the Puyu Middle School and so on.

Harbin Confucian Temple is not only the last well-regulated Confucian Temple built in the whole country, but also one of the antique buildings influenced by western architecture in the early Republic of China. It is characterized by the use of western architectural technology and materials to reflect the connotation of traditional Chinese architecture. The gold pillars of the main hall (Dacheng Hall) are converted into reinforced concrete, and the top stones of the gold pillars are made of terrazzo.

Figure 4 St. Nicholas Cathedral

Figure 5 Jile Temple

Figure 6 Confucious' Temple

Table 3 Religious Historic Architectures in Dazhi Street Area

Architectural Name	Construction time	Architectural style
St. Nicholas Cathedral	1900	Classical gothic
Christian Lutheran Church	1916	Gothic style
Orthodox Virgin Mary Patron Church	1922	Byzantine Architectural Style
Jile Temple	1923	Chinese Traditional Architectural Style
Confucious'Temple	1926	Chinese Traditional Architectural Style

(4) Cultural,Educational Entertainment Architecture

Harbin's modern cultural, educational and entertainment architecture started earlier. School buildings appeared one after another in the early 20th century. The Middle East Railway Administration built Harbin Railway Technical School and Business School in Dazhi Street around 1906. After the completion of the Middle East Railway, the Middle East Railway Administration began to pay attention to the training of professional cadres for "correct use of railways". For this reason, the railway system has opened several schools in Harbin, the most important of which is the Business School. The teaching building of Harbin Business School (male school and female school) is composed of two parts which are identical and symmetrical. The school is in the best position in the new city, juxtaposed with the Middle East Railway Administration Building, opposite the two buildings is the Middle East Railway Club Building [6].Established in 1906, the campus of Sino-Russian Industrial Technical College includes teaching buildings, dormitory buildings, office buildings, practice factories and residences, all of which are in the style of Art Nouveau architecture.Later, after several expansion, it was the predecessor of Harbin University of Technology and Harbin Institute of Architectural Engineering. The Puyu Middle School (now Harbin Third Middle School), which was built and put into use in December 1927, was designed by Russian architects, but the whole building belongs to pure Chinese classical style. Puyu Middle School is the first large-scale Chinese-style building built in Harbin. It is the first successful attempt to integrate Chinese traditional architectural style with European architectural style. It also has the first innovation of key technologies, such as using concrete pilasters instead of log pilasters, but it still maintains a purely Chinese classical style in appearance[6].

In terms of entertainment architecture, the Middle East Railway Club, as the largest entertainment building in Harbin, is very representative. The front of the building extends parallel along the street. The two sides of the building are irregular geometric plane structures. Including theatre and library, outdoor open-air square and various flower beds,

Harbin's early eclecticism style of architecture [8]. There are theatres, film projection rooms, book reading rooms, chess and card rooms in the room, and cultural and entertainment facilities are very complete.The Middle East Railway Club was built in 1911 and is located on Dazhi Street, across the street from the Middle East Railway Administration Building. There is an open space in front of the building, and there is an open-air plaza and various flower beds outside. The front of the building extends parallel to the street, and the sides of the building have an irregular geometric plane structure. The building consists of two parts, the theater and the library. It is an eclectic style building that appeared earlier in Harbin [8]. There are theaters, movie screening rooms, book reading rooms, chess and card rooms, etc., and cultural and entertainment facilities are complete.

Figure 7 Confucious' Temple

Figure 8 Sino-Russian Industrial Technology School

Figure 9 Puyu Middle School

Figure 10 Harbin Business School

(6) Commercial and Service Architecture

Harbin's commercial buildings can be said to be a new force, with rapid development [6]. The most famous one is Qiulin Company. In 1904, Qiulin Company was founded in Dazhi Street of New City. With the development of the whole city, Qiulin Company gradually expanded. Later, after expansion, it became a large-scale department store with higher standards in Northeast China. The plane of the building is L-shaped. It is a two-storey brick-wood structure with the main entrance at the corner. The top crown dome, the wall shape concise by eaves, cornices and daughter walls constitute a key decoration. Later, it was expanded into a four-storey building in 1982, which generally maintained its original style. Moscow Mall, built in 1906, is an important building in the central square of the new urban area. It is two stories high and one story underground. The plane is composed of three standard segments and two corner links, which is the style of the new art movement. With smooth curved piers, windows and domes, a beautiful shape and unique skyline are formed. The building was changed into a museum in 1922 and is now the Heilongjiang Museum. The Middle East Railway Administration Hotel, built in 1902, is the first large-scale hotel building in Harbin, with three floors high, complete functions and high specifications. Architectural style has both Renaissance style and new art movement charm. These commercial and service buildings with high artistic quality constitute an important part of Harbin's urban landscape. They all play an important role in adapting to modern urban life and shaping the unique style of squares and streets[8].

To some extent, architecture has characteristics independent of social background. Although the times are changing, the architecture left over from the past can preserve their own

values through the new functions and profound historical significance given to them in the new era. Harbin's modern architectural activities for more than one hundred years have brought the spread and application of advanced western science and technology, new structural forms, new building materials, new building forms and new technologies, which not only promoted the prosperity of modern construction industry, but also promoted the development of social economy.In addition, the emergence of new architectural forms enriches the urban architectural landscape, activates the image of the city, and forms the orderly coexistence of Chinese traditional architecture, western architecture and Chinese-Western blending architecture. The emergence of new building types in cities, such as libraries, museums, stations, schools and hospitals, reflects the development of cities and social progress.

Figure 11 Qiulin Company

3.1.3 Squares and Streets

In the planning of New City, the setting of square is very important.The plan takes Dazhi Street as the main axis, arranges three circular squares in succession and connects several roads to the square. The three squares include St. Nicholas Church Square, Educational Square and the Front Square of the Middle East Railway Administration (pictured) [5].These squares are connected in series with important landscape nodes and playing a symbolic role. Saint Nicholas Church Square is a circular square formed by the intersection of Dazhi Street and Hongjun Street. On the basis of this, two radiation paths are extended from the square to form the geometric center of the new city (figure). The Jiaohua Square is located in front of the main entrance of Harbin University of Technology, forming an important spatial node in Dazhi Street; the front square of the Railway Bureau is a typical pre-construction plaza, highlighting the space importance of the Middle East Railway Administration building and forming another important space node on Dazhi Street together with the Middle East Railway Club across the street.The spatial layout of multiple squares on one axis not only highlights the important role of Dazhi Street as the axis of the city, but also emphasizes the role of Saint Nicolas Square as the focus of the city. The radial road around the square also facilitates urban traffic, and the traditional layout has been successfully applied to modern urban planning, which makes urban construction reflect profound cultural connotations[5].

Figure 12 St. Nicholas Cathedral Square

3.1.4 Greening and Essential Elements of Sketches

At the beginning of urban planning in New City, the planning layout of urban greening system embodies multi-level characteristics because of drawing on the concept of urban planning in Paris. It adopts a combination of concentrated Park greening, street garden, square greening, street greening and scattered courtyard greening to carry out greening layout. In 1898, when Nikolay Cathedral was built in the new city, trees were planted in the church yard and its surroundings, and a 22-hectare Park (now the campus of Harbin Institute of Technology) was planned between today's Jiaohua Street and Fuxing Street, Dazhi Street and Majiagou River.In 1906, the first street green park (now Beixiu Park) was established between Dazhi Street and Railway Street. At the same time, trees were planted in Jiashu Street, Garden Street, Dazhi Street and Songhua River Street. The main roads in Harbin are relatively wide, and the roads in residential districts are up to 13m. Most of the buildings on both sides of the roads retreat a few meters, thus forming a variety of street greening modes with distinctive features before buildings. This kind of greening method mostly combines roadside trees, flower pools and green space together with simple paving, chairs, hedges and so on, which constitutes a variety of different combinations of roadside greening mode (figure1)[9].Harbin's greening landscape relies on the original natural basis, so it can quickly form a good landscape effect after the beginning of urban construction. The local tree species in Harbin are mainly pines, elms, birches, elms and cloves, which are very suitable for the greening, landscape application and architectural planting of Russian-style western cities. These diverse and characteristic greening make the overall landscape of Dazhi Street richer.

Figure 13 Greening Landscape of Dazhi Street

3.2. Artificial Elements

3.2.1Topographic features

Topography refers to the fluctuation of the terrain, which can also be called the form of the surface. Such as mountains, hills, rivers, lakes, seashores, swamps and so on. Usually people design and plan a city according to its topography and landform. Street landscape as an important part of the city, will also be combined with the city's topographic characteristics show. While satisfying the street function, combining with the city's topography, it can make the original scenery more beautiful, and also add new artistic characteristics and personality to the city's image. The new urban area has chosen the highest position in the whole city, thus laying a material foundation for him to become the geographical environment, administrative management and social and cultural center of Harbin. New city's topography is undulating. The hilltop extends from southwest to northeast. The slope on both sides is large. The right side is near Majiagou River. The left side is bounded by the Binzhou Railway Line, which separates the new city from the port.

3.2.2 Mountains and rivers 'patterns

Landscape pattern is an important part of a city's natural elements, which reflects the harmonious coexistence of the city and nature. Dazhi Street is adjacent to Majiagou, and the part near Majiagou in the section is perpendicular to it in road planning. Majiagou is integrated into the overall landscape system of the new town to carry out the corresponding landscape planning, thus enriching the urban landscape types.

3.2.3 Vegetation types

Because Harbin is located in the cold area, the greening color in the city is usually monotonous. Generally speaking, the main trees planted in Harbin streets are elm, birch, maple, maple, Manchurian ash, yellow pineapple, walnut, oak, pine, cypress and so on. Clove is a city flower in Harbin. There are more than 35 kinds of clove in the city. In view of the geographical characteristics of Harbin, the natural vegetation here is usually dominated by coniferous and broad-leaved mixed species such as pine, elm and birch. Among the low shrubs, the urban area used to be dominated by elm trees, while there are many kinds of

cloves, so Harbin has the reputation of "City of Cloves" and "Yudu". The Russian colonists made full use of this feature. After the construction of the Middle East Railway, elm and clove were taken as the main greening tree species in the street landscape. The planning concept of Western Garden City was adopted in the planning of Harbin's urban landscape, which greatly improved the greening degree of Harbin.

3.3. Humanistic Elements

The city is not only an important material space carrier for the inheritance of historical context, but also indirectly embodies the contents of social change, humanities and arts, moral concepts, religious beliefs, local folklore and so on, forming the cultural connotation of the city, i.e. intangible culture. Focusing on the elements of human memory helps to enhance people's cultural identity and build a more complete urban memory structure.

3.3.1 Symbolic Elements of Geographical Names

The place names of Harbin reflect the changes of history and the development of the city. For example, since 1920, China has gradually regained its sovereignty over Railway dependencies and become a special administrative region that continues to open to the outside world. During this period, Harbin experienced a wave of revival of national culture. In March 1925, the General Administration of Police of the Eastern Provincial Special Area made a change in the name of the street originally named in Russian in Harbin. At the same time, some street names were renamed and some of the old names of the street were restored[10]. Some street names in the new city where Dazhi Street is located have been changed accordingly(Table 4).

Table 3 A List of Changing Street Names in Harbin[10]

Urban Area	Before renaming	After renaming
Butou District	King Hillkov Street	Diduan Street
	New City Street	New City Street
	China Street	Central Street
	Cossack Street	Gaoshi Street
	Shitoudao Street	12th Street of China
	Japan Street	6th Street of China
New City	Holwalt Street	Chezhan Street
	Dazhi Street	Dazhi Street
	Nikolayevsk Street	Temple Street
	Fengtian Street	Fengtian Street
Majiagou	Brusselov Street	Zhonghe Street
	Balkan Street	Bashan Street
	Officer Hospital Street	Wenzhi Street
Xiangfang District	Lujun Street	Lujun Street
	Junguan Street	Junzheng Street
Xin'an Port	Zuolin Street	Ankang Street
	Mikhailov Street	Anding Street
	Albazin Street	Anle Street

3.3.2 Dietary culture

With the construction of the Middle East Railway in the early 20th century, a large number of Russian immigrants came to Harbin, and at the same time brought Russian food habits here. As Dazhi Street is located in the administrative office area of the Middle East Railway and the residential area of Russian workers, it has been deeply influenced by Russian catering culture. The Middle East Railway Club on Dazhi Street not only has the function of

recreation and entertainment, but also is the earliest Western restaurant in Harbin. Many large banquets for the inauguration, welcome and farewell of diplomatic missions, international associations and senior officials are held here. In the 1920s, Harbin gradually developed into an international city, and the demand for Western food was increasing. The main restaurants managed by Russian overseas Chinese gradually became operated by multinational nationals, and there were more Russian-style restaurants managed by Chinese people [12]. The influence of Russian dietary culture on Harbin has lasted till today. Eating Russian food is still a part of Harbin people's dietary habits. Russian food such as Large column Pakistan, sausage and so on is a common dish on Harbin people's table. As a traditional staple food of the Russians, Large column Pakistan is not only loved by the Russians and Europeans, but also by the Chinese living in Harbin[13].

4. Conclusion

The study of urban memory has led us to form a new way to understand the city and find a better way to plan and build our city. Through the construction of the memory structure of the city, it can enhance the public's sense of identity and belonging to the city, enrich the public's emotional experience of history, and connect it with the current life, so that the historical and cultural connotation and humanistic value of the city can be widely transmitted and deepened, so as to optimize the current urban spatial form and shape the city's characteristics. It provides a feasible way of thinking.

5. References

[1] Lewis Mumford(1968). The City in History: Its Origins, Its Transformations, and Its Prospects[M] London:Mariner Books.

[2]Rossi, Aldo(1982).The architecture of the city.Cambridge: MIT Press.

[3]徐苏宁(2007).城市设计美学.北京：中国建筑工业出版社.

[4]刘泉(2008). 近代东北城市规划之空间形态研究.大连理工大学.

[5]刘松茯(2004).近代哈尔滨城市转型下的城市规划.哈尔滨工业大学学报.

[6]克拉金(2007).哈尔滨——俄罗斯人心中的理想城市. 哈尔滨：哈尔滨出版社.

[7]石方(1995).中东铁路的修筑对哈尔滨经济社会发展的作用与影响.学习与探索.

[8]侯幼彬,张复合,村松伸,西泽泰彦(1992).中国近代建筑总揽•哈尔滨篇.北京：中国建筑工业出版社.

[9]王一婷(2011). 哈尔滨历史街道景观视觉特征研究.哈尔滨工业大学.

[10]越沢明(2014).哈尔滨的城市规划.哈尔滨：哈尔滨出版社.

[11]哈尔滨市志•城市规划 土地 市政公用建设(1998).哈尔滨：黑龙江人民出版社.

[12]何宏(2008).哈尔滨的早期俄式西餐.学理论.

[13]庄鸿雁(2008).城市文化与文化城市——哈尔滨：城市记忆与文化思考.北京：中国文史出版社.

Research Paper

Underground Built Heritage as catalyser for Community Valorisation

Underground4value

Giuseppe PACE, ISMed-CNR, Italy

Abstract

This paper is about how framing an innovative approach for community empowerment by organising networks and consortia for preparing proposals in different research programme frameworks. In the beginning, there was as study for classifying underground spaces and using them as a solution for a sustainable over ground urban development. By advancing in the proposals preparation, the team developed a completely different vision. The underground space was more and more seen as a place for building local identity and sense of belonging, progressing from a functional to a cultural value, from a site conservation to a community valorisation approach, by giving centrality to the people and their needs. As first step, the project faced the challenge of regenerating urban areas by realising Underground Built Heritage potential for local communities and experimenting a methodological approach on sustainability transition. Just like a story, the paper describes the evolution of the approaches, and the implementation of the activities, also if unsuccessful in the competition. The consortium grew and matured, a network based on strong analysis and revision, whose members developed an impressive social capital and learned by any failure. Piece by piece, this network was able to achieve the success, and to start a COST Action, the CA 18110 "Underground Built Heritage as catalyser for Community Valorisation". The Action, funded for establishing and implementing an expert network, promotes balanced and sustainable approaches to preserve the Underground Built Heritage (UBH) and, at the same time, to realise the potential of the underground space in urban and rural areas for regeneration policies. The paper finally explains how a well-motivated group of people can transform a network activity, with a little budget, in a research and on field project and how such a network can provide innovative tools for engaging and empowering local communities.

Keywords

Underground Built Heritage, Community empowerment, Transition Management, Sustainability

1. Introduction

This should be a dissemination paper of COST Action, the CA 18110 "Underground Built Heritage as catalyser for Community Valorisation". Although just started, this action has already a very interesting story to share. It is about the process of cross-fertilisation developed through its maturation process, consisting of several proposals in different EU frameworks. All these proposals had the underground space as the common starting point. In the beginning, there was an international research group focused on the underground

space, investigating it from different perspectives, such as history, geology, conservation, and valorisation, and trying to define different aspects of the cavities, by providing functional classifications, conservation/valorisation case studies, and visualisation technologies. Local experiences were analysed mainly in terms of underground spaces' sustainable reuse for solving over-ground urban problems, sometimes from a heritage-conservationism perspective, and rarely from the local communities' perspectives, not properly illustrating or explaining decision-making processes, as well as local specifications and characteristics, or the local needs as drivers of change. That was the state when a Horizon 2020 call, the SC5-21-2016 (Cultural heritage as a driver for sustainable growth: Heritage-led urban regeneration), was published. Since that moment, a small team of experts started to imagine how local communities could be engaged and involved in the urban first, and then rural, regeneration processes catalysed by the existence of underground heritage, and how that heritage could contribute to individual and collective identity, social cohesion and inclusion (Applejuice Consultants, 2008; Dodd and Sandell, 2001). Usually, heritage-led urban regeneration initiatives aim at integrating cultural heritage buildings into urban regeneration schemes for generating popular, successful urban quarters with character, where people enjoy living, and also engender economic development through job creations and influence social issues such as crime, health, education and particularly social capital (Roberts and Sykes, 2000; Evans and Shaw, 2004). What could it happen if the building are underground and/or impossible to use in a traditional way, or if it is still largely unexplored? Could the symbolic value be enough for developing community identity and regeneration? What kind of meaning should be built?

2. Pioneering the concept

2.1. CUBRe 1: Culture of Underground Built Environment as a driver for urban Regeneration

Supported by the certainty of the underground heritage's historical and cultural outstanding value, the team started to deal with the specific challenges and goals of the topic SC5-21-2016, such as:

- mapping, analysing and documenting successful heritage-led regeneration models;
- assisting communities through provision of expertise, advice and capacity building in developing and implementing during the life of the project their heritage-led regeneration plans;
- setting up a robust monitoring scheme to monitor the communities performances;
- developing methodologies to enable replication and up-scaling of heritage-led urban regeneration projects in different contexts;
- identifying regulatory, economic and technical barriers;
- establishing long-term sustainable data platforms securing open, consistent data

Behind the slogan of an underground heritage "…not just a challenge, but also a valuable resource to celebrate, protect and use", that first proposal was thinking at a balanced and sustainable methodology to support the conservation of the heritage and, at the same time, to realise the potential of its spaces for 'replicable' regeneration policies in urban areas. The main project challenge was engaging local communities in the preservation of the

underground historic fabric by empowering them with adequate cultural, scientific and technical knowledge and then revitalising the public realm and developing skills for townspeople. To fertilise such a behavioural change, the team adapted an approach never used in the cultural heritage sector: the Transition Management (TM). The TM is a tool for stimulating, developing and supporting real-life experiments (**Living Labs**) in a goal-oriented modulation, aimed at shaping **processes of co-evolution** and **co-creation** (Kemp et al., 2005). It allows communities to explore alternative social trajectories in an adaptive, forward-looking manner, combining the capacity to adapt to change with the capacity to shape change (Rammel et al. 2004) and is concerned with positive goals, collectively chosen by the community following a process of problem structuration. The team contacted, invited and involved new partners in the proposal preparation, especially institutes with competencies in planning and ICT. Considering the starting point, the project did a good progress in terms of problem understanding, but missed maturity in the activities and, especially, a structured knowledge base: the platform. In addition, many partners were not enough focused on the community and more interested to study the heritage preservation. Finally, collective learning and dissemination tools were poorly defined and not enough innovative in respect of the challenge.

2.2. HURN: Heritage-Led Underground Regeneration Network

That first experience made possible applying to the INTERREG Europe 2016 call. Nonetheless, the different framework asked for major changes in the objectives, activities, and partnership, which was reduced to eligible countries and public bodies. Within the scope of conserving, protecting, promoting and developing natural and cultural heritage, the call asked for improving the implementation of regional development policies and programmes in the field of the protection and development of natural and cultural heritage. The new challenge stimulated a reflective approach in the team, which fixed as main goal to establish, implement and exploit a platform for sharing best practices on the sustainable use of the Underground Heritage. Therefore, the activities were focused on collecting partners' best practices on governance mechanisms, planning framework, stakeholders' involvement management, financing mechanisms, technical needs, and their direct impacts on the underground heritage preservation, environment, society and economy, as well as potential negative externalities (i.e. 'gentrification', hardbranding, mass tourism, recreational villages, underground degradation…). The collected information, then, was the knowledge basis for a platform, open and accessible to all parties interested in the underground regeneration. The Platform could manage data, providing knowledge on main technical and organisational barriers to the underground regeneration and correlated solutions, and analysing new potential functions, seen as evolution of the historical ones – with a particular attention to their divulgation – maintaining a conservative approach of their historical value as part of the European Cultural Heritage.

Each involved region (Basilicata, Apulia, Flanders, Valencia, and Cyprus) promised to produce a UBH action plan, integrating expert knowledge with local, institutional, and market knowledge, gathering needs from local/regional stakeholders, increasing the local communities' involvement, raising local awareness, and finally providing

transparent and open policy recommendations to the regional authorities. However, also in that case, the platform is little more than a toolkit.

3. Maturing concept, tools and consortium

3.1. The workshop "Underground Cultural Heritage as a driver for Regeneration. Strengthening local and regional participation in European programs"

The two unsuccessful proposals promoted a moment of reflection and suggested an enlargement of the potential partnership. Supported by Unioncamere Campania and Enterprise Europe Network, the CNR team organised a workshop in Naples (November 8-9th, 2016) with four session and a final round table to discuss about the future challenges. Participants' enthusiasm and intense debates reinforced the network and gave new impetus to the team for developing new proposals in EU funding programmes, such as Horizon 2020, INTERREG Europe, and COST.

Partners from Slovenia, Spain, Moldovia, Belgium, Cyprus, Russia, Turkey, and Georgia, contributed with theoretical, methodological, technical studies and several case studies dealing with: a) conservation and monitoring of the UBH; b) valorisation policies (from urban regeneration to sustainable tourism); c) planning approaches for integrating bottom up initiatives in regional policies; and d) case studies and potential follow-ups.

In particular, the CNR prepared a detailed analysis of future EU calls on Cultural Heritage, in order to reconsider the potential of the Underground Built Heritage in that framework. At that time, success rate for Cultural Heritage calls was incredibly low in H2020 (2.1%), and definitely higher in Interreg Europe (20.5%). The meeting, in addition, provided a first clarification about innovative planning approaches for community empowerment, such as Strategic Stakeholders' dialogue (SSD) (Van Tulder et al 2004) and Transition Management (TM) (Kemp at al. 2005). In addition, I started proposing their integration into a new tool, the Strategic Transition Management (STM), based on local communities' experiments and empowerment, and a multi-level strategic dialogue (e.g. Living Labs) (Pace, 2018). Finally, the meeting pointed out the need for a better support from the ICT private sector and a more extended network of countries. Naples workshop provided the seeds for the future proposal success: the wide and voluntary participation and the development of a common understanding created a right momentum for the following challenges.

3.2. CUBRe 2: Conservation of the Underground Built heritage as catalyser for rural Regeneration

The second CUBRe proposal represents the big change in the approach. Designed for participating to the topic SC5-21-2017 "Cultural heritage as a driver for sustainable growth: Heritage-led rural regeneration", it deals with if and how could Underground Built Heritage support rural development initiatives. All main national and supra-national programmes (Agenda 21; EU Objective 1, 5b and LEADER schemes), as well as rural regeneration studies (Edwards et al, 2000; Pretty, 1998; Shucksmith, 2000; Hodge & Midmore, 2008; Brown, 2010; Scott, 2012; EDORA, 2013; Juppenlatz, 2015) placed emphasis on two correlated

concepts, endogenous development and partnership. Both of them place the community participation at the centre of the rural regeneration process. The first in terms of stakeholders' capacity of mobilising local actors and resources, the second in terms of changing governance practices by empowering local people in rural areas and involving them in the planning process through 'bottom-up' approaches. CUBRe objective was to answer two main needs for rural regeneration: establishing community participation and drawing local resources. The UBH was that local resource, by lying at the heart of people' sense of place and contributing to individual and collective identity, social cohesion and inclusion. However, CUBRe portraits the UBH as a resource largely unexplored, even not documented, and indeed under-utilised, whose conservation depends on local public bodies with different organisational and legal frameworks and, often, lacking of technological capabilities and financial resources.

The proposal maintains the previous CUBRe approach of community engagement, but greatly implemented the platform, the Underground Heritage Platform (UHP), and better specifies the connections between the project, the platform and the living labs. In particular, the UHP develops two capacity-building activities: **knowledge meetups** and **knowledge consultancy**. The first shares cumulated knowledge through innovative and highly participative in-person and digital knowledge sharing meetups. To build capacity in the living lab, UHP establishes exchange and feedback with relevant stakeholders and other peers that lead to replication and knowledge sharing. It develops online learning tools, visualisation, technical guidance and production to help establishing and institutionalising a knowledge-sharing framework, combined with specialised on-site training events. It also includes participatory online webinars with more practical guidance and exchange.

Knowledge consultancies are tailored and targeted for each replicator needs. A user-generated needs model ensures direct involvement of replicators and their stakeholders into the process, providing them with advice and coaching. The Platform becomes the central product of the project and is tested, implemented and managed throughout the entire project life. Designed to support different public and private stakeholders, it uses open source software and develops flexible and accessible tools, by exploiting the latest mobile application technologies and solutions, which maximize its services usability, effectiveness and dissemination. Outcomes are a common understanding and awareness of the issues at stake, mobilization of local knowledge, joint problem ownership, and co-creation of solutions, that is, a better basis for decision-making.

Finally, CUBRe developed an innovative and effective communication and dissemination strategy, based on the "Role Models" success-stories storytelling and a wide local campaigning for activating a favourable environment from both social and economic point of view. The communication would sustain a vision of the underground heritage as a positive economic resource and a crucial element for recovering individual and collective identity, and building social inclusion and cohesion, which better supports Living Labs creation and increases the willingness of local communities to co-create rural regeneration plans.

Established in order to achieve a disciplinary complementarity, coherent with the project knowledge needs, the consortium included a very dedicated group of professionals, public officials, and academics from eight EU and three EU associated countries. Among partners, there were six universities, four research institutes with expertise in applied research, four private companies with relevant expertise in communication, business services, monitoring

and informatics, three city councils, two regional development agency, and seven non-profit organisations.

The proposal was among the four (on 42) that successfully passed to the H2020 Stage 1. The evaluation recognised the interactive, open-source digital platform, as a multifunctional tool for research, education, dissemination as well as a symbolic and innovative mechanism of local empowerment. In Stage 2, the project ranked second and first of the reserve list, but was not funded. Although unsuccessful, the proposal was fundamental milestone for working on UBH at the community level.

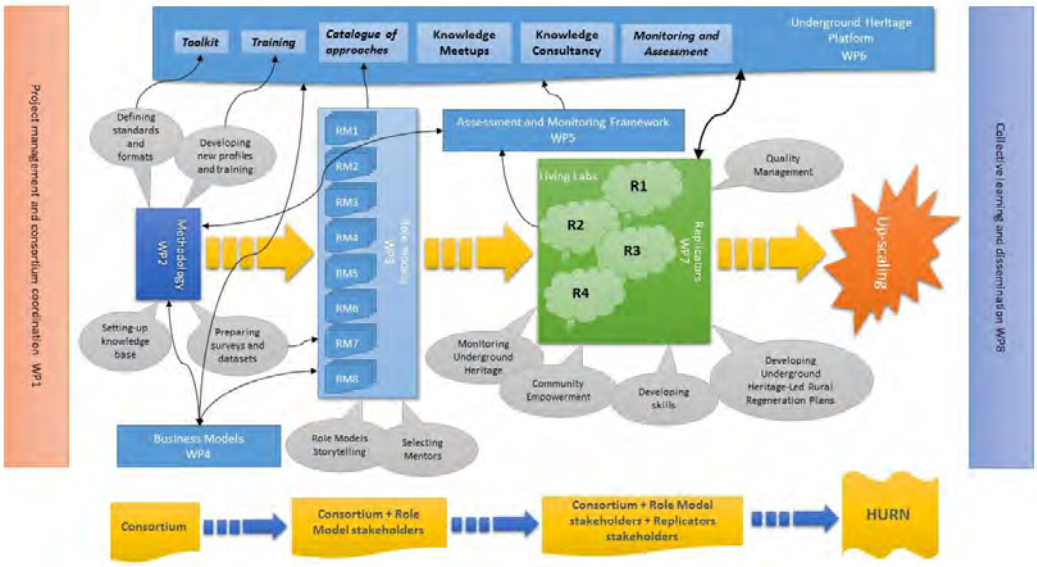


Figure 1 Overall CUBRe Logical Building Blocks and Work packages

3.3. HURN 2: Heritage-Led Underground Regeneration Network

The subsequent challenge was the INTERREG Europe call 2017. The specific objective was "Improving natural and cultural heritage policies" and the proposal represented a relevant progress from the previous 2016. With the participation of seven organisations from Italy, Spain, Slovenia and Belgium, the proposal addressed the implementation of the Operational Programmes ERDF 2014-2020 for Sardinia and Murcia regions, the Operational Programme for the Implementation of the EU Cohesion Policy 2014-2020 in Slovenia, and the Marketing strategy 2016 – 2020 for Tourism Flanders.

With the scope of fostering regional policies for a sustainable approach to the UBH, this second HURN proposal defined the following goals:

- Collecting the good practices and making them available to active and passive users, by disseminating cultural, scientific and technical knowledge on UBH, and by setting up a catalogue of approaches and context-specific practices for the "Environment & resource efficiency platform"
- Applying a Strategic Dialogue approach, by engaging key stakeholders in the involved regions, for formulating and implementing UBH valorisation strategies

- Producing an UBH action plan for each concerned region, which integrates expert knowledge with local, institutional, and market knowledge, gathers needs from local/regional stakeholders, increases local communities' involvement, raises local awareness, and provides transparent and open policy recommendations to the regional authorities.
- Seeding a stable European Heritage-Led Underground Regeneration Network (E-HURN), with a well-defined and ambitious communication strategy.

The action decided to develop a powerful and well-experimented communication and dissemination support to the project by adding a Telematic University to the consortium. That would facilitate the knowledge transmission between HURN scientific and institutional partners, as well as with the local and international stakeholders. By using those technological tools, knowledge could be collected and analysed, as well as a catalogue of approaches produced and context-specific practices directly linked to the Programme platform. In addition, it would also make available the HURN toolkit and training facilities, and set up monitoring tools for all policy instrument implementation. In that proposal, for the first time, the Strategic Dialogue (SD) 8-step model (Van den Berg and Pietersma, 2014) was adapted to the UBH specific objectives. Unluckily, for a missing partner electronic signature, the proposal was not retained for the evaluation and the team acquired little learning from that experience.

4. The COST ACTION "Underground Built Heritage as catalyser for Community Valorisation"

4.1. The first proposal 2016

The COST (European Cooperation in Science and Technology) Association, established in 1971, is an International not-for-profit Association under Belgian Law, which has currently 39 Member countries, and manages the COST programme. Its mission is to enable break-through scientific and technological developments leading to new concepts and products and thereby contribute to strengthening Europe's research and innovation capacities. It allows researchers, engineers and scholars to jointly develop their own ideas and take new initiatives across all fields of science and technology, while promoting multi- and interdisciplinary approaches. COST aims at fostering a better integration of less research-intensive countries to the knowledge hubs of the European Research Area. In the beginning, it was not 100% clear how to use the COST networking tools for developing a pure on-field innovative action. However, maybe a networking approach could make UBH-led community engagement more understandable. Under that perspective, the first Underground4value saw the light. The main challenge was to promote a sustainable use of the UBH, by integrating policies and practices of conservation into the wider goals of regional and local development, in respect of the inherited values and traditions of different cultural contexts.

The proposal was mainly focused on solving the conflict between underground heritage and underground space. It stated that current physical planning approaches under-perform in dealing with Cultural Heritage, and specifically with UBH. There is a rising awareness that physical approaches can only be part of the solution to communities' problems, and that planners should better "…address how people mix and connect, their motivations, and whether they 'own' where they live" (Bianchini, 1999). In addition, planning tools must

stimulate and facilitate local communities' empowerment, by connecting natural, social, cultural, political and economic environments, gauging impacts across different spheres of life, and grasping the importance not only of 'hard' but also of 'soft' infrastructures" (Bianchini, 1999). The transition of the proposal centrality from the built heritage to the individual and the community was then completed.

The proposal was positively evaluated (55 on 65) but not retained for funding. Why? The evaluation was very clear. It defined the topic as relevant, but rather an "evergreen" issue, which can always be considered as timely, and therefore not extremely urgent to solve. Were they right? How could we change their mind?

4.2. The second proposal 2018: CA18110 "Underground Built Heritage as catalyser for Community Valorisation"

Those two questions were at the centre of the proposal redesign in the 2018 COST proposal collection. Even if the new proposal does not appear so different, its centre is not anymore the Underground Built Heritage, but its value for the community and the society. Therefore, it is a value "to celebrate and preserve and when sustainable, to re-use and valorise, realising its full potential to support local communities' development" (see http://underground4value.eu/). The centre becomes now how the community can use this value in terms of sustainability challenge, a value that can catalyse urban/rural regeneration and attract tourism, raise community awareness and make local communities more resilient to globalised systems of production and consumption by preserving their unique environmental and cultural aspects. The sustainability challenge is certainty timely, as well as actions supporting the transition towards sustainability, by promoting changes in interdependent societal systems and across multiple scales – from the supply chains to the communities and individual citizens' behaviours and values – through complex and uncertain processes, mainly depending on experimentation, learning and sharing ideas. The proposal, also if difficult to experiment only in an expert network, opens the way to develop areas for experimenting and managing the transition. Activities seek for acquiring and testing tools to encourage dialogue and engage stakeholders across society in order "to determine where we need to go and how we are going to get there" (EEA 2016). Past experiences and the network composition provide relevant knowledge about tools for stimulating and facilitating local communities' empowerment and connecting natural, social, cultural, political and economic environments. They are the Strategic Stakeholder Dialogue (SSD) and the Transition Management (TM), eventually integrated into a new tool, the Strategic Transition Management (STM). The proposal defines as a new objective to "…pioneering socially and environmentally innovative solutions, by stimulating, developing and supporting processes of local community co-evolution and co-creation, which allows communities to explore alternative social trajectories in an adaptive, forward-looking manner, such as the Strategic Transition Management (STM)" (Underground4value, 2018).

The proposal was retained with a score 63 on 65, and admitted to funding. Since April 9th is active as COST Action 18110, and put together experts of 25 countries. The most innovative component is the new annual organisation of the activities, which are less and less of pure and open networking, and more and more part of a structured project (Figure 2).

The Management Committee selects four case-studies. Then, three thematic working groups - Underground Built Heritage conservation and monitoring (WG2); Underground Built

Heritage reuse and valorisation strategies (WG3); Underground Built Heritage planning approaches (WG4) - and two methodological and organizational ones - Knowledge Base Development (WG1); Dissemination and exploitation strategies (WG5) – prepare knowledge base contents and assessment tools for analysing case-studies. Small teams of participants perform yearly four case-study assessments, by using the Short-Term Scientific Missions (STSMs) tool.

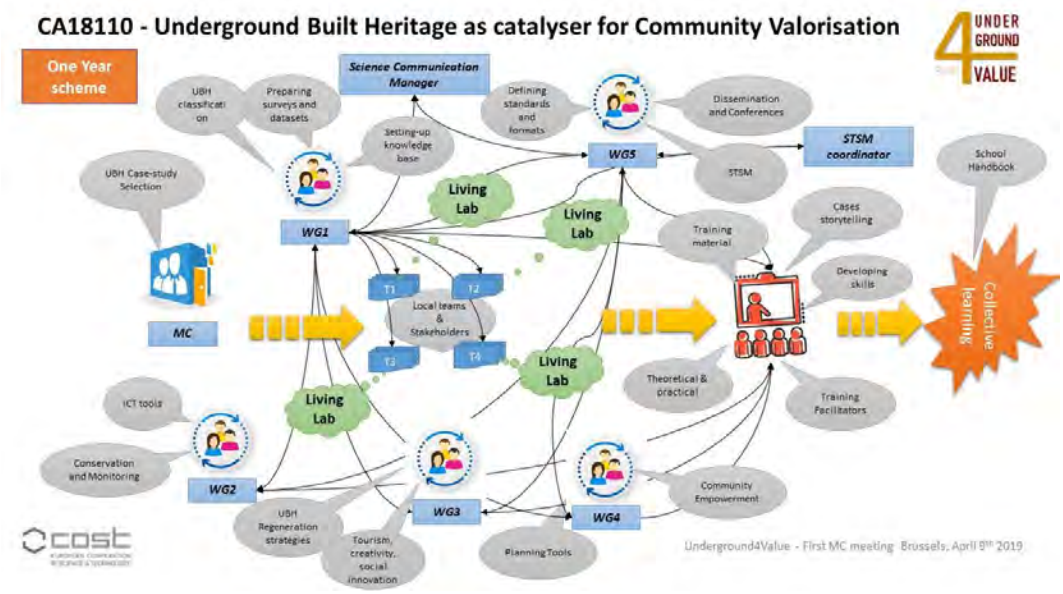


Figure 2 COST 18110 one-year action scheme

These assessments, jointly conducted by an external participant, together a local team, aims at developing a living lab approach on a specific UBH-based topic. Since the first meeting, the network developed a shared definition of living lab, that is, innovative actions experimented and implemented in real communities (a neighbourhood, a city, a region), but sheltered by adequate scientific and technical knowledge, technological capabilities and financial resources.

That approach would open to interacting with local communities, disseminating innovative thinking and supporting them to explore alternative social trajectories in an adaptive, forward-looking manner. Results will be discussed and analysed during workshops and, specifically, at the training courses, where trainers and trainees will work together on specific topics, producing a yearly publication.

The first year case studies are Naples (IT), Postojna (SI), La Union (ES), Göreme - Cappadocia (TR) (Figure 3).

The Action is an Expert network with the scope to become a structured and stable voluntary association for sharing research experience, best practices and ideas on UBH. A platform approach will support the creation of a repository for new research and for developing training tools, open and accessible to all parties interested to the UBH. Platform and tools will provide knowledge on main technical and organisational barriers to the UBH conservation and reuse. This knowledge will be the basis for:

- promoting continuity of use and significance to the underground historic fabric, revitalizing the public realm and developing skills for townspeople

- Assisting local communities' decision-making with cultural, scientific and technical support from many aspects (i.e. archaeology, geo-technics, history, urban planning, cultural anthropology, economics, architecture, cultural tourism).

Naples (IT): Modern Age tuff quarries under one of the most crowded urban areas of the world, with about 800 caves, 3000 water cisterns, 180 km of aqueducts' tunnels, catacombs, cemeteries, tombs, air-raid shelters, partially used as touristic attraction and partially reconverted into transport infrastructure

Postojna (SI): Three underground natural caves located on the classical Karst, which represent a significant case study as historical example of regeneration and valorisation since visitors' information centre and tours date back to 17th century. It is also one of the first examples of underground best practice in architecture hosting a post office and a multiservice space for visitors.

La Unión (ES): Mining caves since the time of Romanized-Iberian settlements, they have been transformed in a successful touristic destination. An exemplary site of abandoned caves and their valorisation as significant signs of local rural cultural heritage. The introduction of flamenco dance performances and music exhibitions are the most innovative approaches to re-functionalisation

Göreme - Cappadocia (TR): Located on the central Anatolia plateau, the region is set in a moonlike landscape of giant rock cones, housing historic cave-dwellings and Byzantine churches. Added to the World Heritage List by UNESCO in 1985, it offers a sustainable balance between heritage conservation, cultural tourism development and local community empowerment, thanks to many successful regeneration interventions.

Figure 3 COST 18110 first year case studies

Obviously, the new Action is only at the beginning, but the enthusiasm showed by the participants at the first Working Group meeting in Ancona (June 6-7th, 2019), as well as the interest of the local stakeholders, demonstrated the high potential of the concept and its replicability. The case study phase, with the expert assessment and the living lab establishment, will give a clear measure of the action potential, which will benefit from the reflective event of the training school.

The school is specifically organised with the purpose of developing new forms of training for planners. During the training school, outcomes of working groups and case-studies will be tested and validated. In addition, organised stakeholders' conferences will act as a vehicle for networking, public engagement, dissemination, knowledge sharing and exchange of best practice and innovative concepts and ideas for future developments and joint ventures. Specifically when surveying the gaps in underground built heritage, the Action will seek engagement with local communities' leaders, professional associations, privates, universities, SMEs in Cultural Heritage, experienced professionals and other stakeholders. Senior research associates, members of local policymaking bodies and associations, experts in cultural heritage research, will be invited to contribute to the Action's activities and events, and benefit from the Action's outcome.

5. References

Applejuice Consultants (2008), *Social impact of Heritage Lottery Funded projects*. Evaluation report on research conducted for the Heritage Lottery Fund during 2006–2007.

Bianchini F. (1999), "Cultural planning for urban sustainability", in Nystrom L., Fudge C. eds. *Culture and Cities. Cultural Processes and Urban Sustainability*, Stockholm, pp. 34-51

Dodd J. and Sandell R. (2001), *Including Museums: Perspectives on Museums, Galleries and Social Inclusion*, Research Centre for Museums and Galleries.

EDORA, European Development Opportunities for Rural Areas (2011), *Final Report*, ESPON

Edwards WJ et al (2000) *Partnership working in rural regeneration: governance and empowerment?* Policy Press, Bristol.

Evans G and Shaw P (2004), *The contribution of culture to regeneration in the UK: a review of evidence*. London Metropolitan University, London.

Hodge I & Midmore P (2008), 'Models of Rural Development and Approaches To Analysis Evaluation And Decision-Making', Économie rurale, 307

Juppenlatz, E. (2015), Rural Regeneration and Localism: A case study of Northumberland, PhD Thesis, University of Newcastle

Kemp R, Rotmans J (2005), 'The management of the co-evolution of technical, environmental and social systems', Weber M, Hemmelskamp J (eds.), *Towards Environmental Innovation Systems*, Springer Verlag.

Pace G (2018), Planning Approaches for Heritage-led Community Development", in Genovese L, Yan H, Quattrocchi A, (eds) Preserving, Managing, and Enhancing the Archaeological Sites: Comparative Perspectives between China and Italy, pp 163-172.

Pretty J (1998), The Living Land. Agriculture, Food and Community Regeneration in Rural Europe, Earthscan, London

Rammel C et al. (2004), *Governing Sustainable Development. A Co-evolutionary Perspective on Transitions and Change*, GoSD working paper 1.

Roberts P and Sykes H (2000), Current challenges and future prospects, in Roberts P., Sykes H. eds., Urban regeneration: a handbook. Sage publications, London, pp. 295-314.

Scott, A. (2012) *Partnerships: Pandora's Box or panacea for rural development?* Working Paper Series, no. 11, Birmingham University

Shucksmith, M. (2000), *Exclusive countryside? Social inclusion and regeneration in rural areas*, Joseph Rowntree Foundation

Van den Berg G and Pietersma P (2014), *The 8 Steps to Strategic Success: Unleashing the Power of Engagement*, Kogan Page, London.

Van Tulder R. et al (2004), *De Strategische Stakeholderdialoog. Opkomst, sussesfactoren en toekomst*, Erasmus University

Research Paper

A City Branding Framework in Regional Development Planning: The Case Study of Pringsewu Lampung

Citra Persada, Architectural Program, University of Lampung; Indonesia
Yunita Kesuma, Architectural Program, University of Lampung; Indonesia
Fadhilah Rusmiati, Architectural Program, University of Lampung; Indonesia

Abstract

The city branding shows the relation of the goals of managing the city's image that needs to be planned. The city branding is not about slogans, logos and promotional campaign, but it will be taken in practical program framework of the local development planning. The purpose of this paper is to identify an empirical city branding framework in Pringsewu, a historical area in Lampung Province. Then this paper will devise the strategies to increase a practical city branding. The research consist of three main phase: desk study, field research analysis and derived recommendation with practical city branding strategies framework. A qualitative approach is used by in-depth interviews with twelve respondent from local community figures, bureaucrats and academicians. Based on SWOT (Strength, Weakness, Opportunity and Threat) analysis of the qualitative data, the empirical programs of city branding in Pringsewu include logo and landmark. That is disengage in local development policy and regional planning, there is a weakness from practical city branding. As the result, we suggest that a bottom-up approach based on local community should be taken to developing a place brand strategies. The three elements in branding strategies accepted for Pringsewu: 1) involved and strengthen city branding in local development plan and strategies, 2) building revitalization of place branding infrastructure, 3) developing local community empowerment. A practical city branding could help a place to attract tourism, visitors, traders and investors then increase economic growth. The city branding can represent the community entity, geographical wideness, local development planning and potential local comodities. It provides a good starting point that would be the right strategies framework and practical approach for local development planning.

Keywords

City, Branding, Strategies, Pringsewu

1. Introduction

Nowadays, cities are forced to compete with each other to gain more tourist destination, workplace, cultural rich place and various forms and activity fields (Kotler, 2002). The competition among cities might be seen for fast changes in technology and the globalization (Kavaratzis, 2005). Cities are tried to search for new ways to promote themselves to be

attractive to created the brand identity that would change the image of the city. City branding was found to be a backbone concept, while city marketing focuses on brand identity and brand image strategies includes construction, communication and management of the city's image to support the needs and expectations of customers (Krantz & Schatzl, 1997 in Purwanto, 2017). For this case, cities develop strategies to support, to introduce and advertise them to "sell" their brand image in the global market. Most of the research study reveal that there are mainly three approaches for promoting cities: cultural events; restoration and promoting heritage; the construction of iconic buildings (Hankinson, 2006 ; Kavaratzis, 2005). In fact, many cities prefer to built construction of iconic buildings to get attention and attraction. The problems of this approaches for other cities are built it without considers branding concept, potential resources, policy and local development planning. The city branding shows the relation of the goals of managing the city's image that needs to be planned. The city branding is not about slogans, logos and promotional campaign, but it will be taken in practical program framework of the local development planning. This research aims to present city branding framework based on an empirical city branding phenomena, involving geographic, economic, social, cultural, and policy in Pringsewu REgency, a historical area in Lampung Province. Then this paper will devise the strategies to increase a practical city branding which involve potential effects on residents with combination of city branding measures and city marketing components. From a practical perspective, these findings could help stakeholder such as government, local tourism organizations and residents to create a sustainable strategy to develop their tourism destination. In this paper, there are three principal questions:

a. Have the city succeeded to forming " Bamboo City" as local branding and provides it within strategic developmental plans?
b. Why is it necessary to strengthen "Bamboo City" branding for Pringsewu Regency?
c. How can " Bamboo City" brand image be created in the social, economic and environmental strategies?

2. Literature Review

City branding is a methods to gain the attraction and establish city recognation (Rainisto, 2003). City branding is created to achieving competitive advantage, in order to increase investment income, tourism industry and community development. The city branding concept was reinforcing local identity and citizens identification with their city and activating all local resources (Kavaratzis, 2004). Nowadays, the branding of places and more specifically of cities, has gained an extraordinary momentum among city officials (Anholt, 2007). City as a brand have a purpose of promoting the existing and potential resources and trying assert their individualit to differentiate themselves from each other within various economic, political or socio-psychological objectives (Kavaratzis and Ashworth, 2005). Many cities and towns is living in a world where competition to start thinking about finding new ways to improve the image of the city with the purpose of attracting visitors. (Kotler et al.,2004).

City branding was a main concept to guide a city marketing strategies. City marketing focuses on brand identity and brand image strategies includes construction, communication and management of the city's image to support the needs and expectations of customers (Krantz & Schatzl, 1997 in Purwanto, 2017). The most important success factor to created city

marketing is the planning group, vision and strategic analysis, place identity and image, public-private partnerships and leadership (Rainisto, 2003).

In addition to the success factors above, to fullfil the challenges in an environment where the practice of city marketing is done, it is political public affairs, global market, regional development and process that coincidence of the marketing process. A framework for evaluating city branding, called the city brand Hexagon, is used to make the Anholt-GMI City Brands Index (Anholt, 2006 in Papp-Vary, 2011). Simon Anholt, a practitioner who is often credited in coining theterm 'nation branding',2 started the Nation Brands Index in 2005 and partnered up with GfK in 2008 (Anholt, 2011). Following the commercial success of Nation Brands Index, Anholt started the Anholt- Global Marketing Institute (GMI) City Brands Index. The current ACBI is surveyed by GfK Roper Public Affairs & Corporate Communications (GfK America, 2013) The survey asks around 40 questions to 20,000 people from 20 countries about 50 cities, and is administered online (Anholt, 2006). ACBI has the six components of the hexagon for the characteristics of cities include the presence, place, potential, pulse, people and prerequisites.

> " Presence [. . .] measures the city's global contribution in science, culture and governance. Place [explores] people's perceptions about the physical aspect of each city in terms of pleasantness of climate, cleanliness of environment and how attractive its buildings and parks are. Pre-requisites determines how people perceive the basic qualities of the city [. . .] such as schools, hospitals, transportation and sports facilities. People [reveals] whether the inhabitants of the city are perceived as warm and welcoming, whether respondents think it would be easy for them to find and fit into a community that shares their language and culture and whether they would feel safe. Pulse [measures] the perception that there are interesting things to fill free time with and how exciting the city is perceived to be in regard to new things to discover. Potential [measures] the perception of economic and educational opportunities within the city [. . .] " (GfK in 2008 in Anholt, 2011).

The six components of the characteristics of city's hexagon is possible to provide recommendations to decision makers to identify potential for intervention or to assess the effectiveness of branding projects. Kavaratzis (2004) showed the frame of a city brand communication through different variables, which have both functional and symbolic meanings. Primary Communication is related to city life or activity support are provided in four categories. There are landscape strategies, infrastructure projects, organisational and administrative structure dan the city's behavior. Secondary Communication for media-generate imagery branding and one of practical promoting programs like indoor and outdoor advertising, public relations, graphic design, logos, etc. Tertiary Communication created a "word of mouth" such a slogan,tagline and verbal branding for city to gain attention and attraction for strengthen city image.

This framework distinguishes between unintentional and intentional communication. Hankinson (2006) distinguishes four branding perspectives, namely; perception of the brand as an entity, brand as a brand communicator, Brand as a relationship, and brand as a major driver of value. Kavaratzis (2006) described the similarity of concepts covering the main lessons of corporate branding and marketing theories. The similarity of the frames are grouped into eight categories as a component of an integrated approach to managing city

branding. These categories are: vision and strategy; internal culture; local communities; synergies; infrastructure; cityscape and gateways; opportunities; communications.

The concept of a sustainable city image is necessary to define visual image, city image and sustainability.The visual image is legible, real and tangible, contains many elements, defined as paths, edges, districts, nodes, and landmarks' (Lynch, 1960). The making of a good city image as planning strategies has become an essential need for cities in order to survive in the global market. Since successful city brand images give a unique brand image through certain strategies, which benefit beyond the physical aspects of city branding. There are different city branding strategies that could be developed based on diverse city development objectives and visions, such as monumental building construction projects, signed architecture, events, media, etc. The city branding strategies are not limited to the promotion of the city image, but it extends more, to change it for the interest of investors, politicians, real estate and construction projects, planners, architects, and other groups. That stand to profit from enhancing the role of their cities to support sustainable development strategies.

3. Methods

This paper explores the concept of city branding from theoretical and practical viewpoints based on "Bamboo City" Pringsewu Regency's branding case study. The research consist of three main phase: desk study, field research analysis and derived recommendation with practical city branding strategies framework. The first phase helped to identify and analyze the basic features of the government regulation, spatial development plans and city development strategies. Later the second phase, field research helped to analyze and collecting information based on existing experiences of Pringsewu branding strategies. It is undertaken by in-depth interviews with twelve respondents were selected for purposive sampling. Respondents including local community figures, bureaucrats and academicians. This research used a qualitative approach to determine branding tools information provided by SWOT (Strength, Weakness, Opportunity and Threat) analysis. This technique for evaluating and to develop a strategic planning based on a comparative analysis in different components of the social, economic and environmental indicators, as well as current and future potential. Then the last stage was concluding the framework of the important elements' in branding strategies.

4. Discussions

4.1. Branding Strategies in Pringsewu

Pringsewu is a regency of Lampung Province, Sumatera, Indonesia. It was spacial development from Tanggamus Regency under The Law of The Republic of Indonesia Number 48 of 2008 on The Regional Autonomy Legislation of Pringsewu Regency in Lampung Province. The regency name "Pringsewu" came from Javanese languange terms "sewu" (thousand) and "pring" (bamboo). From the histories, Pringsewu was a trasmigration development area in Sumatera under Dutch kolonial rule during the early 20th century. The people on Pringsewu are mostly coming from the transmigration program which is the descended migrants from Java, Madura and Bali. The goverment supported and allowed Javanese transmigrant to keep

hold of their way of life including the language and social-cultural objects. It caused the unnamed land with bamboo forestry is called "pringsewu" then officially authorized on October 2008. Based on interview, "pringsewu" related to historical root of islamic development by K.H.Gholib in 18th centuries. He was islamic preacher who came from East Java into Sumatera and Johor, Malaysia. He well known as "*kyai bambu seribu*", a religious leader with respecting, tolerance and anti-discrimination in multiracial and multireligious society during Dutch kolonial. In 1927, he built Jami mosque and *pesantren*a (a place where students live and study Islamic knowledges) to develop islamic education in Pringsewu (Figure 1). It was a historical building in Pringsewu and K.H. Ghalid become street's name.

Figure 1 K.H Ghalib Jami Mosque and *Pesantren* in Pringsewu

(Source: http://perpusda.pringsewukab.go.id/)

"Bamboo City" branding was created by understanding and sosio-cultural histories from Pringsewu residents. The logo of Pringsewu which adopted bamboo philosophy and is listed in Regeant Rules and Regulation Number 11 of 2011. Due to the fact "Bamboo City" branding is not added in Spatial Regional Planning and Long Term Plan of Pringsewu Regency, it is biased toward city branding strategies. Based on reviewing and discussing with respondents, the branding is inconsiderate to the vision and strategic programs. City branding was a main concept to guide a city marketing strategies includes the construction building project, socio-cultural development and economic strategies programs. Spatial plan and development strategies are one of the important success factor to created city marketing (Rainisto, 2003).

In fact, the city branding "bamboo city" was provide in visual media such in logo and landmarks but untoughtfully provides in slogan, tagline or public relation. The branding uncontinous to invest the effort to promoting "sell" Pringsewu with iconic identity in social, economic and environmental project. A city logo is a part of the core concepts that are visible to the consumer (Anholt, 2007). It was strengthening brand equity through increased awareness, recognition, and royalties ofcustomers (Wheeler, 2009). A city logo helps to steer public perception and effectively revives a positive image for the city. Besides, "bamboo city" was unmentioned in Pringsewu"s slogan. It was "Bumi Jejama Secancan" meaning of people holding hand to live a mutual life together (Figure 2). One of the important reasons is a unique

brand identity in order to create a competitive advantage that will be recognized by global market, meaning of the city have a perception and basic knowledge of how the city.

Figure 2 The Logo and Slogan of Pringsewu (Source: https://promgsewukab.com/)

Landmark was designed as statements of the city branding in architectural to generate enormous public interst. Such building have become brands in their own right and being a communication media to provides the city vision and development strategies. Landmark is used to reflect the consistency of the visual appearance for the goverment to strengthen the city branding. There are monument signs in Pringsewu describe a symbols of bamboo philosophy despite it wasnot made of the real bamboo material (Figure 3). Based on concepts and design, it was unfunctional building and lacking to being a succesfull attributes to provides "bamboo city" brand. Nothing building construction and designed provides bamboo as a building material. Bamboo as a building material has high compressive strength, low weight, renewable, extremely versatile and sustain in those locations where it is found in abudance. Bamboo material is used for the construction such scaffolding, structures, householding even high level buiding. It is one of the fastest growing plants than most other species of plants, which is conventionally suitable cultivated in Southeast Asia. Generally the landmark for "bamboo city" brand was lacking in innovative branding features.

Figure 3 The Monument Signs in Pringsewu (Source: Researcher's documentation)

The Pringsewu's economic is dominated by agricultural such as farming, livestock comodities, trading and small scale manufacturing. most farming production initiatives such as grains, fruits and vegetables provide a source of food for people. The livestock comodities came from

fishery, cattle industry and dairy product. There are modern grocery, wholesale market and traditional trading and home based small scale industry to offer as a economic contribution for Pringsewu's domestiic economic growth. A small scale manufacturing came from home based craft industries in Pagelaran District and Gadingrejo District. Unfortunatelly, most of this production has not been promoted largely and only offering for local trading markets.

Supporting cultural industries in Lampung Province, Pringsewu is chosen being host for the 8th and 9th Bambu Nusantara Festivals which is annual international events of Economic Creative and Tourism Ministry (Figure 4). It was held from May 15th to 16th 2014 and then in November 29th - 30 th 2015 at Pringsewu Government Field. Events is opened to all typo of performance including folk dance, folk music, traditional dance group,modern dance and traditional icon culinary. This festival features various product and attractions to develop and highlight bamboo as local potencials of Pringsewu identity. The cultural festivals attract culture tourist to local community events, it have contributed in the development of cultural tourism. Festivals have major impacts to promote the local potencials and the host communities. The local government as well private sectors and society in general have responsibility for tourism development and promotion to global market.

Figure 4 Cultural Events in Pringsewu (Source: Sumber: https://dutalampung.com/)

4.2. City Branding Framework Based on Pringsewu case study

Based on SWOT analysis provides potencials and weakness in "bamboo city" branding in economics, socio-cultural and envirinmental aspects. It can be the main boundary to establise integrated development strategies with preparing long term vision of Pringsewu's future focus on strengthening economic competitiveness. There are also covered and drawn a short term action plan. The process is participative and involving major stakeholders from all segments of society. There are involved place branding in local development policy and regional planning; building and revitalization of place branding infrastructure; developing local community empowerment (Figure 5). A practical city branding could help a place to attract tourism, visitors, traders and investors then increase economic growth. Place marketing

enables a strategic approach to public planning in collaboration with the private sector. The city branding can represent the community entity, geographical wideness, local development planning and potential resources.

The city branding is stimulate a economic competitiveness which reveal advantages for the urban regeneration of the city. It is generally understood as a action plans to build the possitive image of the city and communicate it to global market within various features via visuals, narratives amd events. The objectives of city branding are: to attract tourism, to gain inward investment and to reinforce local identity of the citizens. Generally, city branding is a means to improve external and internal images of city. The city image should be reflected in the spatial structure of the city and being the potencial attractivenes for tourism. The city image marketing enables a strategic approach to public planning in collaboration with the private sector.

City branding consist of spatial and communication components. Primary communication is divided into spatial and non spatial aspecs. Spatial communication aimed to improve the physical quality of the city, such as built functional building which is made from bamboo as main material contruction, create a “bambu cultivation and creative production territory, and establish “bamboo city’ eco-tourism development and infrastructure project. Non spatial communication deals with enhancement of socio-cultural development features, service provision, creating comprehensive community relations and event community organisation. The secondary communication is promotion of “bamboo city” image by interested parties, such as “bamboo city” eco-tourism project, bamboo cultivation activities and create cultural events or festivals to advertise the manufacturing of bamboo products globally. Furthermore, it is provides job opportunities and economic development strategies based on local community. Tertiary communication to create competitivenes, which reinforces “bamboo city” image and reflect it into city slogan, tagline, campaign and advertising to “sell” Pringsewu in the wide range of global market.

The main concept of practical city branding framework in pringsewu is investing in arts and culture being tourism and bussiness development features. Culture is a source of local economic growth, provides advantages as a source of employment and being value added in tourism and business. Culture helps and regenerates cities for creating integrated local economic strategies. The arts and culture features can actually contribute to increasing property values in these place by making neighbourhoods and creative industries more attractive to investors. As a histotical city, Pringsewu can be regarded as a cultural eco-tourism destination to protects bamboo as local cultures and empowers the native community. Cultural eco-tourism is the subset of tourism that is concerned with the authenticity of city’s lifestyle in certain environmental aspects, such as their entity, local comodities, arts, architecture, rituals, festivals and more values which help convey the culture of the city itself. Furthermore, the cultural eco-tourism conserves cultural traditions, promoting local comodities and improving local community welfare.

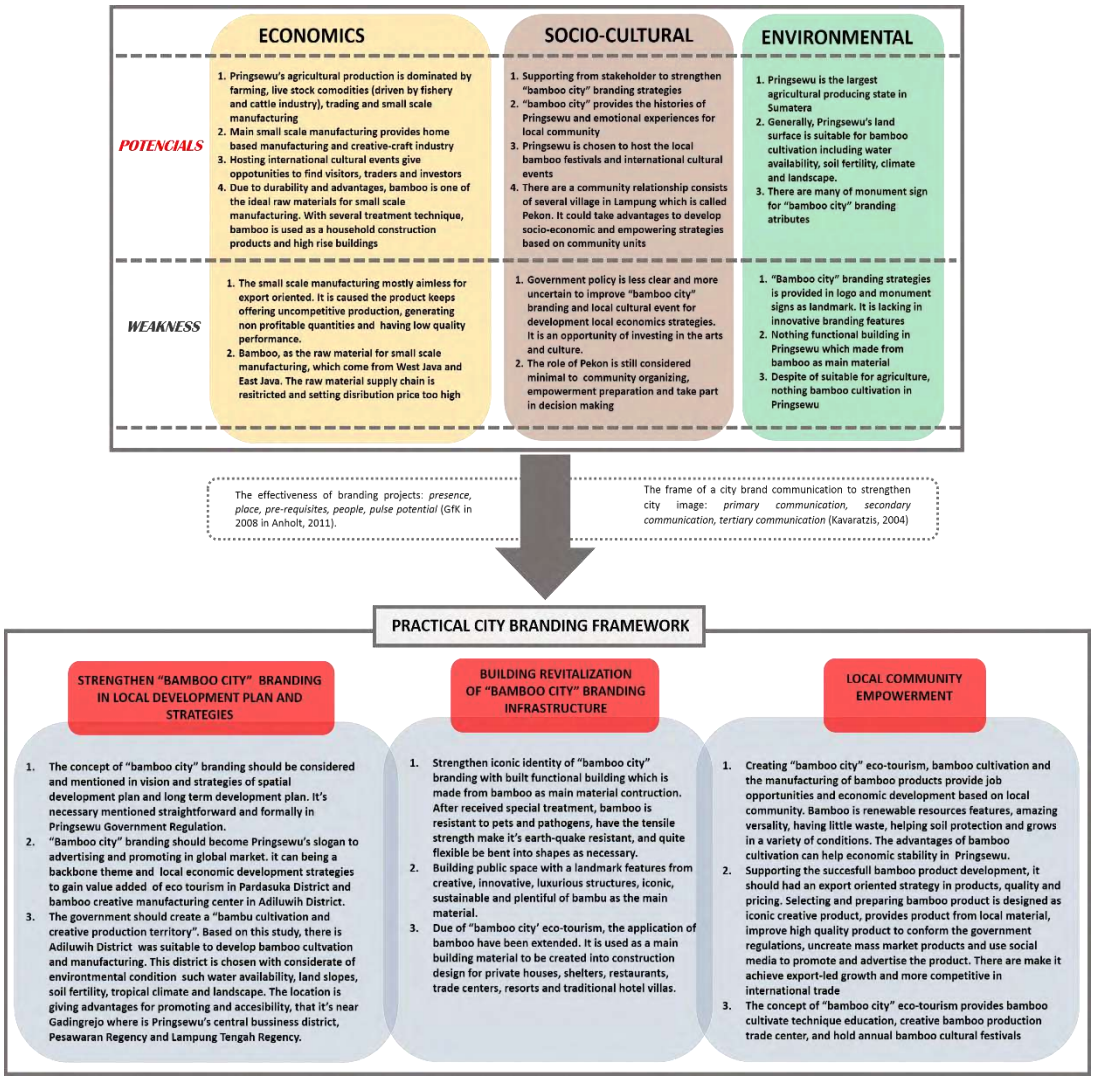


Figure 5 Practical City Branding Framework (Source: Researcher's analysis)

5. Conclusion

Based on Pringsewu case study, "bamboo city" branding strategies is provided in logo and monument signs as landmark. Nothing functional building in Pringsewu which made from bamboo material, that cause the image of "bamboo city" is uncertain and not giving emotion and experiences for visitors. The strategies of "bamboo city" branding is lacking in innovative branding features. The goverment and community supposed to create a new branding strategies for strengthen "bamboo city" in economy, socio-cultural and environmental aspect. The three elements in branding strategies accepted for Pringsewu: 1) involved and strengthen "bamboo city" branding in local development plan and strategies, 2) building revitalization of "bamboo city"branding infrastructure, 3) developing local community empowerment. A practical city branding framework helping a place to attract tourism, visitors, traders and investors then increase local economic growth. City branding was being a marketing strategies

to represent the community entity, potential local comodities, and promoting the image of city in global market.

6. Acknowledgements

The authors gratefully acknowledge the generosity of the research participants in sharing their time, experiences and the support from community organisations, academicians and local governments. This study was funded by The Research Grant Programme from University of Lampung in 2018. This programme provides financially supports for academicians and scientific research to enhance their skills, knowledge, and experience through their own research work. Applications for The Research Grant Programme are reviewed by panels of academicians and scientific research experts in civil engeneering and environmental science fields of study.

7. References

Anholt, Simon (2007) Competitive Identity: The New Brand Management For Nations. London: Palgrave Macmillan.

Anholt, Simon (2006) "The Anholt – GMI City Brands Index. How the world sees the world's cities", Journal of Place Branding, Vol. 2 No. 1 (January).

Anholt, Simon. (2011). Beyond the nation brand: The role of image and identity in international relations. In A. Pike (Ed.), Brands and branding geographies (pp. 289–304). Northampton: Edward Elgar Publishing.

Chaerani, (2011). Pengaruh City Branding terhadap City Image (Studi Pencitraan Kota Solo: 'The Spirit of Java'). Solo, Indonesia: Universitas Sultan Ageng Tirtayasa Press.

Dril, Nataliya; Galkin, Andriy; Bibik Natalya (2016) "Applying city marketing as a tool to support sustainable development in small cities: case study in Ukraine" Transportation Research Procedia 16 (2016) 46 – 53 (March).

Hankinson, Graham (2006) "The management of destination brands: Five guiding principles based on recent developments in corporate branding theory", Journal of Brand Management, Vol. 14 No. 3 (March).

Indriani, Jesi; Kuswoyo, Chandra (2017) "Pengaruh City Branding Dan City Image Terhadap Keputusan Berkunjung Wisatawan Ke Kabupaten Purwakarta". Jurnal Manajemen Maranatha, Vol. 17 No. 1 (November).

Kasapi, Iris; Cela,Ariana (2017) "Destination Branding: A Review of the City Branding Literature", Mediterranean Journal of Social Sciences, Vol 8 No 4 (July).

Kavaratzis Michalis; Ashworth, G.J (2005) "City Branding: An Effective Assertion of Identity or A Transitory Marketing Trick". Journal of Place Branding, 2(3), 183-194 (February).

Kavaratzis, Michalis (2004) "From city marketing to city branding: Towards a theoretical framework for developing city brands. Journal of Place Branding", Vol. 1, No. 1(June).

Kotler, P., G. Armstrong, (2004) Principles Of Marketing. Tenth Ed. New Jersey : Pearson Prentice Hall.

Krantz, M and Schatzl, L (1997). Marketing The City In: European Cities in Competition (eds), Jensen- Butler,C., Shachar, A., Weesep, J. (eds) 1997. Avebury: Ashgate Publishing Company.

Lynch, Kevin (1960) The Image of The City, London: The MIT Press.

Merrilees, Bill; Miller,Dale; Herington, Carmel (2008) "Antecedents of residents' city brand attitudes" Journal of Business Research, 362–367 (May).

Moilanen, Teemu & Rainisto (2009) How to Brand Nations, Cities and Destinations, A Planning Book for Place Branding. USA: Palgrave Macmillan.

Moleong, Lexy (2007) Met0de Penelitian Kualitatif Edisi Revisi. Bandung; PT remaja Rosidakarya.

Papp-Vary, Árpád (2011)"The Anholt-Gmi City Brand Hexagon And The Saffron European City Brand Barometer: A Comparative Study". Regional and Business Studies, Vol 3 Suppl 1, 555-562.

Purwanto, Ujianto; Soliha, Euis (2017) "Influence of City Branding, Brand Identity, and Brand Image On Visiting Decision to Pekalongan City" Jurnal Bisnis & Manajemen, Vol. XVIII, No. 1.

Prayogi, Pria Estu (2017) "Pemetaan Persepsi Masyarakat Pringsewu Tentang Branding Kabupaten Pringsewu sebagai Kota Bambu". Social and Political Departement, Universitas of Lampung.

Rainisto, Seppo.K.(2003) "Success Factors of Place marketing: A study of place marketing practices in Northern Europe and the United States". Doctoral Dissertation. Helsinki: University of Technology, Institute of Strategy and International Business.

Rehan, Mohammed Reeman (2013) "Urban branding as an effective sustainability tool in urban development" HBRC Journal (2014) 10, 222–230 (November).

Riyadi (2009) "Fenomena City Branding Pada Era Otonomi Daerah". Jurnal Bisnis dan Kewirausahaan, Vol. 5 No.1 (Maret).

Riza,Muge; Doratli,Naciye; Fasli, Mukaddes (2011) "City Branding and Identity" Procedia - Social and Behavioral Sciences 35 (2012) 293 – 300 (Desember).

Sevin, H. Efe (2014) "Understanding cities through city brands: City branding as a social and semantic network" Cities 38 (2014) 47–56 (January).

Sugiarsono, Joko (2009). City branding Bukan Sekedar Membuat Logo dan Slogan. Jakarta: Salemba

Sugiyono (2006) Memahami Penelitian Kualitatif. Bandung:Alfabeta.

Wheeler, Alina (2009) Designing Brand Identity.New Jersey: John Wiley and Sons, Inc.

Case Study / Project

Culture capital of the Turkic World

Roman POMAZAN, Alexandr KHVAN

Abstract

The 1001 fairy tale of the East, a cultural capital of Kazakhstan, a center of arts and festivals of Central Asia, a contemporary oasis in Syr Darya valley. There are only a few targets of urban transformation of Turkistan, the masterplan strategy designed by interdisciplinary team of Urban Sustain Architecture (Kiev) and Frame Art (Astana). Turkistan is one of the oldest cities in Kazakhstan, former capital of Kazakh khanate and religious center of Central Asia. This city plays extraordinary role in culture and history of Kazakhstan. It is Kazakh Mecca, former capital of Kazakh khanate, historical pantheon of Kazakh politics. It is also a heart of touristic region of the group of ancient cities on Syr-Darya. Here are located nearly 50 medieval cities of the ancient cultures Soghdiana, Chorasmia and Transoxiana. Kazakhstan state authorities defined key objectives of urban transformation - new administrative center and culture capital of Central Asia and the Turkic World. Turkistan is conceived deemed as a touristic attraction in a row of Samarkand, Bukhara and Khiva. And the city has a potential for it. Key locations for transformations are Old City with UNESCO heritage of Khawaja Akhmed Yasavi Mausoleum and new administrative district of New City.

The project based on the results of field research and assessment of economy, culture, transport, environment, theatre industry of Kazakhstan, landscape and biodiversity, priorities of development and city`s stakeholders. Sustainable development of this project is impossible without: support of small and medium-sized businesses; involving of stakeholders on micro- and macro-levels; reorientation of the microeconomics to services, recycling and science-based industry; legislative and financial support of culture and development of independent creative industries. All mentioned above statements are included in the strategy core. Together with key objectives the strategy proposes scenarios for solving of ecological and urban issues of the microregion of Turkistan. Main of them are water management and water quality, salination and degradation of soils, deforestation and failure of ecosystems, waste management, Aral Sea ecological disaster. The strategy affects changes in view and structure of the historical city center (Old city district) and proposes creation of the new business and administrative center on the actual outskirts of the city (New city district).

Key values:

1. Routes from the Old city to the New city and back. Pedestrian, bus and bicycle routes, trade streets and boulevards connecting Old and New city.

2. History through the centuries. Cultural and historical urban landscape as a basis for proper transformation of the city into a center of the Turkic world.

3. Attractions on every corner. Unique and diverse urban landscape formed by archeological, historical and cultural monuments, pieces of landscape and park design and contemporary architecture objects

4. Turning grey into gold. Proper transformation of urban environment, scientific recovering of the heritage objects, increasing the city`s comfortability for the citizens and tourists.

5. Highlite street edges. Well defined city structure with clear separation between public and private, street and courtyard space.

6. Unite the nature. Recovering of the rivers. Connection of the green belts into a single network of natural landscape which penetrates the entire city.

7. Bioclimate and energy. Using the local advantages of the climate for increasing of the energy security. Energy efficiency and rational usage of resourses.

8. Transportation without problems. Convenient and comfortable public transportation system which takes into account seasonal dynamics of touristic flows. Local electric transport inside the buffer zone of historical heritage area. Quick and convenient connection to the outer world

9. Sustainable implementation.

Project focused on the real opportunities for development, market demand, macro- and microeconomy factors.

Case Study / Project

The Power of Culture

in Creative Placemaking for Future Urban Economy

Ehsan RANJBAR

Abstract

Based on socio-economic changes of cities and emerging new types of urban public spaces in 21th century, urban design as an interdisciplinary science which concentrates on public domain needs to introduce new lens to analyze and improve quality of contemporary urban spaces. In new literature of urban design creativity has been introduced as a key attribute to create successful places. In this process of creative placemaking for preserving the identity of urban spaces we need to be connected to powerful concepts like culture which is alive from past to future. In other word culture has a unique potential to convey creativity in designing new public spaces. Such approach is effecting on urban economy based on introducing contemporary urban spaces as new tourism destinations. European cities have valuable experience to use the cultural potentials and assets in improving quality of life and urban tourism.

The presentation with reviewing some of European cities experiences, is trying to analyze the idea in Iran as an Asian and Middle-east country, where the experiences of using culture enhancing urban quality have been neglected in the current literature of urban studies. The results demonstrate the power culture in Iranian everyday life of public spaces. Those spaces used cultural-entertainment led regeneration approach have successful from the lens of urban economy for all the city. The most important thread in development of theses space is privatization of urban spaces by rich corporations. According the analysis of these urban spaces and reintroducing the rich treasure of culture in Iran as one of rare alive civilizations, the paper brings up new and integrated model of strategies on using culture-led regeneration approach in future of Iranian cities.

Case Study / Project

An Awkward Dance

Nightlife and Urban Development (Lessons from Berlin)

Benjamin SCHEERBARTH

Abstract

Berlin exemplifies the relationships between (sub)culture, identity, and the emergent knowledge economy like no other. Unique conditions, including the aftermath of two World Wars, a generation-long separation by the Berlin Wall, and a period of failed investment-led over-speculation, created a testbed for alternative cultures, local creativity, and entrepreneurialism. Today, the city is internationally renowned for its cultural diversity and its vibrant nightlife, both fundamental driving forces behind the city's journey to becoming Europe's center for the immaterial economy and new work. The club scene only recently found ways to measure and communicate its social and economic benefits to garner political support. While the city begins to recognize the financial and marketing value of its nightlife, district-level planning administration has been introducing stringent laws, regularly endangering the scene. Despite nightlife's critical contribution to the cultural geography of the city, the local urban planning establishment often perceives both individual clubs and informal entertainment zones as urban hazards to be restricted and controlled. While a few academic voices call on city planners and policymakers to pay more attention to nightlife and its numerous benefits for the city, actors of the subcultural scene are getting involved in urban development themselves. Armed with resilience and resourcefulness stemming from years of practicing tactile urbanism, subcultural actors begin to become authors of locally sensitive solutions. While these projects quickly garner admiration for their inventiveness and popularity, urban planning administration and bureaucracy presents itself as the biggest hurdle to successful implementation. This presentation shares lessons learned from Berlin's ambivalent relationship between subculture and urban planning, applicable to major cities around the world in search of strategies to partner with alternative culture to increase attractiveness and livability. It further calls for a less restrictive and more creative planning practice, which is not afraid of learning from different sources such as the nebulous but incredibly productive urban nightlife.

Case Study / Project

Forward Thinking on Culturally Urban Imprint in the Contemporary Era

Rejuvenating the Traditional Neighbourhood Values and Characters: An Urban Morphology Review on Qatari Cities

Harini SEPTIANA, Noora AL NAEMA, Amna Khalid J A AL-JABER,
Fatma AL BADER, Lolwa M. Alfaya AL KHALDI

Abstract

Most of the cities in the world are witnessing tremendous changes in their urban landscape, over the last half-century. Under the modern planning regime, the spatial layout organization of a city is very much dictated by the ease of motorized movement priority, in order to cope with increased travel demands as a result of the pressing growth of the economy and population. Today, it becomes planning norm that the primary determinants to define a city's spatial structure are based upon motorized movement patterns, along with other factors such as the population size, urban capacity, and the growth size or scale. The upside of such approach is that the spatial structure becomes more effective and efficient in accommodating a denser population with their infrastructure service, and in anticipating the future expansion. However, the downside will be the tendency to undermining the 'people factor' with their social cultural life and activities.

Without careful thinking and proper planning, one of the impacts of highly prioritized transport infrastructure in shaping the city spatial structure, is the loss of identity. There is a danger of the unique urban culture being diluted and forgotten, leaving 'a legacy' of soul-less cities everywhere, with each lacking any distinct personality or character. With more and more cities seeking to enhance their competitive global position through employing cultural strategies in their developments, it is definitely 'a wake-up call' for cities that have been busy focusing on their rapid modern developments without wisely maintain their local identity and character. Urban identity needs to reflect cultural and historical values, through modern interpretation and not simply by importing foreign templates. Therefore, the urban imprint should be recognized as an illustration of a place's culture and traditions. It demystifies the interaction of built environment and people with all their values, that work together to define an identity. I

n this paper, Qatari cities and towns become the study context as they also experience extreme speed of changes after the discovery of oil and gas in the 1970s, and in current situation, a globalized language of urbanism has overshadowed the then Qatari's unique blend of maritime, rural and urban culture. The world of motorways has become dominant over 'the used to be' tightly-knitted neighbourhoods with intricate alleyways (sikka) and small public open spaces (barahat).

This paper mainly examines the morphology of traditional neigbourhoods that are still intact in the Downtown Doha area and other old towns (such as Umm Slal Mohammad, Al Wakrah and Al Khor) and seeks the opportunity to capture their key principal characters to inspire the modern spatial layout.

The paper comprises of three sections. The first section discusses the evolutionary morphological process of Qatari cities and towns, from rural-village characters to modern spatial layout and its impacts. The second section analyses the traditional neighbourhoods (fereej) as the smaller unit of the city, to elicit attributable principal factors that shape them (i.e. tradition, social cultural values, climate sensitivity, physical pattern) as well as the current adoption of modern spatial layout. And last section elicits the best way forward in defining appropriate urban morphology that fit-well to Qatar context, and in employing cultural strategy to enhance it.

Case Study / Project

Informal entrepreneurs in old districts in central city Shanghai

Qi SHEN

Abstract

In China, urbanization progress is shaping rapidly the urban space and urban society. Megacities are attracting incoming migrant labour and correspondingly external investment from national and international real estate developers. Conflicts between different social groups in space usage become more intensified and critical. Informal entrepreneurs in old districts in Shanghai are mainly the migrant generation released from agricultural sector after the 1980s, rooted in the wide rural land surrounding metropolitan regions. The conflicts between the informal entrepreneurs and the newcomer business developer, between the informal working environment and the new business development projects, indicate a wider conflict beyond the metropolitan level, between the development in the rural land and urban land. This paper focuses on those informal sectors in old districts in Shanghai, including family-owned retail shops, street vendors, recycling, delivery etc.. Informal economy plays a significant role in filling up the blanks in the current economic structure. It offers enormous work opportunities for migrant labour, who are excluded from the labour market due to low-level education and lack of financial resources.

The research consists of two parts. The first part concentrates on the observation survey on the physical environment and working condition of the migrant labour. Study on certain urban spaces is meaningful. It will help us to understand the space features, social functions, and social meanings of those urban spaces. Their meaning is unfortunately inadvertently or intentionally ignored in the public discussion. Which turns into the result of a large-scaled demolishment in old districts and the tearing of native social network in the process of urban renovation. The second part opens a discussion on a progressive urban developmental strategy, aiming to modify the current urban renewal process and soften the effect of business development projects. Small-scaled and gradual progress allows further conservation of the working places of migrant labour and native social network. With a low-key intervention method, to approach an efficient improvement on the physical environment quality. As the ultimate goal, to integrate the native community and migrant workers into the process of urban development and extend the interaction mechanism within the native community into the new projects.

Research Paper

Activation and Revitalization

The Revival Plan of Yihe, Nanjing

Luni SHEN, Shanghai Tongji Urban Planning & Design Institute Co.,Ltd; China

Abstract

Based on the revival planning of Yihe, Nanjing, this paper emphasizes the importance of culture to the metropolis, explores the alignment of new formats and historical spaces, and generalizes several strategies of historical space activation on the respects of culture revitalization, industry innovation and space activation.

Keywords

Culture Revitalization, Space Activation, Industry Innovation, Yihe Road

1. Introduction

As an ancient capital of six Dynasties, Nanjing enjoys a long history of more than 7,000 years of civilization as well as a history of nearly 2,600 years of city construction. Nowadays, as a metropolis in the Yangtze River Delta region, Nanjing also plays a significant role in the Yangtze River economic belt and the eastern coastal economic belt.

Yihe historic conservation district is one of Nanjing's iconic historic spaces. Its history can be traced to" the city plan of Nanjing" of ROC(the Republic of China), which was planned by Henry Killam Murphy in 1929 and was China's first modern urban plan. At that time, this plan presented the zoning planning concept in line with international urban planning. According to the plan, Yihe Road was zoned as the first residential area, the superior residential area.

Figure 1 "The city plan of Nanjing"

Figure2 The plan of the superior residential area

(Source:" The city plan of nanjing ",1929)

Figure 3 Maps of Yihe, spatial pattern is well served (Source: Drawn by project team)

Up to now, Yihe Road continues its use as residential area, and its spatial pattern has been well served. However, although "the features of ROC(the Republic of China)" and "historic conservation district" have become well-known "tags" of Yihe, public's perception of Yihe is still just a static piece of “urban memory”. Its precious culture, historical heritage and unique identity have not been well utilized. In order to drive Yihe’s vitality and enhance its social value, a revival plan of Yihe was conducted by Tongji urban planning & design institute in 2018, aiming at implementing three levels of revival work in the context of historic environment activation.

2. Culture Revitalization

According to the revival plan of Yihe, the first step to do was the revitalization of culture. Several cultural routes were planned and a series of cultural exhibitions would be settled to excavate and expand the cultural connotation of Yihe Road. Through the modern transformation of historical resources, the urban spirit was expected to reflect on a broader level.

2.1. Historical connotations and remains of Yihe

1920s was a period of transition when China began to transform from feudal society to democratic society. At that certain time, ” the city plan of Nanjing” was a big innovation which represented the democratic will as well as the national confidence.

Up to now, within the scope of Yihe Road, there are 287 historic buildings, 225 ROC(the Republic of China) feature courtyards, 200 celebrities' former residences, 32 historic embassies sites and 2 sites of significant historical events. The number of embassies and the density of historic sites are at the top level among those historic conservation districts across the country.

Tab. 1 Historical remains of Yihe (Source: Collected by project team)

Sum	• *35 hectares，303 courtyards* • *225 ROC(the Republic of China) feature courtyards， 74%*
Cultural heritage sites	• *3 of Provincial level* • *38 of city level* • *11 of district level* • *171 immovable historical relics*
Celebrities' former residences	• *200 former residences of celebrities, 66%* • *2 sites of significant historical events* • *5 masterpieces*

Embassies	• *24 embassies sites, 8%* • *63 General's house,21%*

2.2. Current Influence and Popularity of Yihe

From the perspective of Nanjing, there are 750,000 related terms of Yihe on the Internet, ranking the ninth in the ROC(the Republic of China) related attractions. As the first one, the presidential palace has 18,600,000 related terms, 25 times that of Yihe.

Tab. 2 Internet related terms of the ROC related attractions in Nanjing

(Source: Collected by project team)

Attractions	***Related terms***
1. Presidential Palace	*18,600,000*
2. Zhongshan Mausoleum	*13,700,000*
3. Nanjing Museum	*5,820,000*
4. Jinling University (Nanjing University)	*4,320,000*
5. 1912 Bar Street	*2,640,000*
6. Meiyuan New Village	*2,240,000*
7. Central University (Southeast University)	*1,890,000*
8. Meiling Palace	*1,640,000*
9. Yihe Road	*752,000*
10. Jinling Women's University (Nanjing Normal University)	*664,000*

From the perspective of China, the related terms of Yihe is less than 1/10 of Tianjin Fifth Avenue and Qingdao Badaguan. Compared to similar historic districts, the popularity of Yihe is quite low. Its culture value has not been effectively promoted and its influence are far away from it deserves.

Tab. 3 Internet related terms of similar historical districts in China

(Source: Collected by project team)

Key word	***City***	***Related urban plan***	***Time***	***Related terms***
Fifth Avenue	*Tianjin*	*"Material Construction Project for Tianjin Special Municipality city"*	*1930*	*14,700,000*
Badaguan	*Qingdao*	*"qingdao city plan"*	*1933*	*8,560,000*
Yihe Road	*Nanjing*	*" the city plan of Nanjing"*	*1929*	*752,000*
Jiangwan ROC Buildings	*Shanghai*	*"Great Shanghai Plan"*	*1929*	*505,000*

2.3. Strategies of culture revival

As the only mega city in the Yangtze River Delta, Nanjing needs to perform as an innovative source, an open portals and an important strategic pivot in the Yangtze River Delta urban group. It needs Yihe to form Nanjing's culture brand, build its city image and improve its city position. Therefore, just focus on the ROC(the Republic of China) culture is not enough, the revival of Yihe should be considered on a broader view.

(1) Building a culture scene shared by both hosts and guests

It is believed that the retention rate of the original residents is an important criterion for judging the authenticity of historic blocks. At present, the population retention rate of historic blocks in China is around 60%. Based on the situation of Yihe, the revival plan decided to retain 60% of the courtyards as residential places , and to open 40% of the courtyards to the public. Which means, this plan will not only serve the open part of the future, but also serve the existing living places, building a cultural scene shared by both hosts and guests.

Tab.4 Population composition of Historic District in China

(Source: "The Study on Some Issues Related to the Conservation and Planning for the Historic Streets and Areas in China")

Historical distrct	***Original population***	***Planning population***	***Retention rate（%）***
East Liuli Factory Area, Beijing	*3553*	*2092*	*62.39*
East Liuli Factory West Street, Beijing	*2290*	*1370*	*59.83*
Fuchengmen Inner Street, Beijing	*9360*	*8200*	*87.61*
Nanchizi Area, Beijing	*9200*	*6900*	*75.00*
Beichizi Area, Beijing	*8531*	*5577*	*65.37*
Xianyukou Area, Beijing	*23798*	*18488*	*77.69*
Nanchang Street, Beichang Street, Xihuamen Street, Beijing	*6486*	*4000*	*61.67*
Yue city, Shaoxing	*8823*	*7270*	*82.40*
Lu Xun Road, Shaoxing	*3571*	*2618*	*73.31*
Xixiaohe, Shaoxing	*4473*	*2600*	*58.13*
Dagu Ancient Town, Guilin	*5000*	*3000*	*60.00*
Ziyang Street, Ximen Street, Linhai	*8992*	*5800*	*64.50*
Average Value	*--*	*--*	***63.58***

(2) Highlighting key resources

Through putting cultural resources such as cultural heritage sites, celebrities' former residences, embassies, historical events, etc. on the map, scoring each resource according to its value, we got a cultural resource heat map, which showed that high culture heat located in Yihe road, North of Ninghai Road, Beijing West Road - Tianzhu Road, and the key area of culture revival would be Yihe road and Ninghai Road.

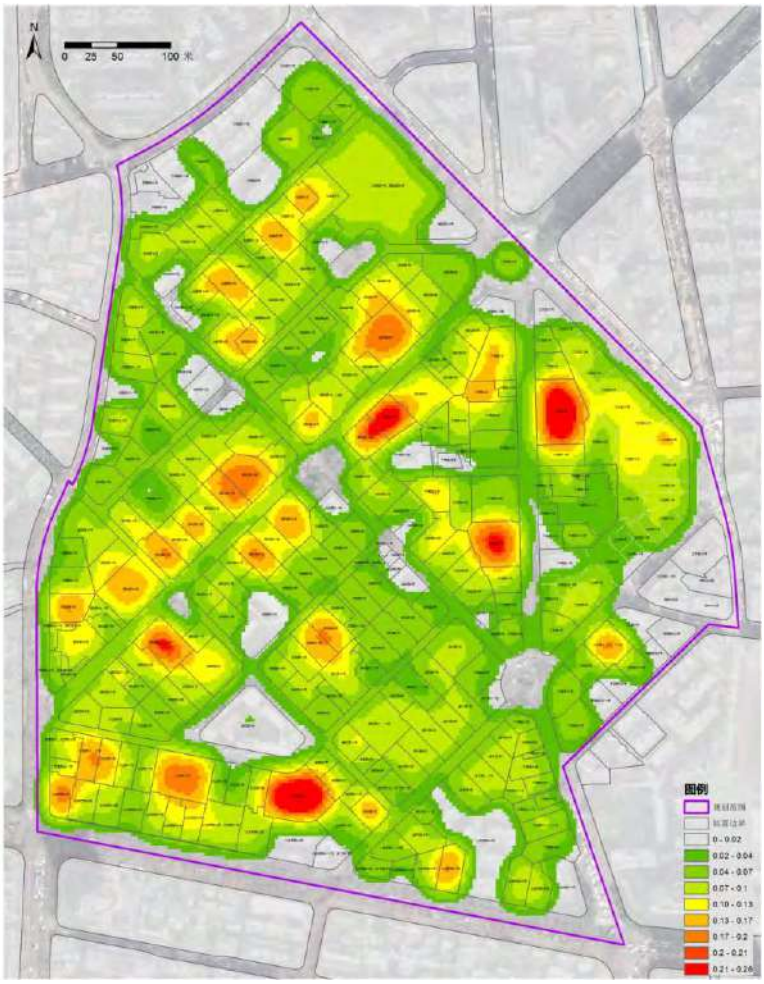


Figure 4 Map of cultural resource heat (Source: Drawn by project team)

Based on the culture heat map, several theme routes were designed according to the distribution of different cultural resource types, such as the series of celebrities' former residences, and the series of embassies, etc..

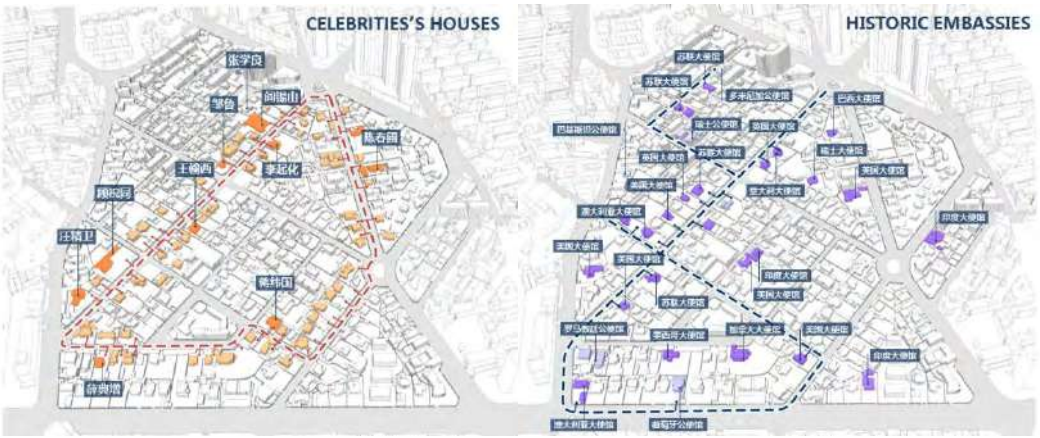


Figure 5 Route of celebrities' former residences Figure 6 Route of embassies

(Source: Drawn by project team)

(3) Injecting international elements

Through introducing international expert apartments, overseas expert studios, international organizations, international business offices, foreign affairs reception services, foreign affairs intermediary services, investment promotion services, etc., Yihe is planned as a "culture parlor" of Nanjing, helping to enhance Nanjing's international influence.

In conclusion, understanding and utilizing the cultural connotation of Yihe is the top priority work of the revival plan. Culture will define the direction of industry, as well as inject the soul into the material space.

3. Industry innovation

Based on a research on the present resources and regional competition situations of Yihe, an industry screening was conducted and the result turned out that art finance and international platform would be the ideal leading industries of Yihe. In addition, culture exhibitions, fashion recreation, residence and other ancillary services would perform as supporting industries, driving the activation of Yihe together.

3.1. Industrial orientation of cultural genes

According to the analysis of Yihe's culture connotation, we summarized Yihe's cultural genes into the ROC(the Republic of China) culture, architectural culture and historical culture.

The ROC(the Republic of China) culture contains east-west integration, cultural prosperity and social progress, its corresponding formats include international exchanges, cultural innovation, artistic creation, technological innovation, etc.; Architectural culture contains the display of the city plan, the form of the superior residential area, and the architectural feature. Its corresponding formats include planning display, residential facilities, architecture design, etc.; Historical culture are concentrated in a large number of celebrities' former residences, historical events, and historical embassies. Its formats orientation includes exhibitions, foreign affairs activities, international offices, etc..

Tab. 5 Formats orientation of cultural genes (Source: Summarized by project team)

Cultural genes		*Formats orientation*
The ROC Culture	*east-west integration*	*international exchanges*
	cultural prosperity	*cultural innovation, artistic creation*
	social progress	*technological innovation*
Architectural Culture	*"the city plan of Nanjing"*	*planning display*
	the superior residential area	*residential facilities*
	architectural feature	*architecture design*
Historical Culture	*celebrities' former residences*	*exhibitions*
	historical events	*patriotic education*
	historical embassies	*foreign affairs activities, international offices*

3.2. Industrial system

Relying on the characteristics analysis of Yihe, an industrial system was organized, focusing on the two leading industries and three supporting industries:

Tab. 6 Industrial system (Source: Summarized by project team)

Leading Industries	*Art creativity*	*Creative design, road show, experience consumption, auction transaction, art finance, fashion order, craftsman economy, digital culture, etc.*
	International exchange	*International Organization Headquarters, International Chamber of Commerce Association Office, Foreign Affairs Reception, Investment Promotion Service, International Business Service, etc.*
Supporting Industries	*Culture Expo*	*Architectural real museum, cultural exhibition exchange, student second class, cultural exhibition, graduation design exhibition, technology exhibition release, festival activities, award ceremony, etc.*
	Fashion recreation	*Immersive cultural tourism, slow living services, specialty businesses, creative dining, cultural entertainment, boutique hotel, B&B, city walks, etc.*
	Residence and ancillary services	*Medical care services, health care, education and training, smart communities, international staff support (international community), etc.*

4. Space activation

After the industrial structure was determined, the next task to do was the activation of historical space. How to adapt and utilize these historical spaces was well considered through analyzing different space demand of different industries. By protecting the heritage ontology and activating the historic space, new connotations for these historical spaces would be created while the historic culture context would be inherited.

4.1. Space demands for different industries

(1)Space demands for art creation

Art creation includes Design office, Workshop, Art show, Art bank, etc.. They have low demands for street accessibility and have strong adaptability to different space types. Comfortable and interesting art space are easily to be build though connecting some small courtyards or transforming some old spaces .

Tab. 7 Space demands for art creation (Source: Summarized by project team)

Formats	*Scale types*	*Area demands（㎡）*	*Building demands*	*Courtyard demands*	*Open space demands*	*Culture value demands*
Design office	*small*	*100-500*	--	--	--	*medium*

	medium	*above500*	*Column-free space*	*Separate / multiple linked courtyards*	*Appropriate open space*	*medium*
Workshop	*Small-medium*	*200-500*	*--*	*--*	*--*	*medium*
Art show	*small*	*300-1000*	*Column-free space*	*--*	*--*	*medium*
	medium	*above 1000*	*Column-free space*	*Separate courtyard*	*Appropriate open space*	*medium*
Art bank	*Small-medium*	*above 1500*	*Column-free space*	*--*	*--*	*Low*
Art auction	*Small-medium*	*above 1000*	*Column-free space*	*--*	*--*	*Low*
Art investment fund (office)	*Small-medium*	*300-600*	*--*	*Separate / multiple linked courtyards*	*--*	*Low*
Experience consumption	*Small-medium*	*100-500*	*--*	*Separate / multiple linked courtyards*	*--*	*Low*
Fashion order	*Small-medium*	*300-800*	*Column-free space*	*Separate / multiple linked courtyards*	*--*	*Low*

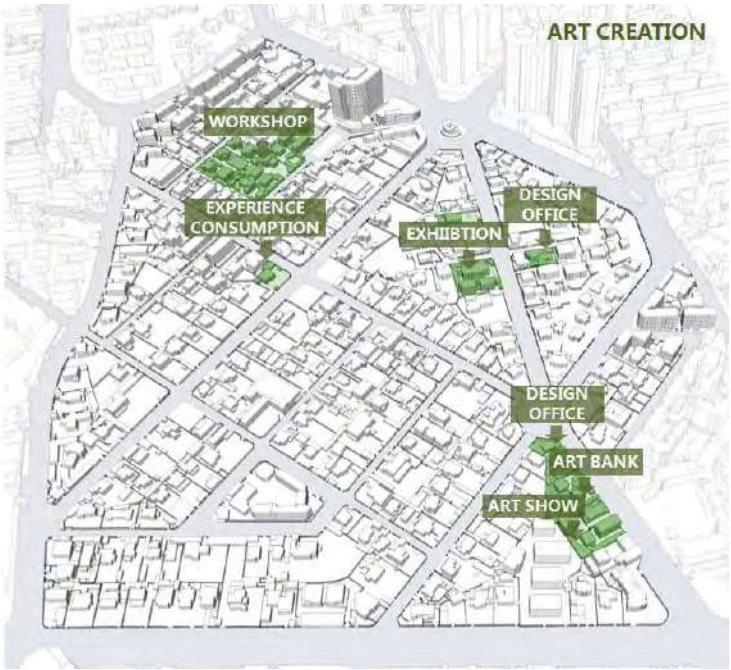


Figure 7 Distribution of art creations (Source: Drawn by project team)

(2)Space demands for international exchange

International exchange includes international organization, international association office, reception service, intermediary service, etc.. They have low demands for culture value but often have strong needs of column-free indoor space or comfortable outdoor sites to hold different types of meetings.

Tab. 8 Space demands for international exchange (Source: Summarized by project team)

Formats	*Scale types*	*Area demands (㎡)*	*Building demands*	*Courtyard demands*	*Open space demands*	*Culture value demands*
International organization, international association office	*small*	*200~1000*	*--*	*Separate / multiple linked courtyards*	*--*	*Low*
	medium	*above 1000*	*Column-free space*	*Separate / multiple linked courtyards*	*Appropriate open space*	*Low*
International business office	*small*	*200~1000*	*--*	*--*	*--*	*Low*
	medium	*above 1000*	*Column-free space*	*--*	*--*	*Low*
Reception service	*accommodation*	*above 5000*	*--*	*Separate / multiple linked courtyards*	*Appropriate open space*	*Low*
	catering	*200~2000*	*Column-free space*	*--*	*--*	*Low*
Intermediary service	*small*	*100~500*	*--*	*--*	*--*	*Low*
	medium	*500~2000*	*Column-free space*	*--*	*--*	*Low*
Investment service	*small*	*100~500*	*Column-free space*	*--*	*--*	*Low*
	medium	*above 500*	*Column-free space*	*--*	*Appropriate open space*	*Low*

Figure 8 Distribution of international projects (Source: Drawn by project team)

(3)Space demands for culture expo

Culture expo includes museum, exhibition hall, etc.. Normally, high culture value places are their best choices. In addition, they also need column-free indoor space or enough outdoor space to hold exhibitions or ceremonies.

Tab. 9 Space demands for culture expo (Source: Summarized by project team)

Formats	*Scale types*	*Area demands (㎡)*	*Building demands*	*Courtyard demands*	*Open space demands*	*Culture value demands*
Museum, exhibition hall	*Small-medium*	*above1000*	*Column-free space*	--	*60%*	*high*
Memorial Hall, celebrities' former residences	*small*	*300~1000*	--	--	--	*high*
	medium	*above 1000*	--	*Separate / multiple linked courtyards*	--	*high*
Gallery, art sales show	*small*	*100~800*	--	--	--	*medium*
	medium	*above 800*	*Column-free space*	*Separate / multiple linked courtyards*	--	*medium*
Technology Product Release Show	*Small-medium*	*above 1000*	*Column-free space*	*Separate / multiple linked courtyards*	--	*Low*
International Arts Festival, Awards Ceremony	*Small-medium*	*above 2000*	*Column-free space*	*Multiple linked courtyards*	*70%*	*medium*
Art investment, road show	*Small-medium*	*above 1000*	*Column-free space*	--	--	*Low*
Patriotism education	*Small-medium*	*above 1000*	*Column-free space*	*Multiple linked courtyards*	*60%*	*high*

Figure 9 Distribution of culture expo (Source: Drawn by project team)

(4)Space demands for experiential consumption

Experiential consumption contains leisure Shopping, creative dining, boutique hotel, Cafe, etc..They prefer to locate near offices, museums and other public facilities and usually they have higher remands of space quality.

Tab. 10 Space demands for experiential consumption (Source: Summarized by project team)

Formats	*Scale types*	*Area demands (㎡)*	*Building demands*	*Courtyard demands*	*Open space demands*	*Culture value demands*
Experience, Leisure Shopping	*Small*	*50-100*	*--*	*--*	*--*	*Low*
	medium	*above 100*	*Column-free space*	*--*	*--*	*Low*
Creative dining	*Small*	*50-100*	*--*	*--*	*--*	*Low*
	medium	*100-200*	*--*	*--*	*Appropriate open space*	*Low*
Cultural entertainment(cafe，winery, etc.)	*Small*	*50-100*	*--*	*--*	*--*	*Low*
	medium	*above 100*	*--*	*--*	*Appropriate open space*	*Low*
Boutique Hotel	*Small-medium*	*300~2000*	*--*	*Separate / multiple linked courtyards*	*Appropriate open space*	*Low*
Tourist Service Center	*Small-medium*	*above150*	*Column-free space*	*--*	*Appropriate open space*	*medium*

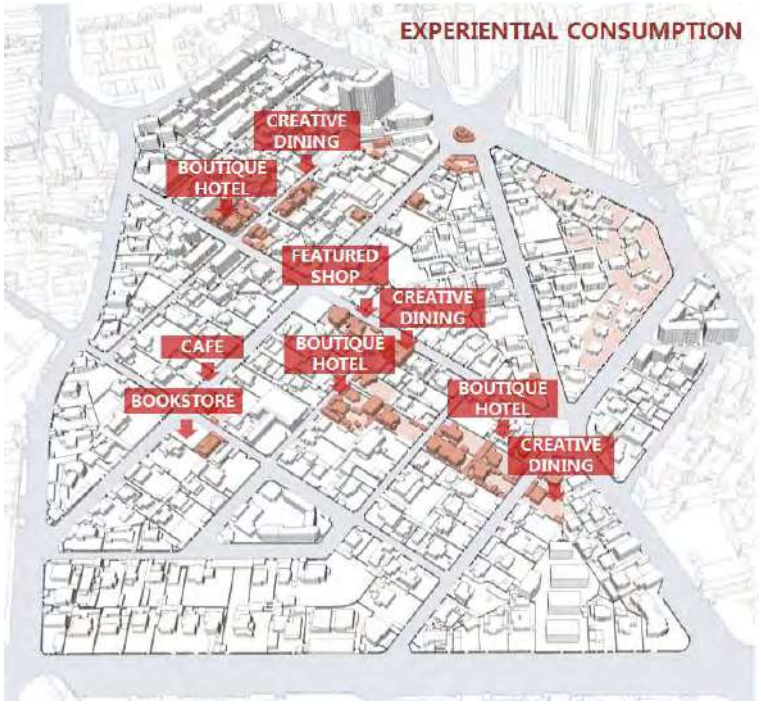


Figure 10 Distribution of experiential consumption (Source: Drawn by project team)

(5)Space demands for residential support services

Residential support services includes medical centre, community service, etc..Their location should be convenient for residents. And they also need column-free indoor space to guarantee the organization of community activities.

Tab. 11 Space demands for residential support services(Source: Summarized by project team)

Formats	*Scale types*	*Area demands（㎡）*	*Building demands*	*Courtyard demands*	*Open space demands*	*Culture value demands*
Medical center	—	*above 3000*	*Column-free space*	*Separate / multiple linked courtyards*	--	*Low*
Smart Street Management Center	—	*above 1000*	*Column-free space*	*Separate / multiple linked courtyards*	--	*Low*
International Community	—	*100~500*	--	--	*Appropriate open space*	*Low*

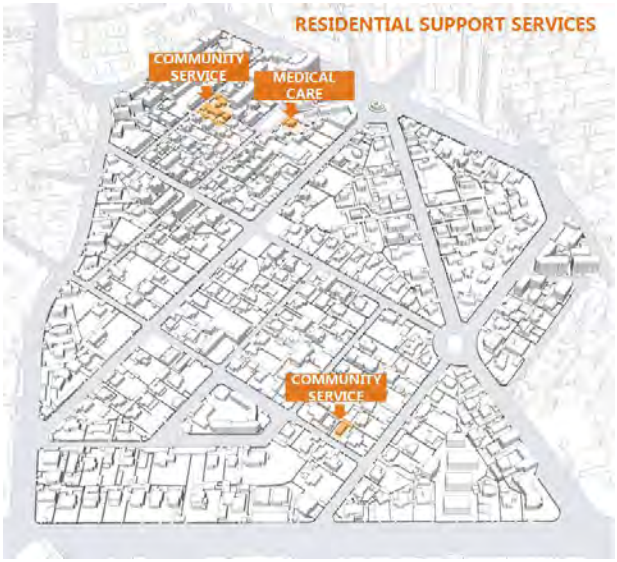


Figure 11 Distribution of residential support services (Source: Drawn by project team)

After all the formats were settled, the plan of public courtyards distribution appeared. 117 public courtyards, 40% of all the units ,that meet the criteria of retaining 60% original residents, guaranteeing the authenticity of this historic district. Most public courtyards located along the regional representative road, such as Yihe Road and Ninghai Road, in order to attractive pedestrians, improve appearance, as well as drive the vitality of the region.

Figure 12 Distribution of public courtyards (Source: Drawn by project team)

4.2. Strategies for space activation

At present, the street interfaces in Yihe district are mostly closed to public. With great privacy and small publicity, each courtyard has its own entrance, a large number of historic resources are enclosed in these courtyards.

Figure 13 Closed street interface (Source: Drawn by project team)

Therefore, we proposed a concept called “intra-wall economy”. On the basis of retaining the interface along the street wall, we planned to remove partial partition wall between two adjacent yards, connect the open space of several courtyard, and then shape the "inner street". As a result, the shared space will be created through the expansion of node space, historical resources will be open to public, together they will drive the “intra-wall economy” and bring vitality to this region.

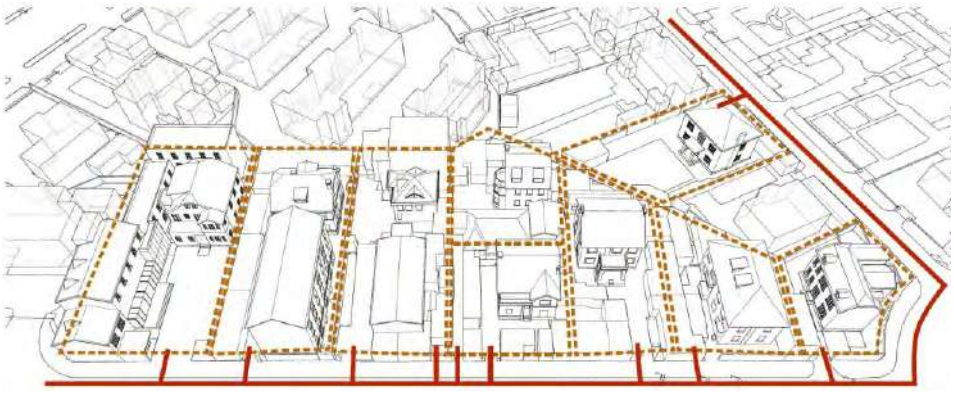


Figure 14 Closed courtyard at present (Source: Drawn by project team)

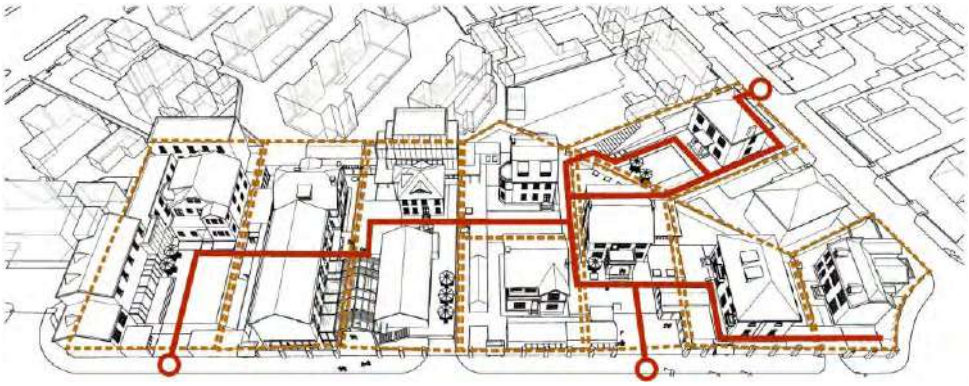


Figure 15 Inner street in the future (Source: Drawn by project team)

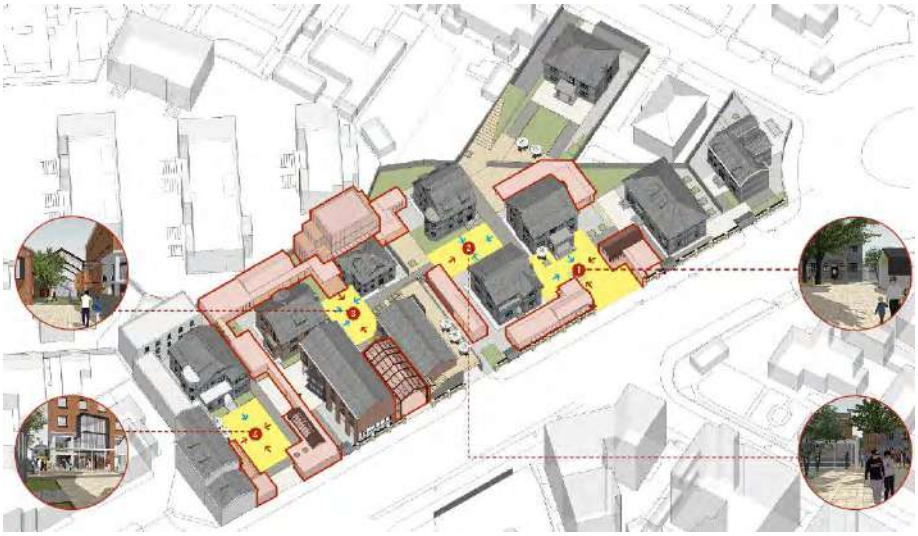


Figure 16 Vibrant intra-wall economy with vitality (Source: Drawn by project team)

5. Conclusion

As the demands for urban renewal in metropolis are growing rapidly, revitalization planning becomes one of the most important types of planning at present. Urban revitalization often involves the conservation and the utilization of historical elements, as well as the alignment of new formats and historical spaces. This paper combs different space requirements of different industries and generalizes several strategies of historical space activation, hoping to provide certain reference for other similar situations.

6. References

Geva, A., & Byard, P. S. (1998). The architecture of additions: design and regulation. Apt Bulletin, 33(1), 57.

Gustavsson, R., & Peterson, A. (2003). Authenticity in Landscape Conservation and Management — The Importance of the Local Context.Landscape Interfaces.

Yisan, Ruan; Meng, Sun (2001) "The Study on Some Issues Related to the Conservation and Planning for the Historic Streets and Areas in China", Urban Planning, Vol.25(10).

Lifan, Yu; Xiaohua Zheng(2017) "Preservation of City Historical Memory with Conservation Plan for the Historical Scenery of the Villa Area on Yihe Road in Nanjing as a Case ",Culture Geography, Vol.9.

Research Paper

Recycling industrial heritage: promoting local diversity and cohesion in globalising cities

Milan ŠIJAKOVIĆ, TT Architects; United Kingdom

Ana PERIĆ, ETH Zurich, Institute of Spatial and Landscape Development; Switzerland; University of Belgrade, Faculty of Architecture; Serbia

Abstract

The shift towards knowledge economy accompanied with the flow of people, capital and goods has manifold effects on urban development. On the one hand, cities are becoming more alike: in chasing for profit, global capitalism imposes spatial patterns that lack distinctiveness. On the other hand, network society makes people living in a global village, thus bringing multiculturalism to the fore. Consequently, continuous change and replacement of urban layers lead to the loss of readability, local diversity, and, finally, identity of a place.

To tackle the issue of preserving local identity in a globalising world, we place an emphasis on industrial heritage and the effect of its recycling on a local urban area. As industrial areas keep memory and deep-seated associations for local residents and communities, they play an important role in defining the identity of both the place and its inhabitants. To recycle industrial heritage means to alter obsolete industrial area using its available, useable material, thus making the site suitable for the new function. Recycling differs from both preservation – that persists in maintaining status quo, and the total demolition of an area in order to build it from scratch. Recycling of an industrial site with historic value, thus, make an important contribution to regeneration of urban areas and has a range of social benefits: recycled districts reinforce local cultures, instil a greater sense of pride and confidence among its inhabitants, and retain cohesion in globalising cities. Finally, recycled industrial areas usually become the hubs of creative industry, thus fostering the local economy based on knowledge in contrast to pure tourist areas as manifestations of global consumption.

Keywords

Urban recycling, industrial heritage, diversity, identity, culture.

1. Introduction

Architectural recycling and the broader concept of urban regeneration have usually been linked with sustainable development through its environmental component. However, the relationship between the urban regeneration and social sustainability remains underdeveloped, theoretical and oversimplified when compared to the progress of the environmental movement. If cities are to succeed as engines of economic growth, a balance must be achieved between promoting economic competitiveness, social cohesion and tackling environmental issues (Colantonio and Dixon, 2011).

Socially sustainable development can be defined as "development (and/or growth) that is compatible with harmonious evolution of civil society, fostering an environment conductive to the compatible cohabitation of cultural and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population" (Polese and Stren, 2000:15-16). Through their chronological analysis of social sustainability themes, Colantonio and Dixon (2011: 18) came to conclusion that "traditional themes, such as equity, poverty reduction and livelihood, are increasingly been complemented or replaced by more intangible and less measurable concepts such as identity, sense of place and the benefits of 'social networks'". The authors underline that "social sustainability blends traditional social policy areas and principles such as equity and health, with issues concerning participation, needs, social capital, the economy, the environment, and more recently, with the notions of happiness, well-being and quality of life (Colantonio and Dixon, 2011:18).

In the past decade we have witnessed a growing number of projects and research focusing on the positive effects of the architectural recycling on the environment, such as: exploitation of the existing urban infrastructure with no need for new site development; lesser generation of residues in relation to a totally new construction; saving new materials from being used, and cutting the associated environmental impacts of producing and transporting those materials. However, there is a range of positive social effects as well, including the reduction of local social problems and increased engagement and participation of residents, improved image of the local community and the reduction of crime and illegal activities (Colantonio and Dixon, 2011:20).

Colantonio and Dixon (2011) outlined 10 social sustainability dimensions and policy areas in which urban regeneration projects in general can generate potential outputs and outcomes as follows: demographic change (ageing, migration and mobility); education and skills; employment; health and safety; housing and environmental health; identity, sense of place and culture; participation, empowerment and access; social capital; social mixing and cohesion; and, well-being, happiness and quality of life. The authors are highlighting these areas as critical for the social sustainability of local communities and neighbourhoods.

This research focuses on the social component of the sustainable development and the role of the recycling of the industrial heritage in promoting cohesion and local diversity. Therefore, in the following subchapters, the concepts of architectural recycling and industrial heritage will be analysed, while placing a special focus on the social benefits of recycling industrial heritage.

2. Architectural recycling: a preservation through change

The Oxford Dictionary defines recycling as using again. However, while reuse means using again in the same way, recycling implies the element of change, i.e. starting a different cycle. Through the process of recycling, materials are changed into new products. According to Douglas (2006), recycling refers to transforming or re-utilizing a redundant or underused building or its materials for more modern purposes. Viganò (2012) points out that recycling is not just reusing, and highlights that, if we follow the analogy with the organic world, recycling puts forward a new life cycle. Furthermore, Ricci (2012) argues that recycling means creating new values and new meanings and points out that unlike conservation,

which embalms the image of architectural or urban space, when recycling is carried out the change itself is the value. Thus, the fundamental difference between recycling and many related terms is the notion of shift of the original function or purpose. Therefore, in this research the term recycling refers to the process of intervening with the existing industrial building, on different scale, and with different intensity, with the aim of making the building suitable for the new function.

Given that only a small percentage of the total building stock is made up of new works, this inevitably means that existing buildings play a key role in reaching the sustainable agendas. A number of authors (Kincaid, 2002; De Garrido, 2012; Kubba, 2012 and Szokolay, 2004) point out that through repurposing of what already exist, substantial environmental, economic and social benefits can be achieved. Through this process the embodied energy of building materials is saved, the environmental impact associated with excavation, production and transportation of the new materials avoided and the embodied memory of the communities preserved.

Architectural recycling refers to the process of altering the existing building, by using all of its available, useable material, in order to make it suitable for the new function. It is important to mention that unlike other terms which relate to intervention on the existing building, recycling implies the notion of change. Through such a process original building is altered, in order to make the accommodation of new function possible, while using as much of the original buildings' material as possible. This process increases the working service life of existing buildings, and so the rentability of the resources already applied (Cepinha, Ferrão and Santos, 2007). Through this process, extraction, processing and transport of the new material is diminished and the need for new development reduced, which has direct social, economic and environmental advantages. Recycling is also seen as a process which can mediate between the radical stasis, reflected in the rigid rules of preservation, and the radical change which new construction implies.

The practice of recycling is the practice of transformation, i.e. recycling demands change – the right amount of change. Through this transformation a new, viable use is affiliated to the disused building. Thus, recycling cannot be compared to preservation, which persists in maintaining status quo, nor to total replacement of a given building. Through this process a balance is searched for between the radical stasis and radical change.

Architectural recycling helps communities, governments and developers reduce environmental, social and economic costs of continued urban development and expansion. Gosling et al. (2013) highlight the benefits of recycling which include positive contribution to the socio-economic agenda driven by heritage and community interests, extending the economic viability of buildings and reducing maintenance costs. In the following subchapter the concept of industrial heritage will be analysed focusing on social benefits achieved through its recycling.

3. Recycling industrial heritage

The growing realisation of the importance of the industrial architecture consequently lead to the emergence of the 'industrial heritage' concept and to the interest in its preservation. Industrial heritage implies not only the "tangible heritage associated with industrial technology and processes, engineering, architecture and town-planning", it also includes

"many intangible dimensions embodied in the skills, memories and social life of workers and their communities" (ICOMOS, XVII Assemlée Générale, 2011: 1).

Loures and Burley (2012: 226) explain that even though industrial heritage was given a 'formal' document regarding its protection in the Nizhny Tagil Charter in 2003, followed by the Monterrey Charter, "some of the principles enounced in several other international charters and conferences, supported by the Council of Europe (COE), the International Council on Monuments and Sites (ICOMOS) and United Nations Educational, Scientific and Cultural Organization (UNESCO) included somehow the protection of industrial buildings and landscapes".

Industrial buildings and sites are important milestones in the history of humanity. Nevell (2017:6) highlights that today's industrial heritage sites are the embodiment of the development marking the shift "from rural agrarian society to an urban manufacturing society [which] changes (…) the way people live and work around the globe". The profound effects of the industrial development on the landscape, economy and society can serve as an instrument for "improving social inclusion, for nurturing historic roots and achieving sustainability through regeneration" (Oglethorpe, 2017:3).

Industrial heritage holds indisputable value through its ability to create a sense of place and identity for communities. According to Landry (2013), the development of many existing communities is based around its industrial past which acts as a source of memory and a place of anchorage for many communities, demonstrating its intrinsic cultural and social value. The author highlights that historic buildings exude memory and foster stability in a rapidly changing society.

According to Preite (2013), rehabilitation of the industrial heritage has played a fundamental role in the creation of a new urban landscape. Restored industrial building and industrial areas that have been transformed can develop an enormous cachet, as many examples like warehouses converted to flats in London's docklands and in Liverpool's Albert Dock have shown (Binney et al., 1990). According to Stratton (2000: 127), industrial and science museums, located in run-down industrial and dockside areas, "have evolved to be at the forefront of innovative interpretation and, in some cases, to act as agents of inner-city regeneration". Reutilization of industrial buildings secures long-term opportunities that connect directly to the development and redevelopment of the cities which are at the centre of our economic life (Kincaid, 2002).

Buildings in industrial areas act as incubators for small businesses especially in growing sectors of the economy (House of Commons ODPM, 2004). Regenerated industrial heritage sites offer a deviation from a traditional corporate aesthetic that is desired by creative start-ups. In their report, "New ideas need old buildings", the Heritage Lottery Fund (2013) highlights a strong correlation between industrial heritage and creative start-up industries. The report shows that, in the historic places, there is a greater propensity for businesses to be working in the most highly productive parts of the economy – professional services and the creative and cultural sector. It also shows how independent retail and leisure businesses seek to cluster in historic areas of towns and cities – adding to the distinctive sense of place which is key to success in attracting successful businesses. The research shows that historic buildings have a greater concentration of businesses linked to the creative and knowledge economy. It also shows that historic buildings are far more likely to be occupied by the types

of independent non-branded business that give places a sense of distinctiveness, authenticity and diversity.

Cossons (2013: 13) underlines that "across much of Europe, industrial heritage now takes its place as an acknowledged and valued part of the wider historic landscape, in many cases enjoying legislative protection and enthusiastic public support". According to the same source, industrial heritage is being seen today as a symbol of national identity. Recycling industrial heritage helps preserving the character of the community and provides people with a sense of belonging. This process acts as a catalyst of the urban transformation and renewal through its ability to promote cultural distinctiveness and preserve the character and embodied memory of our communities.

3.1. Recycling industrial heritage: a social perspective

Architectural heritage plays a crucial role in supporting cultural continuity, and promoting distinctiveness and identity of neighbourhoods and towns. In a joint report with the British Property Federation (BPF) and the Royal Institute of Chartered Surveyors (RICS), Historic England highlighted the significance of the heritage assets in the formation of a communal identity through their ability to create a sense of place and destination (Historic England, 2017). The Civic Trust points out that there is a great positive contribution which improving the historic fabric of areas plays in restoring local confidence as well (House of Commons ODPM, 2004).

Explaining the social benefits of heritage, Graham and Howard (2008) refer to David Lowenthal's four traits of the past: *antiquity* – conveys the respect and status of antecedence, and underpins the idea of continuity and its essentially modernist ethos of progressive, evolutionary social development; *connection between the present and the past* – represents an unbroken trajectory, established by certain artefacts in emblematic landscapes created by societies; *a sense of termination* – reminds us that what happened in the past has ended; *sequence* – allows us to locate our lives in linear narratives that connect past, present and future. These traits provide familiarity and guidance, enrichment and escape, and "a point of validation or legitimation for the present in which actions and policies are justified by continuing references to representations and narratives of the past that are, at least in part, encapsulated through manifestations of tangible and intangible heritage" (Graham and Howard, 2008: 6).

Historic buildings lend character to an area and have deep-seated associations for local residents and communities (House of Commons ODPM, 2004). Esther H.K et al. (2012) stresses the role of the historic buildings in representing the memory of the society and retaining the attractiveness of the streetscapes, adding character and providing status and image to the neighbourhoods. According to Godwin (2011), local distinctiveness and character is what makes places special and, by association, their people too.

The Parliamentary Select Committee on The Role of Historic Buildings in Urban Regeneration (2004) states that the historic environment has an important part to play in regeneration schemes, helping to create vibrant interesting areas, boosting local economies and restring local confidence. The Committee underlines that historic buildings provide a foundation for the regeneration of many of our towns and cities and that through the regeneration of these buildings a sense of community can be reinforced, an important contribution to the local economy made. The Committee also states that reuse of buildings, which have historic value, can make an important contribution to the regeneration of the urban areas and

underline that reuse of historic buildings have several benefits: Act as a catalyst to the regeneration of a neighbourhood or district; Boos the local economy and create jobs; Reinforce local cultures, instil a greater sense of pride and confidence in a neighbourhood, and; Achieve better use of natural resources.

The Institute of Historic Building Conservation outlines that "historic buildings have been a positive catalyst in achieving structural economic change, attracting higher value investment and jobs, and providing the context for creative, high quality contemporary design in new development" (House of Commons ODPM, 2004: 6). The historic environment plays an important role in creating jobs, attracting tourists, and supporting small businesses.

4. Concluding remarks

Industrial heritage plays an important role in defining the identity of both the place and its inhabitants. Industrial complexes are recognized as the local landmarks and symbols of the cities' vibrant life. The emergence of the 'industrial heritage' concept demonstrates the growing awareness on the importance of the industrial architecture. Industrial heritage is not just about industrial buildings, it is the deep societal history of industrial communities today. Through reactivation and repurposing of industrial buildings cities have transformed and regenerated entire districts. These buildings have become symbols and impetus for urban, economic, social, and environmental change.

Industrial buildings were also responsible for the creation of new and impressive urban identity and they determined the character of neighbourhoods and towns. Simply by the virtue of their size, but also due to their active role in the shaping of communities these buildings are considered valuable and important local landmarks. They have deep-seated associations for the local residents, and they give character and distinctiveness to a neighbourhood. Precisely because of the part industrial buildings played in the shaping the Modern World, i.e. profound changes induced by the industrial revolution, and their social importance as collectors of the embodied memory of our communities, these buildings have an important role in the urban regeneration of towns and cities. Through the recycling - 'preservation through change', of industrial buildings, a sense of community can be reinforced and the important contribution to the local economy can be made.

Industrial heritage is of manifold significance in terms of our cultural identity, social practices, and contemporary industry. Given that image and branding are crucial for the social regeneration of city areas, recycling of industrial heritage sites offers a unique opportunity to add value to a local community. The recycling of these buildings acts as a catalyst for the improvement and regeneration of districts and wider urban area as well. In this way new jobs are created, local economy is boosted, local cultures reinforced and better use of natural resources is achieved. Furthermore, recycling industrial heritage can be used as a form of unique branding that could inspire a sense of local pride through the creation of cultural and heritage symbols which can act as centres of community life.

References

Ball, Rick (1999) "Developers, regeneration and sustainability issues in the reuse of vacant buildings", Building Research and Information, Vol. 27 No. 3. pp. 140-148.

Binney, Marcus; Powell, Ken; Machin, Francis (1990) Bright Future: The Re-Use of Industrial Buildings, London: SAVE Britain's Heritage.

Bullen, Peter; Love, Peter (2009) "Residential regeneration and adaptive reuse: Learning from the experiences of Los Angeles" Structural Survey, Vol. 27 No.5. pp. 351-360.

Cepinha, Eloísa; Ferrão, Paulo; Santos, Sofia (2007). The certification of buildings as an enterprise strategy of the real estate sector: a national scope analysis. In Bragança, Luís; Cuchí, Albert (Eds.). Portugal SB07. Sustainable construction, materials and practices: Challenge of the industry for the new millennium (pp.113-120). Amsterdam: IOS Press.

Colantonio, Andrea; Dixon, Tim (2009) Measuring Social Sustainable Urban Regeneration in Europe. Available online: http://oisd.brookes.ac.uk/sustainable_communities/resources/Social_Sustainability_and_Urban_Regeneration_report.pdf. (Accessed on 15 May 2019).

Colantonio, Andrea; Dixon, Tim (2011) Urban Regeneration and Social Sustainability: Best Practice from European Cities, Oxford: John Wiley & Sons, Ltd.

Cossons, Neil (2013) Industrial Heritage: Treasure or Trash? In TICCIH. (Eds.). TICCIH Congress 2012: The International Conservation for the Industrial Heritage Series 2. Selected Papers of the XVth International Congress of the International Committee for the Conservation of the Industrial Heritage. (pp. 11-21), TICCIH: Chung Yuan Christian University.

De Garrido, Luis (2012) La Práctica Proyectual del Nuevo Paradigma en Arquitectura: Teoría, Diseño y Proceso Constructivo = Design Practice of the New Architectural Paradigm: Theory, Design and Construction Process, Oviedo: Síntesis Arquitectura.

Douglas, James (2006) Building adaptation, Oxford: Elsevier Ltd.

Yung, Esther; Chan, Edwin (2012) "Implementation challenges to the adaptive reuse of the heritage buildings: towards the goals of sustainable, low carbon cities", Habitat International Vol. 36, No. 3. pp. 352-361

Godwin, Phil (2011) "Building Conservation and Sustainability in the United Kingdom", Procedia Engineering Vol. 20, pp. 12–21.

Gosling, Jonathan; Sassi, Paola; Naim, Mohamed; Lark, Robert (2013) "Adaptable buildings: A systems approach" Sustainable Cities and Society, Vol. 7. pp 44-51

Graham, Brian; Howard, Peter (2008) The Ashgate Research Companion to Heritage and Identity. Hampshire: Ashgate Publishing, Ltd.

Heritage Lottery Fund (2013) New ideas need old buildings. HLF: London.

Historic England, BPF and Rics, Heritage Works (2017) A toolkit of best practice in heritage regeneration. Available at http://www.bpf.org.uk/sites/default/files/resources/Heritage-Works-14July2017-for-web.pdf. (Accessed on 28 May 2019).

House of Commons ODPM: Housing, Planning, Local Government and the Regions Committee (2004) The Role of Historic Buildings in Urban Regeneration. Office of the Deputy Prime Minister: Housing, Planning, Local Government and the Regions - Eleventh Report of Session 2003–04. Volume I – Report.

ICOMOS (International Council on Monuments and Sites) (2011) Joint ICOMOS – TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes - The Dublin Principles. Adopted by the 17th ICOMOS General Assembly on 28 November 2011.

Kincaid, David (2002) Adapting buildings for changing uses: guidelines for change of use refurbishment. London: E & FN Spon.

Kubba, Sam (2012) Handbook of green building design and construction: LEED, BREEAM, and green globes. Waltham etc.: Elsevier Butterworth-Heinemann.

Landry, Charles (2013) Old buildings and innovation. In Heritage Lottery Fund. New ideas need old buildings (pp. 4-5) HLF: London.

Loures, Luís; Burley, Jon (2012) Post-Industrial Land Transformation - An Approach to Sociocultural Aspects as Catalysts for Urban Redevelopment. In Burian, J. (Ed.). Advances in Spatial Planning (pp. 223-246). Rijeka: InTech.

Nevell, Mike 'APPG on Industrial Heritage: Evidence Session 2', The House of Commons (12 October 2017), p.6

Oglethorpe, Miles 'APPG on Industrial Heritage: Evidence Session 1', The House of Commons (11 October 2017), p. 3

Polese, Mario; Stren, Richard (Eds) (2000) The Social Sustainability of Cities: Diversity and the Management of Change. Toronto: University of Toronto Press.

Preite, Massimo (2013) Industrial Heritage and Urban Regeneration in Italy: the Formation of New Urban Landscapes. In TICCIH. (Eds.). TICCIH Congress 2012: The International Conservation for the Industrial Heritage Series 2. Selected Papers of the XVth International Congress of the International Committee for the Conservation of the Industrial Heritage (pp. 189-199). TICCIH: Chung Yuan Christian University.

Ricci, Mose (2012) New Paradigms: Reducing Reusing Recycling the City (and the Landscapes). In Ciorra, Pippo; Marini, Sara (Eds.). Re-cycle: Strategies for Architecture, City and Planet (pp. 64-77). Milano: Electa S.p.A.

Sijakovic, Milan; Peric, Ana (2014) Recycling Architecture: the redefinition of recycling principles in the context of sustainable architectural design. In Schrenk, M; Popovich, V; Zeile, P; Elisei,P (Eds.) Clever Plans for Smart Cities (Proceedings of the 19th REAL CORP 2014 International Conference) (pp. 467-476). Vienna: CEIT ALANOVA

Sijakovic, Milan (2015) Recycling Industrial Architecture: the Redefinition of the Recycling Principles in the Context of Sustainable Architectural Design (Doctoral dissertation) UPC: Barcelona.

Sijakovic, Milan; Peric, Ana (2018) "Symbiotic Architecture: Redefinition of Recycling Design Principles", Frontiers of Architectural Research Vol. 7 No. 1, pp. 66 – 73.

Stanicic, Aleksandar; Sijakovic, Milan (2019) "(Re)building Spaces of Tolerance: A 'Symbiotic Model' for the Post-War City Regeneration", Architecture and Culture, Vol. 7 No.1, pp. 113-128

Stratton, Michael (2000) Industrial Buildings: Conservation and Regeneration. London: E & FN Spon.

Szokolay, Steven (2004). Introduction to Architectural Science: the basis of sustainable design. Oxford: Architectural Press.

Viganò, Paola (2012) Recycling Cities. In Ciorra, Pippo; Marini, Sara (Eds.). Re-cycle: Strategies for Architecture, City and Planet (pp. 102-119). Milano: Electa S.p.A.

Wilkinson, Sara; Reed, Richard (2008) The business case for incorporating sustainability in office buildings: The adaptive reuse of existing buildings. In: Proceedings of 14th Annual Pacific Rim Real Estate Society Conference, Pacific Rim Real Estate Society: Kuala Lumpur.

Research Paper

COMMUNITY CAPACITY FOR CREATIVITY BASED RURAL DEVELOPMENT IN A DEVELOPING COUNTRY

Case Studies From Indonesia

Tubagus Furqon SOFHANI, The Department of Regional and City Planning, SAPPK, Institut Teknologi Bandung;Indonesia

Fikri Zul FAHMI, The Department of Regional and City Planning, SAPPK, Institut Teknologi Bandung;Indonesia

Dika Fajri FIISABIILLAH, The Department of Regional and City Planning, SAPPK, Institut Teknologi Bandung;Indonesia

Brigitta Sadnya WULANDARI, The Department of Regional and City Planning, SAPPK, Institut Teknologi Bandung;Indonesia

Abstract

This paper aims to investigate the extent to which a rural community develops a capacity to support the establishment of a local creative economy despite various limitations. This study employs qualitative research methods in examining two villages in Indonesia, namely Kasongan and Krebet. Our findings show that the community capacity and actor networks potentially spark the development of rural economies. Local communities in both cases have utilized cultures and traditions as creative capitals, which were commercialized through communal entrepreneurship and mobilized by an organized network of creative actors. Social values, namely a strong sense of belonging, high shared values and strong emotional connections, are found to be the key factors that foster creative potentials, entrepreneurial capacity, and capacity for mobilization of local resources within the rural communities.

Keywords

Creative economy, community capacity, rural development, Indonesia

1. Introduction

Several studies have shown that rural areas might not be perfect places for the flourishing creativity (Stam et al., 2008; McGranahan & Wojan, 2007; Rantisi et al., 2006). However, there is evidence that development strategies emphasizing on the creative economy and creative industries have developed rural regions very significantly (Friedland, 1982). For instance, some research has shown that rural cultural resources, crafts, community participation and entrepreneurship have played a role in improving well-being in rural areas (Bell & Jayne, 2016; Scott et al., 2016; Ray, 1998; Balfour et al., 2016), and rural resiliency (Roberts & Townsend, 2016). Creativity can also serve an alternative source of endogenous

development in rural areas, in that local communities can independently improve their well-being by involving local initiatives conducted by a set of various actors in rural areas (Turvey, 2006). However, the idea of the extent to which a rural community develops a capacity to direct creativity strategies still receives a limited attention, based on community capability and well-being perspective (Scott, 2012; Sen, 1980) that serve a key for endogenous development, especially in a developing country such as Indonesia.

This paper aims to fill the knowledge gap by examining the extent to which and the ways in which a rural community develops a capacity to support the establishment of a local creative economy in Indonesia. This contributes to addressing the question of how the idea of the creative economy is suitable for rural contexts, especially in developing countries. Two rural areas in Yogyakarta Region, Indonesia, namely Krebet and Kasongan, which are known for their creative and cultural products, are chosen in this study.

This paper intends to feature developing countries such as Indonesia as the ideal site for the implementation of a creative industry policy (Fahmi & Koster, 2017). Even though the advanced economic sectors are concentrated in larger cities, evidenced by the presence of creative industries in the areas, this study can initiate a discussion concerning the government's attempts in promoting creative industries in less urbanized areas and the ways these can be generalized in every region in the country. Further, this paper contributes to revealing how creativity in a rural area has been manifested from interactive networks and endogenous capacities to promote rural development (Balfour et al., 2016; Scott et al., 2016; Esparcia, 2014; Murdoch, 2000; Sen, 1980).

2. Literature review on rural community capacity for creativity based development

The creative economy is an economic sector that uses knowledge as the input and produces innovation (Florida, 2002), in a form of creative products with economic value (Howkins, 2002). Early works on 'creative economy' have greatly addressed the urban-based economy as a key strategy to generate economic development (Landry, 2000; Florida, 2002; Florida, 2003; Landry, 2005). The notion has gained some criticisms toward its 'identikit' solutions (Montgomery, 2005; Peck, 2005; Bell & Jayne, 2016) and its relation with regional disparities and social exclusion issues (Florida, 2017; Scott, et al., 2016; Stark, et al., 2013; Peck, 2005). Moreover, Jayne (2005) also identifies the lack of regional and rural perspective in the concept.

The interplay between creativity, the economy and place is conceptualized by various terms: the 'creative class' (Florida, 2002), the 'creative economy' (Howkins, 2002), the 'creative industries' (Hartley, 2005), the 'creative city' (Landry, 2000), and the 'creative milieu' (Cooke & Morgan, 1994). Those terms focus on their heavy orientation toward the application in the urban-based development. Moreover, in the Indonesian context, the term of creative industries is entangled around 'creative' and 'traditional cultural industries (Fahmi et al., 2016) because of the focus of national policies on creative industries which combines art and cultural elements. Therefore, scholars and policymakers have wondered as to what extent this concept is suitable for the rural domain, especially in developing countries.

Many studies have invested some ideas towards rural creative industries. Some rural regions have successfully shown that creative industries in these contexts can reshape their

economic structures and change their place-image (Bell & Jayne, 2016). Some studies demonstrate that a rural area would be "a place where the creative economy is differently manifested and articulated from the now standard 'creative script' based on cities" (Bell & Jayne, 2016: 210). Several characteristics, distinguishing rural creative economy with urban 'creative minds', are presented as follows. First, rural actors tend to be culturally, sociologically, and economically homogenous (de Silva-Sanigorski et al., 2010), unlike the thesis of Florida's creative class. Second, the lack of access still serves a major challenge in developing creative economy in rural areas (Quang Dao, 2004). Third, rural actor networks are considered stronger (Balfour, et al., 2016; Esparcia, 2014; Murdoch, 2000), compared to those of urban actors'. Considering these distinctions, the rural creative economy requires a different look and consideration with the urban 'creative minds', since local and interactional context in the rural networks can stimulate the creative milieu (Balfour et al., 2016). There is only a few research published on how interactional networks of homogenous rural actors can strengthen the community capacity to flourish creativity for rural development (for instance, Balfour, et al., 2016; Esparcia, 2014; Murdoch, 2000).

2.1. Creative potentials

Creativity is a wide and elusive concept, ranging from technological creativity (invention), economic creativity (entrepreneurship), to artistic and cultural creativity (Florida, 2002). However, it is still unclear which type of creativity is suitable for rural contexts, especially in a developing country, such as Indonesia. The 'creative economy' and 'creative industries' were mostly originated from individual creativity. In general, they seek to develop new ideas, use new technologies and focus on intellectual property, which is then related to the copyright mechanism (Howkins, 2002; Hartley, 2005). Rural artists, in the common art-based industries, might align with this concept in that they exploit their intellectual creativity as their own property and always emphasize on the creation of new knowledge (Balfour et al., 2016), even though they have more limited access to financial or educational assets (Grodach, 2011). They are also able to spread the knowledge to the community and include them in the creative industry to develop the art-based community initiatives (Balfour et al., 2016).

De Beukelaer (2014) has found that some developing countries are rich of cultural traditions that could serve materials for creativity. For example, in most developing countries, creative industries are largely craft-based (UNESCO & UNDP, 2013), which generally are strongly attached to culture. Fahmi, et al. (2016) have also found that rural areas in Indonesia, and possibly in other developing countries, have more potentials for promoting 'creative industries' based on tradition or culture. Craft-based industries can originate from strongly attached knowledge and value in local tradition and custom among rural communities. Different from individual creativity, this cultural value is common goods, which cannot be claimed as an individual property (see also De Beukelaer, 2015; Boateng, 2004). These craft-based industries also differ from other creative industries in that they might use new technologies. However, it is often unclear whether they are concerned with developing new ideas, designs or motifs. They are usually strongly attached to traditional values as they have existed for years and knowledge is passed down through generations. Creative potentials of rural areas can take form either as individual or communal creativity. In other words, both 'modern' creative industries and 'traditional' cultural, craft-based industries can flourish in rural areas.

2.2. Entrepreneurial capacity

Entrepreneurial capacity, in relation to the concept of the creative economy, relates to the skills and attitudes to transform the creative product into an 'economically valuable' product in the market, to identify the economic opportunity, and to develop the efforts into a more stable industry (Balfour et al., 2016; Mitra, 2012). This factor is needed to translate arts-based and/or cultural value product into a valuable product since not all creative potentials can be commercialized. Even though the relationship among entrepreneurship and innovation was once in a bad term, viewed by the classical perspective (Schumpeter, 1934), the current thought of creative economy has shown that the creativity-based development can benefit rural creative professionals (McGranahan et al., 2011), such as rural artists and art-based grassroots businesses.

In a classical view of entrepreneurship literature, individuals or firms would maximize, identify or create an economic opportunity to sell their products. However, in a rural context, the supportive context of entrepreneurship is culturally situated (Balfour et al., 2016). A collective mechanism exists to allow the collective entrepreneurship since the product itself is culturally attached to the community (Julien, 2007). Therefore, an entrepreneurial context does matter (Balfour et al., 2016) to create job opportunities and increase income and should thus be collectively constructed.

This ability of the community to 'commercialize' the product of creative economy needs to meet some conditions, such as: (1) the cultural support of the community through interactive networks (Balfour et al., 2016), and (2) the establishment of a potential market and supporting amenities (Florida & Jackson, 2010) to access some necessity resources (Fahmi et al., 2016). By this way, rural creative industries can easily reach out their potential markets and resources and become more sustained.

2.3. Social values

As collective entrepreneurship needs to be built through the interaction networks within rural community, social values emerge as other factors. To collectively work upon the rural creative industry, a relational network would become more crucial since the interaction provides the foundation of innovation systems (Esparcia, 2014). This makes creativity can be produced through the interactional networks of actors within the rural community.

Innovation, as a part of the creative economy, can also occur if actors combine and integrate their knowledge to collect resource and produce innovative ideas (Dammers, 1999). A sense of community, shared values, and the emotional connection can be built upon regular interactions within rural community (horizontal network), as well as between residents and the state (vertical network) (Balfour, et al., 2016; Tonnies, 2001; Murdoch, 2000). Moreover, networks can trigger another component of social capital, trustworthiness, to facilitate voluntary cooperation and collective action (Putnam, 2014; Ostrom & Ahn, 2003), through actors' networks. Social values, after all, constructed by the complex process of networks involved in the formation of collective action (Miao et al., 2018).

Networks have manifested itself in the form of social and civic participation (Anwar-McHenry, 2011). Civic participation represents a formal interaction and community action-based participation, while the social participation serves informal networks of rural community in all social activities. It is therefore necessary to build both types of participation to support the rural creative economy since these foster collective action, benefits

communal well-being and increases social capital (Torjman, 2004). Collectivity can foster colaborativeness, thereby forming a creative-based economy system in the rural community needs to utilize community bonding (social interaction) and community bridging (civic engagement).

2.4. Capacity for mobilization

An individual breakaway from collective creativity due to the complexity of exogenous forces can challenge the networks of creative actors (Balfour et al., 2016; Gray & Lawrence, 2001). Moreover, collective efficiencies (economic and technological advantages) can remain latent unless they are mobilized by joint action – a conscious cooperation among creative businesses (Phelps & Wijaya, 2016). Therefore, a concern regarding local agency relationship has emerged. There is no certainty as to what extent a rural community can shape their own future due to those forces (Measham et al., 2012), even though they already have a strong interaction network. Thus, an action to prevent individual breakaway and unveil collective efficiencies in the social networks is needed, by either a formalization of the interaction or an organized network of actors (Phelps & Wijaya, 2016; Schmitz, 1999).

Structure, mechanism and function (Miles et al., 1978) of the community, therefore, are the important elements. As described by Chaskin et al. (2001), a community organization can provide access to resources and opportunities, foster development of human capital (in a form of human and communal creativity), and create commitment of community. These abilities, in a rural creativity context, can also perform in an organized network even without a formal institutional framework, such as community organization. In conclusion, establishing the capacity in mobilizing resources of creative industry can build the actors' networks to be more resilience and serve creative processes (Balfour et al., 2016).

3. Methodology

In constructing a framework for analyzing the community capacity in the rural creative economy, we consider the concept of institutional capacity by Healey (1998) focusing on three dimensions: knowledge resources, relational resources, and mobilization. Such resources might be contextually differed in various institutions, but efforts to access these capitals are central in one community/organization to gain influence in mobilizing community strategies towards one mutual goal (Healey, Urban Complexity and Spatial Strategies: Towards a Relational Planning for Our Times, 2007). Thus, this concept would be fit as an analytical framework of this study since this study also aims to elaborate community capacity to generate rural creative economy as means towards rural development. This study tries to contextualize these dimensions into several factors, including: (1) creative potentials and (2) entrepreneurial capacity, (3) social values and collaborativeness, and (4) capacity for mobilization.

To identify the extent to which and the mechanisms through which the community capacity supports the development of the creative economy in rural areas, the qualitative research approach is employed (du Toit, 2015). Two cases were employed, including some villages in Bantul District: Krebet and Kasongan, which have performed collective strategies for promoting local arts and craft products. Interviews were conducted with local entrepreneurs, local government officials and other local community actors to collect information related to local community capacities. To complement these interview data,

related policy documents were collected and field notes were created as an extensive overview (Silverman, 2015). Analysis was done through narrative and content analyses (Silverman, 2011; Krippendorff, 2004) to describe the mechanism of interactional networks and community capacity based on the derived factors in supporting the rural creative economy.

4. General overview

To better understand how community capacity and creativity-based rural development are situated in both cases, in the following we present a general overview of Krebet and Kasongan villages.

4.1. Kasongan

Kasongan is located in Kasihan, Bantul District. Kasihan is dominated by working age population (almost 71% of the total population). This demographical composition can be a great potential for Kasihan, particularly for Kasongan, to develop creative economy strategies. Kasongan, specifically, is assigned to be a socio-cultural strategically area (*kawasan strategis*) and a manmade tourism area during 2010-2030, as this village has unique culture-based products: handicraft souvenirs which have become a 'trademark' of the area, especially pottery (*gerabah*). With this commodity, the local community has developed a cultural center. Tourists are mostly attracted with the making process of pottery and the natural-socio-cultural atmosphere of the Kasongan. Today, there are 582 pottery entrepreneurs and almost 8,000 pottery handcrafters (makers). In addition, Kasongan has obtained the award "One Village One Product" from the Japanese government for its success in initiating the rural art-based industry in 2011.

4.2. Krebet

Krebet is located in Pajangan, Bantul Regency. In the past, most people in this village worked as farmers and factory workers. However, this main occupation has shifted to the batik wooden-mask industry. The changing job preference has indeed transformed the local community's economic and social structure, in that most residents have developed studios and houses in which they make batik. Most women paint batik on the mask, while most men are in a more 'rough work', such as preparing local materials, sawing and sculpting the woods and finishing the products. Nowadays, there are 55 entrepreneurs and 500 handcrafters (205 of 248 households) who work for this batik wooden-stuffs industry and many surrounding villages also follow Krebet in developing the industry.

5. Analysis

In this section, we present the results of the qualitative analysis, which was focused on four layers that potentially influence the way in which the rural creative-based economy has developed, including creative capital, entrepreneurial capacity, social values and organizational capacity.

5.1. Creative potentials

Creative potentials can be created either from an individual's idea or knowledge and be generated by interactions among creative actors. The analysis of interviews shows that in

both cases creative capitals have similarly been generated from an individual initiative which was then spread across local people.

The making of pottery has been a local tradition in Kasongan since the early 19th century, as the local community started leaving the agricultural sector. The interviewees mentioned Kyai Song as the one who had the idea of abandoning agriculture because the crop products had to be handed in to the Dutch colonialists. He then produced household stuffs (for kitchens and living rooms) made of clay in 1825-1830 and later persuaded his neighbors to do so. A shift of local jobs from farmers to craftsmen thus took place. Another person, Saptohudoyo, who came from outside Kasongan, introduced local art flavors to the pottery products, thereby making these more artsy. The local community has then built its knowledge on making potteries, in that the knowledge is passed down through generations.

The case of Krebet showed a similar pattern demonstrating how the creative capital can develop the wooden-stuff industry since the mid-twentieth century. However, the reason behind the development of this industry was quite different compared to Kasongan because the agricultural sector was no longer considered profitable due to topographical and geological conditions. Therefore, a local resident, Guninjar, learnt ('nyantrik') how to make wooden-masks from Mbah Warno in 1972 (natah and nyungging). He then succeeded to earn money from this product, which then immediately became popular. His neighbors were interested in learning how to make the wooden-masks. Similar to Kasongan, other innovative ideas have followed the initial movement of the wooden-mask industry. This product was initially produced with a plain design and had a rather low economic value. Nevertheless, some people have developed a more economically valuable product by introducing batik to the product and expanding the product variation with other products, such as wooden-wayang (puppet). Therefore, the products have transformed into a highly valuable product and economically profitable, similar to potteries in Kasongan.

On the one hand, we found that the idea of some people in adding arts and cultural values to potteries in Kasongan and wooden-stuff in Krebet shows that creativity started from an individual act which has then been diffused to other local actors (see also Balfour, et al., 2016). In line with Howkins (2002) and Hartley (2005), these individual acts appear to be the starter for the 'engine' of the rural creative economy. On the other hand, it is clear that in the making of these products, the communities have been benefited from the existence of local arts and cultural values. Local culture values, in the form of motifs, stories, local wisdom and philosophies, have deeply immersed into these creative products. However, these values then have been completed by the "creative acts", enacted by each local creative actor, in the product and motif diversification, kind of used materials, technique of production, finishing, and marketing. By this way, both cases show how local knowledge has inspired creative actors to utilize it and transform it into creative products, using their own creative potentials.

As such, communal creativity has played a crucial role in the development of rural creativity-based development in both Kasongan and Krebet. Different from the nature of creative industries in urban settings, especially in the developed world, in which individual acts are central to developing creative products, crafters in Kasongan and Krebet take advantage of collective goods, particularly local tradition, in creating their products (see De Beukelaer, 2014; Fahmi et al., 2016).

In conclusion, we found that creative potentials in both cases have been formed through collective processes and by collective values, particularly local tradition, and these have helped construct the cultural identity of these craft villages. Further, individual creative acts cannot be disentangled from local collective knowledge and in fact, as these acts become an integral part of communal creativity (see Boateng, 2011). This finding supports the premise that the creative economy and creative industries in rural areas have different characteristics from those in urban regions. This can be associated with the fact that in a developing country, such as Indonesia, local tradition has a strong influence in the development of cultural products.

5.2. Entrepreneurial capacity

Creative potentials need to be transformed into an 'economically valuable' product so that it can create job opportunities and increase incomes. Entrepreneurial capacity, either from individual or collective actions, needs to be utilized in terms of rural creative economy development. Both cases show that different contexts and entrepreneurial capacities have resulted in different ways of how the creative economy has developed.

As explained, in Kasongan, Kyai Song persuaded the local community to make pottery and later Saptohudoyo introduced local art motives into pottery product. The integration of the arts increases the economic value of the products. Saptohudoyo also turned out to be the first local artist that exported the product abroad. He was the first entrepreneur in Kasongan who recognized the market opportunity of pottery since he knew well that foreigners had a great interest into local art products. Therefore, he built the market networks of pottery with another country, such as Australia. This successful story had reached to the ears of Minister of Domestic Affairs at the time.

The stories of Saptohudoyo and Kyai Song in Kasongan have shown how a capacity of an individual creative actor can create an economic opportunity to sell the products and take advantage of this development in a rural context (Balfour et al., 2016). The case of Kasongan suggests that individual entrepreneurship became the first key to unlock the development of the rural creative economy. As described, other local residents have followed Saptohudoyo to participate in developing the pottery industry. Saptohudoyo had spread out the knowledge to manage and produce potteries more commercially. This individual entrepreneurship has then grown into communal entrepreneurship, in that the supportive context of entrepreneurship is culturally situated and attached to the community (Balfour et al., 2016; Julien, 2007). Local residents have collectively learned and shared the knowledge to each other about how to take advantage of economic opportunities of the product, to overcome the limitations and problems in business and to develop the local creativity so that these businesses can thereby sustain.

Further, a policy on tourism villages from the central government in the early 2000s had helped stabilize the development of the pottery industry in Kasongan. Saptohudoyo, with other actors, had built the networks to utilize and translate the policy in developing the rural creative movements. Another aspect that supported this development was the availability of art formal education in the level of high school and university near Kasongan. These education institutions have helped build and invest art knowledge in supporting the local creative economy. Currently, the artsy pottery has reached local, national and international markets (e.g. Australia and Europe).

Meanwhile, the case of Krebet shows a different story since it had a different entrepreneurial capacity. The pioneer actor, Guninjar, recognized the economic value of wooden-mask for the first time as he had learned from another person and had practiced to 'commercialize' the product. He was not the one who maximized the economic opportunity of wooden-masks since he only designed a plain mask without any aesthetic improvement. Nevertheless, his products were popular at the time and, therefore, he created market networks since then at the local and regional level. This can also be regarded as an entrepreneurial capacity at the individual level. However, he was not the one who managed the local community to participate in the industry. Other neighbors were inspired and invested their efforts to be involved in the production of wooden-stuff. Other actors, namely Kemiskidi and Windarti, were those who expanded the product variation and added more aesthetic value to the wooden-masks. Therefore, the three main actors in Krebet, Guninjar, Kemiskidi, and Windarti, used their own individual entrepreneurship to maximize, identify and create the economic opportunity of these cultural products in the context of rural development (Balfour et al., 2016). As other residents have followed those individual entrepreneurs to participate in developing the batik wooden-mask industry, job opportunities and new sources of income have been created. Similar to the case of Kasongan, individual entrepreneurship has transformed into communal entrepreneurship, which is culturally attached to the community (Balfour et al., 2016; Julien, 2007). The residents have collectively learned how to catch economic opportunities of the products, overcome the limitations and problems in business, and develop the local creativity so that the creative businesses can sustain.

Unlike Kasongan, the wooden-stuff industry in Krebet only had potential market at the local and regional level until the end of the twentieth century. A policy on tourism village from the national government in the early 2000s had also helped to boost the development of batik wooden-mask industry in Krebet. The potential market has just expanded to national and international level due to this policy. This village did not have any other supporting systems, such as art formal education as Kasongan did, so that there was no knowledge investment to help the progress of creative economy. Therefore, the development of the batik wooden-mask industry in Krebet is also established by local entrepreneurial capacities (individual and communal entrepreneurship, supporting amenities, and potential market). However, this was not found in Kasongan.

To sum up, the findings indicate that local entrepreneurial capacities have contributed to the development of the villages as the production centers of those cultural products. An individual entrepreneurship became the first key to support the industry. However, it is found that in these rural contexts, this individual entrepreneurship grew into a communal entrepreneurship in which other actors learnt and collectively shared their entrepreneurial knowledge, which is culturally situated and attached to the community. Both cases have also shown that this distinctive condition different from the entrepreneurial actions and supporting amenity could result in different capacities to take advantage of the economic opportunity in expanding the potential market for the industries.

5.3. Social values

As collective creativity and entrepreneurship need to be built through the interaction networks within the rural community, social values appear to be another factor that a rural creative industry needs. As mentioned in Florida (2002), the development of the creative

economy requires a condition that establishes an art atmosphere for the creative actors to meet and interact with one another because they have sense of belonging to the place and to one another. Therefore, social values and collaborativeness can foster the development of creative actors' networks which can benefit rural creative economy, as what happened in both cases.

As explained, the development of the pottery industry in Kasongan had grown from individual creative acts into communal creativity and from individual entrepreneurship into communal entrepreneurship. The knowledge of these community businesses had been spread out through neighborhood networks. First, Kyai Song had tried to persuade the local community to quit being farmers and to become craftsmen. Due to the neighborhood relations, this succeeded to result in the job shift of Kasongan because many people were interested and had developed the products to become more economically valuable. It appears that he used the established trustworthiness and social interactions to develop the creative economy, which dynamically grew and progressed at the neighborhood level. Afterward, Saptohudoyo used a different approach to develop the industry. As he was not originally from Kasongan, he tried to show how to be successful in the business not only in the local level, but also in the international markets by using local traditional knowledge (traditional art motives). His success story had attracted many neighbors to come and to learn from him and he also started collaborations with the neighbors.

With these collaborations, local networks have evolved within the community and this helped 'formalize' the pottery industry as the basic economic sector of the community. As such, interactions related to the pottery industry, which were initially developed through social bonding, have transformed into a formal network of civic engagement (see Anwar-McHenry, 2011), concerning the management of the pottery industry. These interactions have also made the local norm systems to allow shared power and collaborativeness. Some key leaders have participated to provide rooms for collaborative process and collective action in relation to the creative economy. These actors also tried to expand the networks with other external parties, such as local government and other creative actors, by organizing Kasongan festivals from 2011-2013. Therefore, this case shows that networks can enable social capital to grow within the local community (Putnam, 2014; Ostrom & Ahn, 2003) and this stimulates the foundation of an innovation system (Esparcia, 2014).

The case of Krebet showed a similar situation in that the development of the batik wooden-stuff industry has evolved from individual creative acts into communal creativity and from individual entrepreneurship into communal entrepreneurship. Such a development is enabled by the condition in which the neighborhood networks had supported the knowledge dissemination of the industry, as happened in Kasongan. First, the initiator of the industry, Guninjar, had tried to show the neighbors how to develop the business. Even though he did not directly persuade other rural residents to participate in the industry, he succeeded to persuade a job shift in Krebet as many people were interested to make the wooden-stuff products. He also used the established trust and social interactions to disseminate the knowledge in developing the local industry. Afterward, Kemiskidi and Windarti also became the key players in using social values in the knowledge dissemination. They initiated innovations of product variation (wooden-wayang) and introduction of batik. Their success stories had attracted many neighbors to participate in the batik wooden-stuff industry. Again, they used the established trustworthiness and disseminated the knowledge through social interaction (Anwar-McHenry, 2011). Furthermore, as the networks dynamically

progresses, the local artists have succeeded to participate in the formal meetings of Krebet authorities, thereby influencing local policies on the development. The social networks have supported the batik wooden-stuff industry to be a formal main economic sector within the community. Therefore, any matters regarding batik wooden-stuff industry, such as the management of the industry, has become a 'formal' issue in Krebet so that the social interactions have transformed into civic engagement and bridging (Anwar-McHenry, 2011). The shift of local norms currently allows the creative actors to have voice and power in the formal participations. Some of the creative actors have established space for creative industries to be considered in the collaborative process and collective action. These actors also tried to expand the networks with other external parties, such as the local government and other creative actors, by organizing wooden-mask trainings for the local community in 2014.

In conclusion, both cases have shown that collectivity is able to mobilize the community to optimize their creative capitals and develop their entrepreneurial capacities. Both cases show how social interactions provide room for creativity, as "knowledge incubator", for local actors in discussing creative and indigenous ideas, product development, and market preference. This room was identified as infinite, because creative actors (business owners and workers), to some degree, have their own capability to be involved in the social networks, sharing their ideas and creativities to contribute in the product development.

The characteristics of Kasongan and Krebet rural communities, particularly a strong sense of belonging, high shared values and strong emotional connections, have helped the communities to foster the local creative economy to be built upon horizontal and vertical networks (Balfour, et al., 2016; Tonnies, 2001; Murdoch, 2000). The cases have demonstrated how the established trustworthiness, which is constructed by the aforementioned local characteristics, can serve the 'resource' for the local actors to disseminate the knowledge of developing the industry. The benefit to the community, the proximity between the craft industry and the local community, and cultural value appear to strengthen the social networks. In addition, both cases demonstrate that interactions in the rural economy can evolve from the informal social interaction into formal civic engagement. Local norms systems have shifted to allow shared power and collaborativeness of the creative actors in the formal participation process. The actors have become the key players to include the issue of rural creative economy in the collaborative process and collective action.

5.4. Capacity for mobilization

Social values should be supported by a good institutional arrangement due to an individual breakaway from collective creativity (Balfour, et al., 2016; Gray & Lawrence, 2001) and latent collective efficiencies (Phelps & Wijaya, 2016). Therefore, an ability of the rural community to organize common goods, to help each other and to develop businesses together is needed in an institutional framework. This ability can be performed by a formal organization or a network of various actors. Both cases have demonstrated that a network of various actors can mobilize resources to reach mutual goals, even though there is no strong and firm organization that has been developed. Both cases have shown how the key actors can 'mainstream' the crafts industry as a rural issue. They utilized the established social capital as their foundation to foster the knowledge dissemination to be a formal civic participation. As various interviewees mentioned, any matters regarding the rural craft

industry would become a 'village issue'. However, there is no guarantee for these networks to avoid future challenges for an individual breakaway from collective creativity. Therefore, in this section we analyze as to what extent the networks perform the institutional arrangement in responding such challenges.

In Kasongan and Krebet, the relations among actors have progressed through day-to-day business interactions. The interactions among actors have resulted in a success story of the development of artsy pottery and batik wooden-stuffs industries. However, there is no such a mechanism in this rural area that advances the networks into a formal organization (only Krebet did it for the recent year). The ability to provide resources, develop human capital and create commitment has been run by local crafters and entrepreneurs. Therefore, these resource management abilities, which should be performed by the community organization (Chaskin, et al., 2001), have been covered by the networks of actors until today.

For instance, the networks of actors have resulted in some events and projects which have been created in this village. Kasongan festival, an event to promote the creative businesses in Kasongan, had been mobilized by the relational networks of creative actors (Timbul Raharjo and Djoko Pekik), artists' communities, local communities, and local governments. Timbul Raharjo and Djoko Pekik were the creators and initiators in the promotion of creative businesses in Kasongan. They had the idea to promote and extend the market of creative products of Kasongan through a festival. This festival has been held from 2011 to 2013.

Djoko Pekik and Timbul Rahardjo built the external relation with the regency government through another relative, Djaduk Ferianto. This relation also resulted in a development of road infrastructure that connects Sembungan and Kasongan. The development of this road is shown to catalyze the distribution of potteries. The issue of distribution process of Kasongan pottery products had been a concern of local government since the relations between crafting actors and local government had been built.

By those eventual circumstances, the networks of actors have shown its ability to manage their own resources in developing artsy pottery industries in Kasongan. There is no formal structure of community organization within this case, but the networks can function as the resource manager. Therefore, this case has demonstrated that structure and function in a community organization (Miles et al., 1978) can be replaced by the relational networks.

Meanwhile, Krebet also shows a similar pattern of institutional arrangement. The networks of creative actors also have been developed through events and projects, even though the events had a slight impact toward the ability of the networks to mobilize and organize local resources. As mentioned in the previous section, the local actors in Kasongan had built a relational network with other creative actors in other villages. This network had resulted in a training of batik wooden-mask making-process for the local community in 2014. Budi and Yuli were the creator and initiator for this event. They also built a network with local government (provincial government) for the funding of the event. They also were the actors who organized the event, so that they had become the key players for the event. However, unlike Kasongan, Krebet had succeeded in building a new established 'cooperative' organization *('koperasi'*) for local actors. This organization has a formal structure and functions as the resource manager regarding businesses. However, there is no clear mechanism of how this organization mobilizes the resource to the local businesses. Therefore, Krebet has demonstrated that both networks and actors and community organization have the ability to manage their own resources in developing batik wooden-

stuffs industries. Similar to Kasongan, this case also has demonstrated that structure and function in a community organization (Miles et al., 1978) can be replaced by the relational networks, even though those networks have evolved into a community organization in the end.

To conclude, both cases have demonstrated that a network of creative actors can mobilize resources to achieve mutual goals. Even though Krebet has developed a community organization at the end; the networks of actors for both cases mostly have dominated the resource management and function as a 'shady' organization. However, this condition is still considered as vulnerable for the collective creativity, because collective efficiencies remain latent (Phelps & Wijaya, 2016) and there has a challenge of individual breakaway (Balfour et al., 2016; Gray & Lawrence, 2001).

6. Conclusions

The idea of promoting the creative economy has been used as a tool to drive regional development. Most studies have linked this idea in the prospect of the buzz of metropolitan and urban terrains (Waitt & Gibson, 2009; Stam, et al., 2008; McGranahan & Wojan, 2007; Rantisi, et al., 2006), where all amenities and creative workers exist. Meanwhile, a focus on developing a rural creative economy has been less studied (Bell & Jayne, 2016; Scott, et al., 2016; Ray, 1998; Balfour, et al., 2016). This paper has contributed to supplementing this body of knowledge by presenting the cases of Kasongan and Krebet which demonstrate that a creative economy can be developed in such rural settings despite various limitations. The capacity of rural communities in both cases strongly support the development of community arts and craft-based industries in the villages, whose development characteristics differ from what has existed in urban contexts.

In line with Bell & Jayne (2016), the emergence of the creative economy in both cases reshaped local economic structures and place-specific images. The local main sector has shifted from the agricultural sector towards industrial and service sectors, along with creative images being built in both villages. Clearly, the creative economy in these rural settings has been manifested and articulated in a different way from that in urban settings, because it is established while utilizing local cultural knowledge and local creative actors (Balfour, et al., 2016; Esparcia, 2014; Murdoch, 2000). This supports a notion that the creative economy strategy is culturally attached to the specific contexts in which this strategy develops.

More importantly, this paper has identified that the rural communities manage to develop the capacity to support the development of a local creative economy. First, creative potentials have developed the rural creative economy as individual creative actors initiate the development of the creative sector, which slowly becomes an integral part of the collective identity of the villages. It is important to note that in this context, the creativity potentials flourish from local culture and tradition, in that the community has utilized these as an inspiration and value in developing the products.

It is thus evident that the creative economy in these rural contexts differs from the general patterns shown in urban settings. Creative industries in urban areas, especially in the developed world, usually originate from individual creativity. They are associated by new technologies and the copyright protection mechanism (UNESCO & UNDP, 2013). Meanwhile,

in these rural areas, and potentially in other developing countries, the rural creative economy has been benefited from communal creativity, in which individual creative acts cannot be disentangled from collective, traditional values.

Second, both cases indicate that individual entrepreneurs have started their own businesses, which have grown into communal entrepreneurship (Balfour et al., 2016; Julien, 2007). However, our findings show that the ways of how entrepreneurial capacity and contexts develop appear to influence the development of the local creative economy. In Kasongan some actors guide their fellow entrepreneurs to expand their businesses and this has affected the market size of the creative products.

Third, we found that social values become a factor that strongly fosters the aforementioned factors. Social interactions have provided room for local actors, to some extent, to be involved in sharing ideas and creativities for the product. By utilizing local community features, namely strong sense of belonging, high shared values, and strong emotional connections, the local communities have considerably succeeded in establishing actors' networks for the development of the creative economy. Some rural characteristics, such as social values, appear to catalyze the development of the creative economy and these characteristics might be found weaker in urban settings. This factor also helps the community to mobilize resources of the creative economy. An organized network of creative actors in both cases is able to manage resources to aim mutual goals, although a difference exists in the organization form in both cases: while in Krebet the community has decided to build a formal organization to mobilize the local resources, in Kasongan such a formal organization has not been established. At the end of the day, both cases have shown how informal networks of creative actors, which are fostered by strong social values, can help unveil collective efficiencies and avoid individual breakaway.

These findings have important implications for policy. Creativity-based rural development strategies should be shaped by, and sensitive to, the socio-cultural values where creativity is manifested. Since rural areas have specific cultures and traditions, and the tacit knowledge of this industry is usually transferred through generations, development strategies should be tailored to these contexts. Local cultures and social values can be utilized to develop the creative capital as well as entrepreneurial capacity though collaborative processes, in which each stakeholder takes part in the development process. In this regard, a formal organization might not be a prerequisite, as long as the resources can be mobilized to achieve the goal in developing the rural creative economy.

7. References

Anwar-McHenry, J (2011) "Rural Empowerment through the Arts: The Role of the Arts in Civic and Social Participation in the Mid West Region of Westen Australia", Journal of Rural Studies, Vol.27, pp.245-53.

Balfour, B; Fortunato, M.W.P & Aleter, T.R (2016) "The Creative Fire: An Interactional Framework for Rural Arts-based Development", Journal of Rural Studies, pp.1-11.

Bell, D; Jayne, M (2016) "The Creative Countryside: Policy and Practice in the UK Rural Cultural Economy", Journal of Rural Studies, Vol.26, pp.209-18.

Boateng, B (2004) African Textiles and the Politics of Diasporic Identity-Making. In: J. Allman, (eds.) Fashioning Africa: Power and the Politics of Dress, Bloomington: Indiana University Press. pp.212-26.

Boateng, B (2011) The Copyright Thing doesn't Work Here: Adinkra and Kente Cloth and Intellectual Property in Ghana, Minneapolis: University of Minnesota Press.

Chaskin, J; Brown, P; Sudhir, V & Vidal, A (2001) Building Community Capacity, New York: Aldine de Gruyter.

Cooke, P; Morgan, K (1994) The Creative Milieu: A Regional Perspective on Innovation. In:M. Dodgson & R. Rothwell (eds.) The Handbook of Industrial Innovation, Cheltenham: Edward Elgar Publishing. pp.25-32.

Creswell, J.W (2014) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th ed, Los Angeles: SAGE Publications, Inc.

Dammers, E (1999) Innovation and Learning - Knowledge Management and Rural Innovation, The Hague: National Council for Agricultural Research (NRLO).

de Beukelaer, C (2014) “Creative Industries in "Developing" Countries: Questioning Country Classifications in the UNCTAD Creative Economy Reports”, Cultural Trends, 232-251, p.23.

de Beukelaer, C (2015) Developing Cultural Industries Learning from the Polimpsest of Practice, Amsterdam: European Cultural Foundation.

de Silva-Sanigorski, A.M et al (2010) “Scaling Up Community-based Obesity Prevention in Australia: Background and Evaluation Design of the Health Promoting Communities: Being Active Eating Well Initiative”, BMC Public Health, Vol.10 No.1, pp.1-7.

du Toit, J (2015) Research Design. In: E.A. Silva, P. Healey, N. Harris & P. van den Broeck (eds.) *The Routledge Handbook of Planning Research Methods*, New York/Abingdon: Routledge. pp.61-73.

Esparcia, J (2014) “Innovation and Networks in Rural Areas: An Analysis from European Innovative Projects”, Journal of Rural Studies, Vol. 34, pp.1-14.

Fahmi, F.Z; Koster, S (2017) “Creative Industries and Regional Productivity Growth in the Developing Economy: Evidence from Indonesia”, Growth and Change.

Fahmi, F.Z; Koster, S & van Dijk, J (2016) “The Location of Creative Industries in a Developing Country: The Case of Indonesia”, Cities, Vol.59, pp.66-79.

Fahmi, F.Z; McCann, P & Koster, S (2017) “Creative Economy Policy in Developing Countries: The Case of Indonesia”, *Urban Studies*, Vol.54 No.6, pp.1367-84.

Florida, R (2002) The Rise of the Creative Class, New York: Basic Books.

Florida, R (2003) “Cities and the Creative Class”, City and Community, Vol.2 No.1, pp.3-19.

Florida, R (2017) The New Urban Crisis: How Our Cities Are Increasing Inequality, Deepening Segregation, and Failing the Middle Class - And What Can We Do About It, New York: Basic Books.

Florida, R; Jackson, S (2010) “Sonic City: The Evolving Economic Geography of the Music Industry”, Journal of Planning Education and Research, Vol.29, pp.310-21.

Friedland, W.H (1982) "The End of Rural Society and the Future of Rural Sociology", Rural Sociology, Vol.47 No.4, pp.589-608.

Gibson, C; Waitt, G; Walmsley, J & Connell, J (2010) "Cultural Festivals and Economic Development in Nonmetropolitan Australia", Journal of Planning Education and Research, Vol.29 No.3, pp.280-93.

Gray, I; Lawrence, G (2001) A Future for Regional Australia: Escaping Global Misfortune, Oakleigh: Cambridge University Press.

Grodach, C (2011) "Art Spaces in Community and Economic Development: Connections to Neighborhoods, Artists, and the Cultural Economy", Journal of Planning Education and Research, Vol.31 No.1, pp.74-85.

Hartley, J (2005) Creative Industries, Hoboken: Blackwell Publishing.

Hayter, R (1997) The Dynamics of Industrial Location: The Factory, the Firm, and the Production System, Toronto: John Wiley and Sons.

Healey, P (1998) "Building Institutional Capacity through Collaborative to Urban Planning", Environment and Planning A, Vol.30 No.9, pp.1531 - 1546.

Healey, P (2007) Urban Complexity and Spatial Strategies: Towards a Relational Planning for Our Times, Abingdon, New York: Routledge.

Healey, P (2015) Learning the Craft of Research: A Continuing Process. In:E.A. Silva, P. Healey, N. Harris & P. van den Broeck (eds.) The Rouledge Handbook of Planning Research Methods, New York/Abingdon: Routledge. pp.5-11.

Herslund, L (2012) "The Rural Creative Class: Counterurbanisation and Entrepreneurship in the Danish Countryside", Sociologia Ruralis, Vol.52 No.2, pp.235-55.

Howkins, J (2002) The Creative Economy: How People Make Money from Ideas. 2nd ed, London: Penguin Books.

Julien, P (2007) A Theory of Local Entrepreneurship in the Knowledge Economy, Cheltenham: Edward Elgar.

Khan, M.K (2000) "Rural Poverty in Developing Countries", Finance and Development, Vol.37 No.4, pp.26-39.

Krippendorff, K (2004) Content Analysis: an Introduction to Its Methodology, London: SAGE Publications, Inc.

Landry, C (2000) The Creative City: A Toolkit for Urban Innovators, London: Earthscan.

Landry, C (2005) Lineages of the Creative City. In Creativity and the City, Rotterdam: Netherlands Architecture Institute. pp.1-13.

Markusen, A; Gadwa, A (2010) "Arts and Culture in Urban or Regional Planning: A Review and Research Agenda", Journal of Planning Education and Research, Vol.29 No.3, pp.379-91.

McGranahan, D; Wojan, T (2007) "Recasting the Creative Class to Examine Growth Processes in Rural and Urban Counties", Regional Studies, Vol.41 No.2, pp.197-216.

McGranahan, D; Wojan, T & Lambert, D (2011) "The Rural Growth Trifecta: Outdoor Amenities, Creative Class, and Entrepreneurial Context", Journal of Economic Geography, Vol.11, pp.529-57.

Measham, T.G; Darbas, T; Williams, R & Taylor, B (2012) "Rethinking Rural Futures: Qualitative Scenarios for Reflexive Regional Development", Rural Society, Vol.21 No.3, pp.176-89.

Miao, S. et al (2018) "Income Groups, Social Capital, and Collective Action on Small-Scale Irrigation Facilities: A Multigroup Analysis Based on a Structural Equation Model", Rural Sociology, Vol.83 No.4, pp.882-911.

Miles, R.E; Snow, C.C; Meyer, A.D & Coleman Jr, H.J (1978) "Organizational Strategy, Structure, and Process", The Academy of Management Review, Vol.3 No.3, pp.546-62.

Mitra, J (2012) Entrepreneurship, Innovation and Regional Development, New York: Routledge.

Montgomery, J (2005) "Beware the Creative Class: Creativity and Wealth Creation Revisited", Local Economy, Vol.20, pp.337-43.

Murdoch, J (2000) "Networks - A New Paradigm of Rural Development", Journal of Rural Studies, Vol.16, pp.407-19.

Noaks, L; Wincup, E (2004) Criminalogical Research: Understanding Qualitative Methods, London: Sage.

Ostrom, E; Ahn, T.K (2003) "A Social Science Perspective on Social Capital: Social Capital and Collective Action", Revista Mexicana De Sociologia, Vol.65 No.1, pp.155-233.

Peck, J (2005) "Struggling with the Creative Class", International Journal of Urban and Regional Research, Vol.29 No.4, pp.740–70.

Phelps, N.A; Wijaya, H.B. (2016) "Joint Action in Action? Local Economic Development Forums and Industry Cluster Development in Central Java, Indonesia", International Development Planning Review, Vol.38 No.4, pp.425-48.

Putnam, R (2014) The Prosperous Community: Social Capital and Public Life. In: K. Blair, R. Murphy & J. Almjeld (eds.) Cross Currents: Cultures, Communities, Technologies, Boston: Wadsworth Cengage Learning. pp.249-58.

Quang Dao, M (2004) "Rural Poverty in Developing Countries: An Empirical Analysis", Journal of Economic Studies, Vol.31 No.6, pp.500 - 508.

Rantisi, N; Leslie, D & Christopherson, S (2006) "Placing the Creative Economy: Scale, Politics, and the Material", Environment and Planning A, Vol.38, pp.1789-97.

Ray, C (1998) "Culture, Intellectual Property, and Teritorial Rural Development. European Society for Rural Sociology", Sociologia Ruralis, Vol.38 No.1, pp.3-20.

Roberts, E; Townsend, L (2016) "The Contribution of the Creative Economy to the Resilience of Rural Communities: Exploring Cultural and Digital Capital", Sociologia Ruralis, Vol.56 No.2, pp.197-216.

Schmitz, H (1999) "Collective Efficiency and Increasing Returns", Cambridge Journal of Economics, Vol.23, pp.465–83.

Schumpeter, J (1934) The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle, Harvard: Translated by Redvers Opie, Harvard University Press.

Scott, K (2012) Measuring Wellbeing: Towards Sustainability?, London: Routledge.

Scott, K; Rowe, F & Pollock, V (2016) "Creating the Good Life? A Wellbeing Perspective on Cultural Value in Rural Development", Journal of Rural Studies, pp.1-10.

Sen, A (1980) Equality of What? In: S. McMurrin (eds.) Tanner Lectures on Human Values, Cambridge: Cambridge University Press. pp.197-221.

Silverman, D (2011) Interpreting Qualitative Data: A Guide to the Principles of Qualitative Research. 4th ed, London: SAGE Publications Ltd.

Silverman, R.M (2015) Analysing Qualitative Data. In: E.A. Silva, P. Healey, N. Harris & P. van den Broeck (eds.) The Routledge Handbook of Planning Research Methods, New York/Abingdon: Routledge. pp.140-56.

Stam, E; de Jong, J.P.J & Marlet, G (2008) "Creative Industries in the Netherlands: Structure, Development, Innovativeness, and Effects on Urban Growth", Geografiska Annaler: Series B, Human Geography, Vol.90 No.2, pp.119-32.

Stark, P; Gordon, C & Powell, D (2013) Rebalancing Our Cultural Capital: a Contribution to the Debate on National Policy for the Arts and Culture in England. [Online].

Tonnies, F (2001) Community and Society, Cambridge: Cambridge University Press.

Torjman, S (2004) Culture and Recreation: Links to Well-being, Ottawa: Caledom Institute of Social Policy.

Turvey, R (2006) "Development from Within: an Evaluative Research on Economic Development Strategies", GeoJournal, Vol.67, pp.207-22.

UNESCO; UNDP (2013) Creative Economy Report 2013 - Special Edition: Widening Local Development Pathways, New York, Paris: UNESCO & UNDP.

Waitt, G; Gibson, C (2009) "Creative Small Cities: Rethinking the Creative Economy in Place", Urban Studies, Vol.46, pp.1223-46.

Yusuf, S; Nabeshima, K (2005) "Creative Industries in East Asia",Cities, Vol.22, pp.109-22.

Case Study Paper

Old Deira, Dubai

The Role of Culture, Identity and Planning in a Global City

Peter STARR, AECOM; UK

Abstract

This research project will explore the relationship between planning strategies and multi-culturalism in Old Deira, Dubai. Now an established global city that is firmly integrated in the world economy, Dubai is a salient case study to scrutinise the role of cultural diversity in the growth of this (mini) mega-city. This research will serve as an evidence-base for a presentation that will be given at the 55th World Planning Congress in Jakarta – some concepts may be omitted or expanded by then. This paper will investigate the role that one specific multi-cultural neighbourhood – Old Deira - played in the development of Dubai. What planning strategies, if any, have shaped the multicultural identity of Old Deira, and, based on these findings, how can urban planners apply them in other global cities to promote diverse and multi-cultural neighbourhoods?

Keywords

Deira, Dubai, transnationalism, organic urbanism, authenticity

1. The history of Old Deira: situating Deira in the context of Dubai

1.1. The creation of the Emirates and development of Dubai

In the late 1800s, the British Empire informally controlled swathes of what is now Oman and the UAE. Various agreements between the British and local Bedouin tribes devolved a degree of autonomy and legitimacy in the form of Trucial States, allowing the Al Maktoum family to rule the Emirate of Dubai since 1833. The General Maritime Pact of 1820 and the Perpetual Maritime Truce of 1853 were crucial in pacifying the violent relationships between the different Sheikhdoms (Elessawy, 2017). However, the pivotal political pact was signed in 1892. The Exclusive Agreement gave exclusive territorial and commercial rights to the British Government, effectively turning the region into a British Protectorate.

At the turn of the 20th century, the coastal and regional economies were primarily based on maritime trade and the pearling industry. This flow of goods was facilitated in 1904, when Port Saeed, which sits on the Dubai Creek, was made a free trade zone. The stability, tolerance and employment opportunities enticed many labourers from other British Protectorates to relocate to the city. Afghanis, Pakistanis, Bahrainis and Indians were among the first to settle. Simultaneously, custom-tax increases on the other side of the Gulf, in Iran, led to a wave of Persian merchants immigrating to Dubai. As a result, between 1900 and 1920, the population of Dubai doubled from 10,000 to 20,000 (Hvidt, 2009).

The economic landscape of Dubai and the UAE changed profoundly throughout the first half of the 20th century (Pacione, 2005). Triggered by the mass production of Japanese cultured pearls, the local pearling industry slowly collapsed throughout the 1930s. In a timely

coincidence, preliminary surveys were being carried by British companies in search of oil reserves. In 1939, onshore concessions were granted to Petroleum Development (Trucial Coast) Ltd, a subsidiary of the Iraq Petroleum Company, whose majority shareholder was the British state-owned Anglo-Persian Oil Company. Extractions begin, albeit in rather limited quantities.

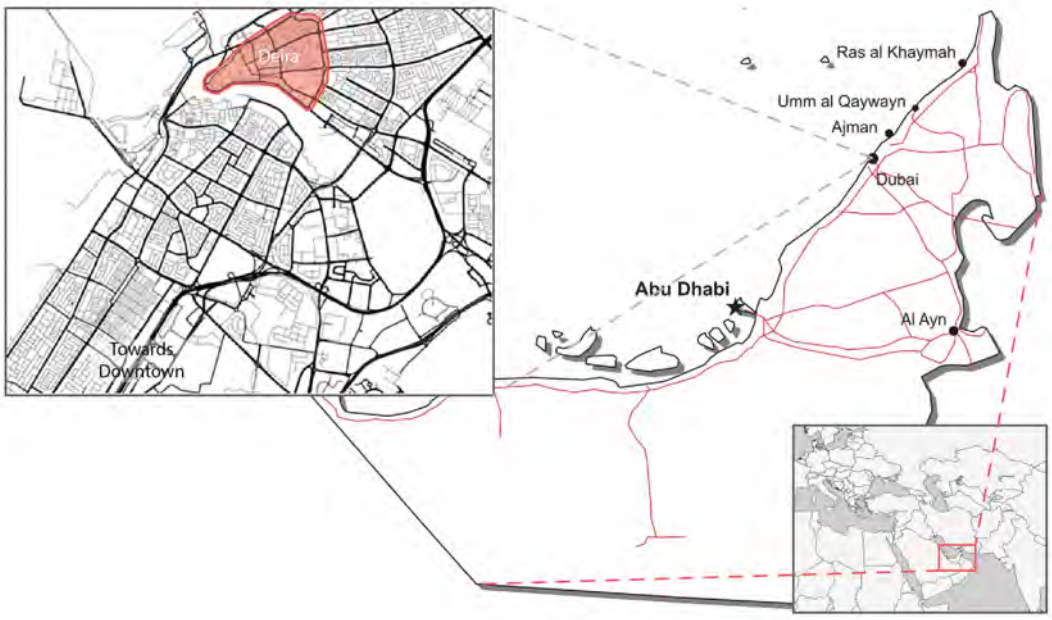


Figure 1 Map of Deira with UAE

Dubai would grow at a somewhat pedestrian pace over the next 20 years; the oil industry did not initially flourish like it did in neighbouring Abu Dhabi. Port Saeed and the Dubai Creek remained the driving forces of the local economy. Being strategically located between important former British Colonies and England, Port Saeed saw increased traffic from nearby Iraq, India and East Asia. The city developed as a hub of trade, and the areas surrounding the Creek naturally grew in tandem with the port. As such, Deira quickly asserted itself as the commercial heart of the city (Elsheshtawy, 2010).

The ruler of the Trucial State, Sheikh Rashid bin Saeed Al Maktoum, had a vision for the city that extended far beyond a regional port city. He envisaged a modern city that would eventually rival the mega cities of the world. Despite limited resources, the Sheikh took the strategic decision to invest in an international airport, which was operational by 1960. With financial support from the Emir of Kuwait, he followed this up with the progressive dredging of the Dubai Creek, a pricey endeavour that proved to be crucial to the city's development (Ogaily, 2015). Port Saeed and the creek would soon be replaced by new deep-water port, Port Rashid, that could be used by the world's largest container ships.

By the time oil was discovered in commercial quantities in 1966 and in full production in 1969, the city's infrastructure was ready to match the incoming surge in maritime trade. The opening of the new port in 1972 concurred with unification of the Trucial States, and the founding of the United Arab Emirates. Much like the country's founding father, Sheikh Zayed bin Sultan Al Nahyan, Sheikh Rashid was weary of building Dubai on oil money. He had the foresight to diversify the city's economy and redirect oil revenues towards vital mega-infrastructure projects (Ogaily, 2015). The Al Shindagha of tunnel, which connected the two

sides of the creek, opened in 1975, followed by the Dubai World Trade Centre in 1978. The Emirate saw these projects as a way of gaining legitimacy on the international stage.

Many attribute Dubai's explosion of development to oil money – this is true, to a certain extent. But there would be a lot less Dubai were it not for the advent of the jet airliner (Brooke, 2013). Dubai's geographical location, more or at less at the centre of the globe, is ideal for a human and freight logistics hub. According to Tim Cook, CEO of Emirates Airline, DXB can serve just about 90% of the world through non-stop flights and a third of the population within 5 hours. Initially, however, Dubai International was just a regional hub, handling mainly Indian businessmen and Saudis and Iranians who came for the relative freedom and debauchery. It was also a destination for Soviet hustlers, who raided Dubai's supermarket to resell the foodstuffs back home (*ibid.*).

Early in its development, the Emirate adopted a proactive approach to tax emption (Pacione, 2005). As previously mentioned, Port Saeed was made a free zone in 1904, as was Port Rashid in 1972. By the mid 1970s, Dubai's position as major player in global maritime trade meant that Port Rashid needed an upgrade. Sheikh Rashid thus embarked on the country's most significant infrastructure project to date: Jebel Ali. The huge container port was built far from the city centre, equipped with a worker village and, from 1985 onwards, designated as a free trade zone (FTZ). Having since been expanded several times, Jebel Ali FTZ is now the world's largest free zone and 9th busiest container port in the world. Building on Jebel Ali's success, tax exemption was repurposed as model of accelerating the city's development. There are presently more than 30 free trade zones, covering sectors from logistics to finance and technology (such as the aptly named Dubai Silicon Oasis).

Most importantly, money made in Dubai is tax free. Coupled with the Emirati Dirham's pegging to the US Dollar, this incentive proved to be effective in attracting foreign white-collar workers. By the turn of the century, it was one of the world's fastest growing cities, the unrivalled hub of the Middle East. Despite the trauma of the 2008 crisis and endless property booms and busts, Dubai's status as an Alpha + city places it in the same league as Tokyo, Paris, Shanghai and Singapore – a vital node of commerce in the global economy.

1.2. Old Deira, gateway to the city: a brief urban theoretical analysis

At first glance, Dubai is very much considered a 21st century city. It is smothered by ultra-modern architecture; gaudy glass skyscrapers are omnipresent. Cranes topping off new buildings are a permanent installation. Modern Dubai's urbanism on steroids provides a cutting contrast with the fabric of Deira. These areas immediately surrounding *Khor Dubai* (the creek) exhibit an urban typology that reflects the district's main function: trade (Hempel, 2018).

As more and more cargo came through Port Saeed and eventually Port Rashid, the areas around the dock yards grew. Import-export businesses and general traders set up shop around the Creek and set up homes in its back streets. People follow people; initially adventurous, male merchants came to Dubai, but their families soon followed. Those working in Deira were mostly from the former British Raj, so large Indian and Pakistani communities developed around the creek. Emirati nationals lived separately, in gated compounds.

Cities grow around people. Supermarkets and small businesses that cater to everyday needs sprouted around Nasser Square, Deira's main public place (now Baniyas Square). A vibrant,

active neighbourhood was being built around the creek. By the early 1970s, when the Government commissioned British architect John Harris to produce the city's first masterplan, Deira was the undisputed commercial hub of Dubai. Like countless other port districts, Deira attracted merchants from far and away. Those who liked it, stayed, and agglomerated around the docks. Much of the city's early growth can be attributed to the vibrant business environment that bubbled in Deira - the history of Dubai starts it in port (Akhavan, 2019).

As a commercial hub, Deira's built environment is defined by the infrastructure that supports trade: banks, everything-stores, general traders, currency exchanges, hotels, etc. These businesses aggregated along the coast, creating commercial corridors that reached inland and drew the urban fabric tighter to the port. Ground floor commercial and retail uses are common. These active frontages ensure there is a constant flow of people moving in and out of the area. A dense, fluid street network spreads out from these main arteries. By virtue of the creek's geography, which stretches relatively deep into the desert, the liberal business environment and the permeable urban fabric, goods could quickly and easily be exchanged and moved throughout the area (see Figure 2).

Large *souqs* (markets) grew in proximity to the creek. It was straightforward to move goods from the port to the various nearby markets, merely hundreds of meters away. The different types of markets, ranging from spices and textile to gold and grain, reflect the diversity of trade going through Port Saeed and Port Rashid.

Figure 2 Figure ground plan of key infrastructure and commercial corridors in Deira (*Source: Hempel, 2018*)

2. Multi-culturalism and transnationalism in Old Deira: how did it happen?

2.1. Planning Deira and Dubai

Despite being a former British protectorate, Dubai's planning system is completely different. The fact that it is a young city means it could be relatively straightforward to observe and comment on potential correlations between planning strategies and urban change. However, this has proven to be challenging, as there is a lack of transparency and documentation. It appears that, since the 1960s, a multitude of city-wide masterplans and strategic land use/zoning plans have been commissioned (behind closed doors) in an attempt to guide the development of the city.

Drawing on the work of Elsheshtawy (2010), Pacione (2005) and Hempel (2018), the following are deemed to have been the most important in shaping Dubai and, consequently, Deira: the 1960s John Harris Masterplan, the 1980s Comprehensive Development Plan by Dioxidis, the Dubai Urban Area Structure Plan 1993-2015, the 2003 Dubai Structural Plan and, most recently, the Dubai 2020 Masterplan. Arguably the most impactful masterplan remains the 1960s John Harris plan (Elsheshtawy, 2019). It created strategic road links around Deira and laid the skeletal foundations for much of the crucial infrastructure that connected the areas north and south of the creek.

The strength of Harris masterplan lays in its recognition of Deira as a vibrant, thriving marketplace. The framework built on the main physical asset of the district: its connectivity. Through new roads and commercial corridors, it increased connectivity to the creek and the rest of the city (see section above on Urban Fabric). The dredging of the creek and reclamation of land for the shipping industry greatly improved its capacity to move freight, thus accelerating the economic growth of the area.

The city-wide strategies that followed the Harris Masterplan were commissioned without consistency in vision or delivery. The result is a series of relatively ad-hoc strategies that are commissioned at the whim of government officials. The continued blanket zoning of Deira as a "commercial hub" or "central business district" is the closest thing there is to an "area action plan" or "local plan" - there is little to no evidence of any Deira specific planning strategies.

The planning system in Dubai was in theory, managed by government offshoots that cover various districts. Up until recently, there was no over-arching, city wide planning committee, unlike Abu Dhabi which has the influential Urban Planning Council. In 2011, the Dubai Executive Council approved the creation of the Supreme Urban Planning Council (SUPC) to streamline the delivery of the Dubai Urban Development Master Plan 2020. It is hard to evaluate the impact of the SUPC so soon after its creation, but the fact that the government is adopting an integrated approach to urban planning is a step in the right direction.

In practice, however, the various governing bodies operate in isolation (Ramos, 2010). Dubai Municipality theoretically has power over the city's maintenance and approval of development permits in publicly owned land. It has no authority over Dubai's many free-trade zones, which are operated by independent bodies that respond to the highest level of government. Ultimately, the city's large property developers (Nakheel, Emaar, Meraas, Damaac, to name but a few) have the most clout. Founded or managed by nationals closely

linked to the ruling family, they are said to operate under the decree of the Sheikh and his entourage. High-profile projects, such as the Palms, are supposedly granted by royal favours.

Old Deira, being a historically low-income neighbourhood, has attracted less interest from the large developers, who have focussed on the city's more luxurious, ambitious projects. Deira has had the freedom to grow organically, relatively untouched by developers and planning regulations. This autonomy allowed it to naturally evolve into a place that authentically reflects its inhabitants, somewhere that is unique in the country.

2.2. Transnationalism in Deira: the case of the fur trade

When Dubai discovered oil in large quantities in the 1960s, the emirate did not have the local labour or expertise to develop its industry and infrastructure. As oil revenues rapidly grew, Sheikh Rashid could afford to attract top Western business leaders, luring them with ludicrously high, tax free salaries. Most of these executives were British men (such as John Harris). Being a former British protectorate, the new oil and construction companies imported workers from countries they knew well – India and Pakistan. Entire labour camp districts were built for workers on mega-project construction sites, with the most famous ones being the Jebel Ali Industrial Area and Al Naboodah, next to the airport.

The more well off moved to Deira. As previously explained, it is the ideal location for small merchants who need good access to the port. First, lone men came, but their families soon followed. Schools and social infrastructure were built to cope with soaring demand. As Dubai grew into its role as the premier hub of the Middle East, it played a vital role in linking maritime trade between Asia and Africa and, to a lesser extent, Europe. People from around the world came to Dubai to do business. Deira really captures the essence of multi-cultural trade. Walking through Baniyas square you see Nigerians buying Korean electronics from Chinese general trade stores operated by Indians.

Whilst Dubai is now an established hub of high-end globalisation through its financial centre, its economy is underpinned by small time trade. Elsheshtawy (2014) explains that places like Deira grew as nodes of low-end globalization. Since regulations are so lax – few questions are asked at customs – businesses that blur the line between the legal and illegal prosper. This system is consistently exploited. Dubai is the perhaps the world's money laundering capital (Forbes, 2019). Deira more specifically is a stop-off point (The National, 2010) for drugs on their way to Europe from poppy-producing nations, such as Afghanistan and Burma. In an otherwise incredibly safe country, the area has also become rather notorious for low-end prostitution and the sex/human trafficking industry. Dubai's powerful underground economy thrives in Deira's affordable and loosely policed environment.

Elsheshtawy (2014) and Mathews & Yang (2012) details the relationship between East Africa, Dubai's Deira and Hong Kong's Chungking Mansions. The Kenyan entrepreneurs he met in Deira had just come from Hong Kong and were on their way to Nairobi. Many specialise in the import and export of mobile phones. Gordon Mathews, Professor of Anthropology at the Chinese University of Hong Kong, describes this flourishing informal industry (Financial Times, 2011). Second-hand or fake mobile phones (of varying quality) from Japan, Korea and China are repaired in mainland cities like Guangzhou or Shenzhen and are then delivered in mass to the Chungking Mansions shopping centre, located in Hong Kong's well Tsim Sha Tsui district. Indian and Pakistani vendors buy the phones at cut-rates and sell them to African middle-men, who stuff thousands of phones into their luggage and fly onto to their next destination.

For most, the pit stop is in Dubai, where they can unload some of their merchandise to be sold in (most likely) Deira before flying back home, where they sell the rest. According to Mathews, in 2009 (Financial Times), an estimated 15-20% of mobile devices in sub-Sharan Africa can be traced back to Hong Kong. In countries like Kenya, some 70% of cell phones are from Chungking Mansions. It is hard to measure the exact logistics of this informal economy, but it is safe to assume that a fair amount of the handsets passed through Dubai.

Deira has its own unique case study. The informal economy that best highlights this is the fur trade. Since the turn of the century, quality furs are sold at cut prices in malls and apartments around Baniyas Square (Khourchid, 2008). The majority of shops are owned and operated by Greeks from one particular town, Kastoria, in the north of the country. Kastoria has been at the heart of the ancient fur trade since the 14th century – Byzantine nobility famously shopped for furs there. The furs are originally from Scandinavia but are processed and assembled in Kastoria. Targeting Dubai's fur-loving Russians, Greek entrepreneurs brought their product and expertise to Deira, which was the city's commercial district in the when they arrived in the noughties. The furs are quite cheap in the emirate as consumers benefit from the inevitable tax exemptions.

The Greeks occasionally employ Russians to work in sales. But most are actually from Central Asian countries, as they expect lower wages (van Leijen, 2012). As a result, there is a growing community of Uzbeks, Kazakhs and Kyrgyz expatriates. I recently ran into an Uzbek owner of an electronics shop (which included perfumes and jewellery) in Deira who spoke English, Russian and Arabic. To add another ingredient in the cultural melting-pot, the Greek fur traders employ Indian runners, who prowl the streets of Deira in search of Russian tourists and live off commissions from sales. Seemingly Slavic enough, I was approached numerous times by young Indians who spoke commendable Russian. Many shops in Deira attempt to lure clientele with both Cyrillic, Chinese and English advertising. Foreignism has marked its territory.

3. Lessons learned, the future of Deira and conclusions

3.1. Lessons learned and international transferability

Organic Growth: highlighting the intimate relationship between form and function

Walking through Deira on a Friday night is an experience rich in sensation. I wandered through Baniyas Square at around 23:00 and the area is in full swing. African families gather next to Pinoy couples in the main square. Pakistani construction workers huddle around public benches whilst Indian store owners stretch out in the grass. Egyptian and Iranian children play football next to a taxi stand. Shops are open, and people drift in and out, browsing lazily. This vibrancy is an outcome of the co-location and competition between innumerable small businesses that essentially sell much of the same.

Deira is so obviously in opposition to most of the rest of Dubai. The core reason is rather simple: Deira is old and Dubai is young. The historic districts that surround *Khor Dubai* date back hundreds of years. Some say Al Fahidi (on the opposite side of the Creek to Deira) was linked to the Old Silk Road. Regardless, Deira has had the time to grow as a place and build character. The essence of the area is still steeped in maritime trade. As previously explained, form follows function in Deira. From the commercial corridors and main roads that lead out from the port to the alleys and courtyards filled with everything-stores, every street corner

in Deira contributes to the viability of the area. The urban fabric reflects the area's economic value as a successful market place, an interface that has evolved between buyers and sellers from around the world. The vibrancy of Deira is ultimately proof of its success as a neighbourhood and as a public space (Elsheshtawy, 2008).

-Authenticity vs. imported generic modern

For all its deficiencies, Deira is nonetheless an authentic environment. If you close your eyes and take in the smells of 5 streets throughout Deira you could be transported to 5 different countries. Places where Deira's nationalities collide, such as Baniyas Square, are psychedelics trips into the heart of what Deira is – gritty, thriving and genuine. I observed Pakistani-Pinoy couples drinking *karak chai* (milk tea) next to Iranian elders. Hanging above them was a neon light in Chinese character. There is an element of Blade Runner to the heart of Deira. At first glance the streets are seedy. The lighting is not the best, so wandering through can seem a bit intimidating. It all feels a bit chaotic, as people swarm in and out of shops and arcades and alleys. The sweeping sound of the call to prayer clashes with the abundance of aggressive neon lights, giving the area a uniquely surreal atmosphere.

After spending a few days in Dubai, wandering through Deira is a refreshing experience, as the rest of the city is so obviously imported from everywhere else. Business Bay, the new central business district, could be an office complex from anywhere in South East Asia. The Marina could be Miami, the International Financial Centre could be Manhattan, so on so forth. Huge gated communities, such as Arabian Ranges, are copy and paste jobs from Arizona. These places are imported from other cities, meaning that Dubai can feel like an exaggerated and tacky recreation. At times, Dubai can really feel like a fragmented mish-mash of generic modern architecture. The eccentricities of Deira are a welcomed counterweight to the more spurious aspects of the city.

De-regulated urbanism: the *autonomous development of Deira*

The urban development of Deira is a tangible example of what could be called autonomous urbanism. Because of its affordability, it has not yet been targeted by Dubai's institutional developers. The built environment has therefore organically evolved to reflect the needs of the community in the form cheap, flexible spaces that can accommodate a range of different uses. What is currently being used as the office for a general trader could potentially be converted, very easily, to a light-manufacturing showroom, an electronics shop, a convenience store or even a Chinese restaurant. The clustering of many industries in one location innately attracts both customers and business. The de-regulated planning system guarantees the fluidity of the property market, which is crucial to its success. Conversely, this also allows for the development of a semi-illegal and abusive land ownership system; Deira is known for its squalid living conditions and violations of health and safety standards.

In summary, it is perhaps the lack of an articulated planning system (Ling, 2018) that has most contributed to the development of Deira. The key drivers of growth have mostly been initiatives that are loosely related to planning. Ultimately, the vibrancy of Deira appears to be a positive externality of investment in infrastructure and neo-liberal-ish economic policy (Bertaud, 2018). As previously demonstrated Deira is product of trade, not vice-versa. The district's status as a free trade hub is the source of its energy, density, affordability and transnationalism. Formal planning strategies played a very limited role.

Visa regulations and government supervision

Any paper on Dubai must address, in some form, the wider socio-political context. Emirati nationals – those born in the Emirates to predominantly Emirati families – represent around 8% of Dubai's total population. The other 92% are expatriates, who live and work in the country under strict supervision. Work visas are generously granted to foreigners; after all, the country was built by them. But when you are in the Emirates, you respect the rules. The country is one of the most supervised in the world, meaning that it is also one of the safest. There is virtually no room for error for those on work visas. Having already paid so much to find work and secure the visa to the UAE, the low-skill, low income workers from Pakistan, India, Nepal and the Philippines are not going to waste their opportunity. Furthermore, many families back home rely on remittances to get by. For example, remittances contributed 28% to Nepal's GDP in 2018 (World Bank, 2019). Consequently, there is not much petty-crime, as breaking the rules unconditionally results in expulsion.

The UAE has been labelled by some as a "benign-dictatorship". Public displays of discontent are not tolerated. There is very little religious freedom and even less free freedom of expression. Deira can therefore be gritty and authentic without the sense of danger normally associated with such places. To a certain extent, Deira provides a soft introduction to some of the more challenging cities of the developing world – like, say, Karachi or Nairobi. The melting pot of cultures can prosper because there is no lenience for dissent or violence. The Deira social experiment that pits many diverging nationalities together may not be as successful in more tolerant, chaotic Western democracies.

3.2. Conclusion: the future of Deira

In the context of planning for culture, Deira is a fascinating case study. Dubai, the modern mini-mega city we recognise today for its ambitious developments and outlandish skyscrapers, owes much of its growth to Deira. The success of Deira potentially highlights two points. One, globalisation is good for cities – when monitored. Two, multi-culturalism works – when supervised. From this perspective, Deira and Dubai really embody the modern, world city. The rest of the globe can learn a lot from it.

The "Deira" model of trans-national, organic urbanism has elements that are applicable to other parts of the world. Many cities can promote organic urbanism by loosening the administrative grip on planning. Deira demonstrates that a bottom-up, market and user led approach to urban development can be very successful. Whether the government intended to do so is debatable, but small enterprises are empowered by the ease of doing business and finding suitable facilities in Deira. The location is sustainable as it benefits from excellent access to ports and public transportation. The network of roads and alleys also allow goods to be distributed cheaply and efficiently throughout Deira.

This is an extreme case, however, and it is recognised that this would be a challenging approach for other cities to embrace. Nonetheless, there is value in making planning systems more flexible and community-driven. Many city districts could benefit from regulatory relaxation by using the planning system as a framework that guides development, as opposed to a set of prescriptive policies that suffocate neighbourhoods. This being said, the "Deira" model functions well within the socio-political context of the United Arab Emirates. Such considerations must be factored in when discussing the transferability of the Deira model abroad.

Above all else, Deira shows that successful places can be created when various, contrasting cultures are organically integrated through the development of economic relationships. It is

hard to despise someone when you buy fish or tires from them. A significant positive externality of the Deira model is racial and ethnic tolerance. Walking through Deira I witnessed countless inter-racial couples; Pinoys and Pakistanis, Caucasians and Indians, North African and East African, etc. Deira could also be used as a case study for pro-immigration policies, though perhaps extreme in this case, as the representation of Emirati locals is so exceptionally low.

Looking forward, the future of Deira could soon be at a crossroads. The Dubai 2020 Urban Master Plan gives little information other than a land use plan and some relatively generic sustainable urban planning principles. As always, Deira is zoned as "Metropolitan Urban Centre", which one would presume is relatively similar to a Central Business District. Pondering the future of Deira leads us to the age-old question: who are we planning for? Dubai badly needs to provide affordable housing (Alawadi, 2017) for its majority low-income groups. They need decent homes with good access to public transportation, public and green spaces and a provision of flexible space for business.

Dubai seems determined to deliver the opposite. Driving down the city's main highway, Sheikh Zayed road, one can not help but notice the skeletal structures of new skyscrapers. Many stand empty or incomplete, a sombre reminder of the cyclical nature of the property market in Dubai. Unfortunately, the construction of the Palm Deira indicates that city leaders want to push forward with the "luxury living" agenda, despite suggestions that money can be best spent elsewhere. Dubai seriously does not need more gold-plated towers - it needs to draw from its success stories and reflect on how it got to where it is now (The National, 2012). Learning from Deira could be a good starting point.

4. References

Akhavan, M. (2019) “Revisiting Dubai as a Port City”, The New Arab Urban, 175-193

Alawadi, K. (2017) “Land, urban form, and politics: A study on Dubai's housing landscape and rental affordability”, Cities, https://doi.org/10.1016/j.cities.2018.04.001

Bertaud, A. (2018) Order Without Design: How Markets Shape Cities, Cambridge, Massachusetts USA, The MIT Press

Brooke, D. (2013). How Dubai Became Dubai. [online] Nextcity.org. Available at: https://nextcity.org/daily/entry/how-dubai-became-dubai [Accessed 11 Jul. 2019].

Elessawy, F. M. (2017) “The Boom: Population and Urban Growth of Dubai City”, Horizons in Humanities and Social Sciences, 2 (2) 26-41

Elsheshtawy, Y. (2008) Transitory Sites: Mapping Dubai's ‘Forgotten’ Urban Spaces, Department of Architecture, UAE University, https://doi.org/10.1111/j.1468-2427.2008.00819.x

Elsheshtawy, Y. (2010) Debai: Behind an Urban Spectable. Oxford: Routledge, 2010.

Elsheshtawy, Y. (2014) “Searching for Nasser Square: An urban center in the heart of Dubai, City: analysis of urban trends, culture, theory, policy, action,” 18:6, 746-759, DOI: 10.1080/13604813.2014.962890

Eslsheshtawy, Y. (2019) “Real Estate Speculation and Trans-national Development in Dubai”, The New Arab Urban, 235-256

Financial Times (2009). Where Africa goes to buy its mobile phones | Financial Times. [online] Available at: https://www.ft.com/content/4609e212-eb64-11dd-bb6e-0000779fd2ac [Accessed 11 Jul. 2019].

Financial Times (2011). Migrant hopes: Mansions a melting pot of low-end globalisation | Financial Times. [online] Ft.com. Available at: https://www.ft.com/content/3bab2c70-d94d-11e0-884e-00144feabdc0 [Accessed 11 Jul. 2019].

Forbes.com. (2019). Dubai Has Become A "Money Laundering Paradise" Says Anti-Corruption Group. [online] Available at: https://www.forbes.com/sites/dominicdudley/2019/01/29/dubai-has-become-a-money-laundering-paradise-says-anti-corruption-group/#123c817a315e [Accessed 11 Jul. 2019].

Hempel, A. (2018) “Urbanism and choreography of life follows trade”, Life-scapes Beyond Bigness, 186-203

Hvidt, M. (2009) “The Dubai Model: An Outline of Key Development-Process Elements in Dubai”, International Journal of Middle East Studies, Vol. 41, No. 3 (Aug., 2009), pp. 397-418

Khourchid, M. (2008). A fur deal. [online] The National. Available at: https://www.thenational.ae/arts-culture/a-fur-deal-1.510478 [Accessed 11 Jul. 2019].

Ling, A. (2018). Order Without Design: Why Markets Shape Cities Better Than Planners | Anthony Ling. [online] Fee.org. Available at: https://fee.org/articles/order-without-design-why-markets-shape-cities-better-than-planners/ [Accessed 11 Jul. 2019].

Mathews, G. and Yang Y. (2012), How Africans Pursue Low-End Globalization in Hong Kong and Mainland China, in: Journal of Current Chinese Affairs, 41, 2, 95-120. ISSN: 1868-4874 (online), ISSN: 1868-1026 (print)

Ogaily, A. (2015) "Urban Planning in Dubai; Cultural and Human Scale Context", Council on Tall Buildings and Urban Habitat

Pacione, M. (2005) 'City Profile: Dubai.' Cities, Vol. 22, No. 3 (2005): 255–265.

Ramos, S. (2010) "Diversification, Clustering and Risk in Dubai", Al Manakh 2: Gulf Continued

rental affordability", Cities, https://doi.org/10.1016/j.cities.2018.04.001

The National (2012). Story of Dubai starts in Deira. [online] The National. Available at: https://www.thenational.ae/uae/heritage/story-of-dubai-starts-in-deira-1.457012 [Accessed 11 Jul. 2019].

The National (2010). Dubai 'being used as hub for drug traffic' say police. [online] Available at: https://www.thenational.ae/uae/dubai-being-used-as-hub-for-drug-traffic-say-police-1.507040 [Accessed 11 Jul. 2019].

van Leijen, M. (2012). Fur your information, Dubai's Russian secret. [online] Emirates24|7. Available at: https://www.emirates247.com/news/emirates/fur-your-information-dubai-s-russian-secret-2012-02-25-1.444860 [Accessed 11 Jul. 2019].

World Bank (2019). Personal remittances, received (% of GDP) | Data. [online] Available at: https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS [Accessed 11 Jul. 2019].

Research Paper

Cultural Heritage Conservation and the Sustainability of City's Orderly Development: identification, conservation and construction of historic space

Qinglian WANG, wangqinglian23@sina.com; China
Zhiqing ZHAO,zhaozq88@126.com;China
Bocheng ZHANG,951787866@qq.com;China

Abstract

Chinese Eastern Railway is the well-conserved linear cultural heritage in China in the 20th century. Despite that the conservation career of cultural heritage along Chinese Eastern Railway flourishes, the contradicted benefit demands between the conservation of historic buildings and the orderly development of the city is increasingly obvious. In this paper, Hengdaohezi Town, a station-located town along Chinese Eastern Railway, is taken as an example to explore its conservation of cultural heritage and sustainable ways for city's orderly development from the view of historical space. It's indicated from the results that mutually contradicted benefit demands could be balanced through the identification, conservation and construction of historic space. Then the requirements of historic heritage conservation are satisfied through the combination of conservation zoning delineation, limitation of building height, integration of spatial morphology, etc. Additionally, city development and construction and living environments could be improved through the adjustment of land use, alleviation of road traffic, upgrade of greening system, remediation of ecological environment, etc. Moreover, it's shown from the realization ways that identification, conservation and construction of historic space is one of the ways to achieve the sustainable development of historic towns.

Keywords

Sustainability,heritage conservation,town construction,realization ways,Hengdaohezi

1. Introduction

The Siberian Railway is an important regional traffic corridor, built by Russia in the late 19th and early 20th centuries. And Chinese Eastern Railway in China is actually its eastern branch. Almost twenty-five years of construction activities along the lines have led to large-scale and a considerable amount of buildings group, which drove the rise and prosperity of many cities

as the prototype of spatial development of station-located areas. The core cities of regional development and characteristic resource towns are both involved. The former includes Russia's Vladivostok, Khabarovsk, and China's Harbin. The latter includes Russia's Krasnoyarsk, Taiga, Novosibirsk, Omsk, Yimianpo and Hengdaohezi in China. The architectural heritage along Siberian Railway and Chinese Eastern Railway profoundly impact city pattern evolution and even the social integration, cultural exchange and economic circulation in Sino-Russian bilateral area, until now.

As urbanization process and market economy effectively speeds up, the station-located cities and historic buildings are faced with a series of problems to be solved. Firstly, historic buildings lacks of necessary repair with constant damage. A large number of historic buildings are damaged. Random construction and renovation of historic buildings inside and outside have caused excessive density, broking the garden-style layout, one house and one courtyard, of historic buildings and giving huge potential fire problems. Secondly, development and construction activities threaten the conservation of historic environment. The rapid and disorderly development of city construction and renovation of old cities for the purpose of real estate development lead to a large number of residential communities and modern buildings, which hardly consider the relationship of street space scale and coordinate with historic buildings. The improper layout of building scale and body seriously damage the original historic characteristics. Thirdly, the lagging municipal construction affects the life quality of residents. Most of the historic buildings are located in the old cities, where the municipal facility conditions are poor, life garbage is dumped randomly and sewage is usually discharged to the streets directly. Additionally, the green land and public activity space are absent in old cities.

In this research, based on the existing achievements, Hengdaohezi Town is taken as an example to analyze the actual problems for city development, cultural heritage conservation and resident life , such as demolition of old historic building and construction of modern buildings1, original appearance repair of historic buildings and conservation of historic authenticity2. It aims to balance the interesting conflict of mutual contradictories among historic building conservation, city oderly construction and life improvement.

2. Literature Review

Along nearly 2,500 kilometers Chinese Eastern Railway, the buildings and structures are large and diversified in number and types. It has become the unique cultural phenomenon in northeast China with its far-reaching influence on city characteristics, social structure and life pattern. Since the beginning of road and affiliated area construction, the agencies and scholars from China, Russia , Japan and other countries upheld strong academic interest and research enthusiasm for the experience and conservation of engineering construction and architectural skills, social and cultural and economic activities; especially during the past twenty years, when city heritage conservation, rapid acceleration of urbanization and railway traffic almost simultaneously develops, the attention, discussion and research for the city development and heritage along Chinese Eastern Railway has been ushered into a peak

1 remove old historic buildings and build modern building facilities
2 restore historic building appearance and conserve its historic authenticity

period with rich research achievements, displaying multidisciplinary perspective, multi-special categories, and multiple time and space dimensions.

2.1. Cultural heritage prototype interpretation

Based on the prototype and morphology, the diversified classification standards include architectural function (original function, such as station building, engine house, water towers, residential houses, churches, etc.)(Zhuo N.2016), architectural style(traditional Russian-style buildings, Art Nouveau buildings, eclectic buildings, etc.) and façade decoration(roof molding/dome, entrance, column, doors, windows and balcony). Supplemented by the necessary graphic language and literature, the expression and artistic characteristics of each types and categories are systematically analyzed to further explore out more abstract and broad cultural meaning at the level of aesthetics and semiotics(Li, G.Y 2014). Moreover, the spatial morphology and mechanism (architectural spatial morphology, spatial morphology) and more macroscopic natural landscape types，along the lines are summarized in their characteristics to further apprehend the system and structure, spatial distribution and natural environment characteristics of the earlier Chinese Eastern Railway, which is greatly significant to guide the city conservation and urbanization development along Chinese Eastern Railway(Zhao Z.Q.2016).

2.2. Renovation of historic buildings and Renewal of historic blocks

This research mainly consists of two types: design practice and strategies formulation. The former focuses on the specific material space renovation and functional positioning. The digital technology ways are applied to provide design guidance for the renovation of historic buildings; the new blue print of historic blocks and sections are set up through the restoration of systematic characteristics, repair of historic buildings, conservation of ancient trees and the introduction of modern city function space（Zhao, T.Y.2006）In sight of the conservation and reutilization of the former stations and other historic buildings, the implementation strategies are put forward in building appearance, internal structure, utilization function, surrounding environment and public facilities; based on the integration, permanence and systematicness of historic block renewal, the affecting factors of renewal pattern is summarized to further put forward the corresponding working programs as well as the evaluation and feedback mechanism, which is usually accompanied by quantitative evaluation of various indicators; moreover, considering the urban planning as the management ways of city construction, the conservation strategies are put forward for rules and regulations, policy implementation and operation and management（Zhao Z.Q.2012）.

2.3. Regional integration and tourism development

In addition, the conservation of Chinese Eastern Railway is combined with modern economic and social life to therefore fully play the advantages of tourism resources and improve its actual position in city economic society, which is also an important topic of heritage research. The network of tourism space focuses on the selection and theme classification of tourism resources at municipal level connects the resource of theme nodes in series to form theme ways and therefore construct spatial network（Tang, Y.X.2016）; tourism space structure across the administrative regions constructs industrial heritage tourism space structure of Chinese Eastern Railway from three aspects: hierarchy nodes of tourism cities, division of tourism circle and planning of tourism lines（Tang, Y.X.2017）; The tourism development of

the whole lines suggests integrating the representative heritages along Chinese Eastern Railway within four northeast provinces, jointly develop natural landscape within the region, establish the cooperated mechanism and construct the integration of Chinese Eastern Railway lines.

3. Materials and Methods

3.1. Case Study

Hengdaohezi Town, N44°48' and E129°04', is located in the west of Hailin City. Hengdaohezi Town occupies the important geographical position for the three eastern provinces in China. It's 300 km away from Vladivostok, Russia. As the main thoroughfare of northeast Asia, it's in the core of Northeast Asia Free Trade Zone; meanwhile, Hengdaohezi Town is located at the Russian economic belt of Harbin, Mudanjiang , Suifenhe and Dongning, the only place for exchanges of western region in Heilongjiang Province. On the other side, Hengdaohezi Town is an important node for coal, wood and water before climbing the mountains and loading trailers (auxiliary engines). Meanwhile, there is a large amount of railway departments, buildings and anciliary facilities in Hengdaohezi Town, having great influence to the operation and management of Chinese Eastern Railway.

Figure 1 Location and historic and cultural environment analysis

3.1.1 Interpretation of city characteristics

The town is entirely surrounded by mountains and a river goes through inside. The terrain is higher in the north with the slope below 25%. And the partial is between 25%-50%. Depending on the railway and river growth and development, the morphology is belt. The city is divided into four parts by railway, rivers and mountains. The historic buildings are more to the north of the railway, the space is narrow between railway and river, scattering some earlier Russian-style houses. The buildings are mainly built after the founding of PRC to

the south of the river and to the east of the mountains. The spatial layout of city street is evenly distribution and radial. The streets and lanes remains the earlier evenly distribution to the north of railway. To the south of railway, the streets and lanes space is mixed by evenly distribution and radial type, naturally formed.

Historic streets and lanes is pleasant to the north of railway and the width (D) varies between 2m-5m and it's usually 3m-4m away from the eaves height of buildings on both sides, D/H is smaller than , making the street more intimate. The types of historic buildings are dominated by small residential houses and public buildings. The decoration of historic buildings shows strong exotic cultural characteristics, reflecting in flat shape, wood material, wall color, window and door decoration and lien contour, etc. The use of these detailed components and decoration reflects multiple characteristics of Russian-style buildings.

Table 1 city characteristic analysis

Characteristic type	description
Settlement morpholgoy	Strip city morphology, evenly distribution residential morphology and surrounded by mountains with river going through
Street space	Spatial layout of evenly distribution and radial type, pleasant street scale
Building characteristics	Regular appearance (regular geometry), stone and wood structure
Decoration art	Onion dome, tetrahedral tower drum, flat Mukeleng-style houses and engraving patterns

3.1.2 Analysis of cultural heritage

Hengdaohezi Town has a large number of historic buildings with large scale and concentrated distribution. These historic buildings could better reflect the historic characteristics, exotic culture and folk customs during Tsarist Russia and the Japanese-Puppet period. At the same time, they also witness the history of Chinese Eastern Railway with higher historic value. Secondly, the architectural details with beautiful appearance and unique style are well reserved to reflect the historic development background and provide materials for architectural culture and art of historical process with profound academic value.

Thirdly, many photographers, film and television producers, and sketching enthusiasts perform photography, filming, and sketching in towns. A large number of historic buildings have left the most authentic side of the town with higher artistic appreciation. Ultimately, industry-dominated Hengdaohezi Town is changing. And these rare historic resources strengthen the connotation of the town, which is a solid backing for other industries with higher utilization value.

Table 2 typical historic buildings

historic buildings	Representativeness	Value characteristics
Engine House	Modern industrial architecture civilization	Historic value

	point	academic value artistic value utilization value
Railway white building	Former residential houses and official buildings for Chinese Eastern Railway experts	
Log yard	Photos of the earliest log yard in China (in the Museum of Chinese History)	
Orthodox Notre Dame Church	The only remaining wooden church in the three eastern provinces	
Ancient Russian stree	The best preserved Russian style historic district	

3.1.3 Historic space identification

The planning drawings of earlier cities are interpreted to explore their historic space constitution, boundary and characteristics. The layout of earlier Hengdaohezi Town considers railway station as the center and rectangle squares and a large amount of greening are set up surrounding the center. On the other hand, taking railway station as the base point, the town develops along the railway lines. The administrative region is set up in the north (inside there are religious land use, education land use and medical land use); secondly, in the east and west set up are the boundary region (military land use inside) and village region (mainly residential land use). The road network of the town is typically rigid. Street design is wide, straight and flat. The land is divided in standard grid. The buildings inside the street profile are arranged in double rows with ending buildings close to the four corners.

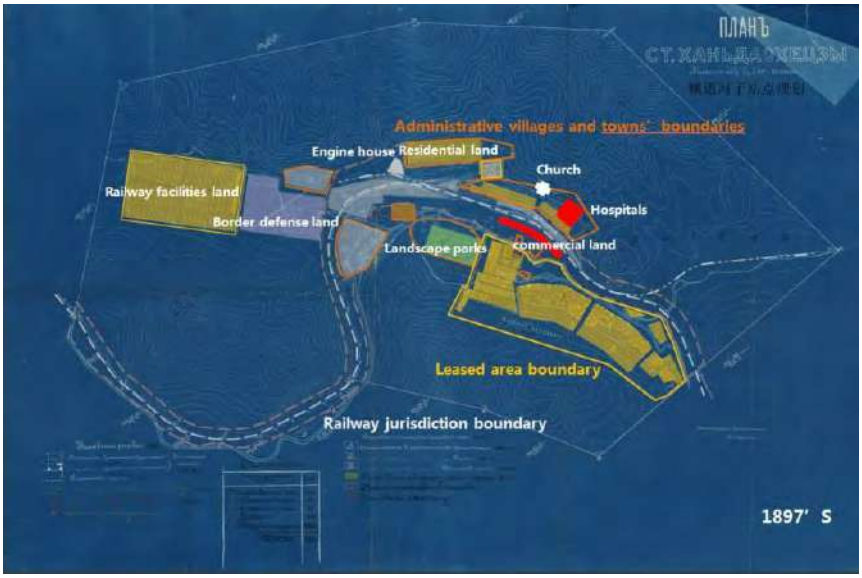


Figure 2 Historic planning drawings

After hundreds of years of city development and construction, city historic space has been submerged in the continuous expansion and transformation of city map. Through the

comparison between original and existing planning drawings, the historic space boundary of Hengdaohezi is determined (see Figure 3). Within historic boundary, it's still clearly to get the characteristics of earlier city planning: grid road network, wide, straight and flat street, neat land division and line architectural texture. However, the typical road greening and that in front of the station are hardly preserved. Overall, the historic space of Hengdaohezi retains the framework of earlier planning.

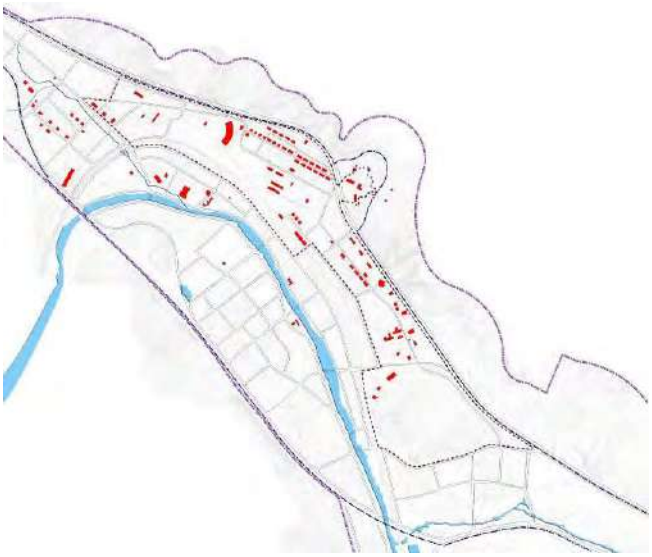


Figure 3 comparison between historic planning and the existing space

3.2. Research Methodology

Combining with the city development problems and relevant analysis, the principles of jointly development are put forward between heritage conservation and regular construction. The first principle is to coordinate conservation and construction. The city not only conserves and continues historic culture, but also needs to promote economic development and social progress and fully combines conservation with construction. City conservation and construction rules are respect to highlight conservation keys. The construction of new districts should be coordinated with old district conservation. Meanwhile, the requirements should be satisfied among city economy, social development and improve citizen's life and working environment. The second principle is sustainable development. City development couldn't quick and simply pursues economic interests. The current utilization methods should ensure the future sustainable development. The relationship among historic heritage conservation, residential environment improvement and industrial development should be comprehensively coordinated. The conservation and utilization are combined with the conservation prioritizing to formulate city construction content with sustainable development significance. The last principle is historic environment conservation. The conservation of historic space not only aims single cultural relic, but also involves relics, historic space, historic buildings and traditional characteristic buildings, facilities and structures and ancient trees, etc. with overall conservation measures. Based on the above three principles, the realization ways, historic conservation and construction are formulated to anticipate achieving the sustainability of heritage conservation and orderly construction.

4. Results and Discussion

4.1. Conceptions of realization ways

The sustainable ways of both are explored through the formation of implementation strategies, planning framework, conservation zoning and key construction (see Table3). The development strategies consider conservation of historic environment, exploration of cultural potential and improvement of life environment; the planning framework further explores cultural connotation based on the analysis of city traditional characteristics. The structural planning is constructed for the overall conservation of material morphology and cultural connotation of Hengdaohezi Town. In material space morphology, the historic elements of the cities are divided into three levels: nodes, axis and regions. These three levels of space are mutually connected to jointly constitute the historic spatial layout of Hengdaohezi Town.

In the first level of conservation zoning, the historic section, where the traditional layout and historic characteristics are completely conserved and historic buildings are concentrated, are determined as core conservation boundary. And outside the core conservation scope, the construction and controlled section are determined. In the second level, the scattered various level of cultural relics conservation unit, historic buildings and traditional characteristic building are determined in their conservation scope and construction and controlled scope. The environmental coordinated area is determined if necessary. The third level mainly aims at ancient trees, mountains and rivers. The key conservation content includes various historic buildings within the cities and their surrounding environment; in addition, the original natural environmental elements area considered as the key component of city historic space, being protected properly.

Table 3 heritage conservation and city construction development ways

Ways	Content	Description
Implementation strategies	conservation	Conservation historic environment and focus on the overall appearance. Improve the conservation recognition and visual perception of historic characteristics from user and experiencers
	governance	Comb historic context, reproduce historic atmosphere. Maximize the conservation of historic trace, promote coordination and unification of history and modern
	renovation	Improve citizen's life, perfect facilities. Consolidate house structures, perfect infrastructures, improve sanitary

		and beautiful environment
Planning framework	single core	core of city center landscape
	Two belts	Hengdao River and its branch going through Hengdaohezi Town
	Four districts	Concentration area of cultural relic conservation buildings and industrial heritage area
	Five scenic points	Orthodox Notre Dame Church, Hengdaohezi Engine House, No.7 Russian-style Wooden Houses, White Railway Building, Railway security station
Conservation zoning	The 1st level	Conservation scope determination of historic buildings concentration area
	The 2nd level	Conservation scope determination of single historic buildings
	The 3rd level	Conservation scope determination of ancient trees and rivers
Key conservation	Artificial environment	Various levels of cultural relics conservation units of key conservation towns and their surrounding environment
	Natural environment	Deserve appropriate conservation as the component of city historic space

Figure 4 conservation framework of historic space

4.2. Conservation of historic space

4.2.1 Determination of conservation zoning

The determination of core conservation scope should comprehensively consider topography, road traffic, courtyard ownership and other conditions to conserve and maintain street space and cultural heritage within the core areas. It's not free to build or demolish. The new built or demolishing buildings must adhere to the conservation principles3, meanwhile, and ensure the consistency with the overall style of the buildings. The first level includes four core conservation areas, in which the sections with abundant historic buildings and well-preserved sections are improved as historic blocks.

Table 4 historic block conservation information

District	Are of core conservation scope	Area of historic building base	Conservation content
Historic block of ancient street	61 hm2	18933 m2	Conserved buildings Historic buildings without being leveled
Shunqiao historic district	6.4 hm2	4003 m2	
Foshou historic district	6.4 hm2	3613 m2	
Industrial heritage district	13.1 hm2	-	

Then, the construction controlled area is determined, 209.7 hm2, according to the integrity of historic environment, coordination of environmental characteristics and the safety of heritage distribution area. The height, scale and color should be coordinated with traditional

3 In core conservation scope, spatial layout of the historic village and the façade, materials and color of buildings along the street should be changed without authorization; the renovation of the existing buildings should keep or restore their historic and cultural characteristics; new construction and expansion of the road shall not be allowed without authorization. The renovation of the existing roads should keep or restore their original road layout and landscape characteristics.

characteristics when the new construction, renovation and expansion are approved within the construction controlled scope; new construction, renovation and expansion should not destroy the traditional characteristics of the historic village. Moreover, according to the overall harmony of village environmental characteristics, the environmental coordinated scope is determined, 774.5 hm2. The construction projects should not be freely constructed within environmental coordination scope to further maintain the historic section relationship with surrounding environment as well as the water, soil and natural environmental landscape to the greatest extent.

Figure 5 City conservation zoning scope

For single memorial buildings and ancient buildings and its surroundings, the conservation scope is 2-5 times of the height of the main buildings and the construction control scope is 4-8 times of the height of the main buildings within the second level. In addition, zoning also needs to collectively consider the construction status quo and development trend of local cultural heritage and ownership of the building land. Construction control scope is mainly based on the integrity of historic environment and harmony of environmental characteristics. Within the third level, the scope is conserved within a radius of 5 meters from ancient trees. The mountains and rivers consider its natural layout and pattern as conservation scope while taking into account the greening environment on both sides.

4.2.2 Limitation of building's height

In view of the requirements of cultural relic conservation, the echo and reunification of scenic spot, the outline of urban space and conservation of characteristic landscape, the existing condition and land use planning are combined, based on the above single height control, to overlap the above single planning results to ultimately determine the building height of each land plot (see Table 5). The original building height of cultural relic conservation unit is maintained, not allowing the height of common buildings or structures exceeding that of cultural relic conservation buildings within the conservation and construction control scope. The existing buildings like this should be removed. The original height of conservation buildings and historic buildings, not being listed in cultural relic conservation unit, are maintained. The common buildings and structures, whose height exceeds that of conservation buildings and historical buildings within the surrounding area of 10 m, shall be lowered or removed.

Table 5 Height control（unit:m）

Controlled area	Building style	eaves height	total height of ridge	total height of buildings	remarks
The 1st level	One-story sloping roof	< 4	< 6	-	the construction buildings, historic buildings and the reconstructed buildings to the original appearance are not subject to this limitation.
The 2nd and 3rd level	Two and three-story sloping roof	< 4	< 4	< 12	Within city construction and control scope, the height limitation is 10m for key areas and 13 m for non key areas.
The 4th level	Four-story sloping roof	< 13	< 15	< 17	Within environmental coordination scope, the height limitation is 13m for all areas.

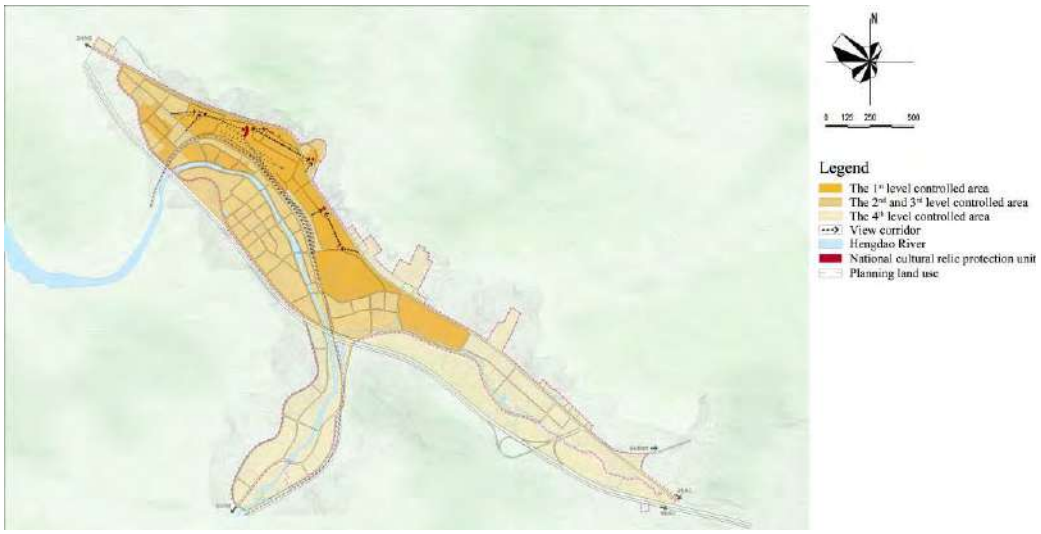


Figure 6 city buildings height control

The control of view corridor for city landscape is the key of building height control. The buildings within landscape corridor shall base on analysis of view field of scenic spots within visible range to further determine height control requirements. View corridor includes the viewing space between scenic spot and landscape objects as well as its surrounding environment. The general view corridor are crucially constructed and conserved for important landscape including round house, No.7 wooden house, white building, Hengdaohezi Town police station, former Hengdao maintenance site, Hengdaohezi railway station and Hengdao maintenance apartment.

4.2.3 Integration of spatial morphology

The historic space morphology is unified through develop conservation and construction requirements of building appearance, color and style, building layout, internal function and building scale. In general, within core conservation areas and characteristic coordination

areas, the morphology and color of newly-built buildings are restricted to keep harmony with traditional characteristics. For newly-built low-rise residential buildings within the cities, the slope roof must be applied. The built residential houses with flat-roof must be gradually changed into slope roof; for the existing buildings with slope-roof buildings, the roof color is cyan. In sight of building color, the newly-built buildings should conform to the color and style of old buildings with red-titled slope roof and red-titled materials.

Respecting the original architectural style, the township and newly-built buildings should keep harmony with historic conservation blocks and un-reconstructed buildings. The slope roof is red titled. The façade is dominated by red brick and yellow. The material is mainly paint and supplemented by red brick. The line is white. Then, according to the different functions of the buildings, the commercial and office buildings apply red titled or red slope roof, yellow materials or ceramic title. The storage and factories and other public buildings use flat roof with grey, blue or iron color. The façade is dominated by cement, stone and paint. In addition, the construction principles of public buildings and commercial buildings focus to create different spatial atmosphere according to different functions to further increase the recognizability of the buildings.

Table 6 Integration of spatial morphology

content	Conservation requirements	Construction requirements	remarks
Building appearance	Maintain and restore the original characteristics of the buildings	The appearance of newly-built buildings should conform to that of historic buildings	To apply building symbols and language with city characteristics; the appearance of buildings on both sides of the river display traditional characteristics of residential houses.
Color and style		Encourage warm color construction(including buildings, pavement and environment, etc)	Avoid monotony, use warm color to give people a warm and lively visual care
Construction layout		Construct historic building layout and water, lanes and alleys and other traditional features	–
Internal function		The newly-built buildings are constructed according to internal functional organization and characteristics of historic buildings	–
Building scale		Control newly-built buildings scale to in	Newly-built buildings should apply courtyard-style (groups

		accordance with historic environment of conservation area	of single buildings) and to give a balanced visual experience

4.3. Spatial construction of township

4.3.1 Adjustment of land use

Township land use is complicated with confusing layout. The historic and surrounding areas are mixed with industrial land use, not conducive cultural heritage conservation. Then the commercial land and entertainment land is less, the parking lot is obviously insufficient for industrial transformation and development. The existing land use is adjusted as follows. The land use conversed for land on both sides of Hengdao River and inside historic block, including industrial land, land with low economic benefit and long-abandoned land use. The original land structure is improved to achieve consideration in conservation, development and efficiency.

Table 7 land use adjustment

Existing problems	Type before adjustment	Type after adjustment	Adjustment purpose
Destroy historic space characteristics	Industrial land	Commercial service Cultural entertainment	Coordinate general characteristics Conserves spatial morphology
Low economic efficiency	–	catering service museum exhibition	Develop tourism industry Improve per capita income
Long-abandoned without utilization	Abandoned land	Green land, squares	Efficient use of land Improve space quality
Less municipal infrastructures	–	Municipal public facilities	Increase public facilities, Enhance living environment

The expansion process of construction land is greatly limited by topography. Land expansion therefore is restrained by spatial growth boundary to some extent. The spatial growth boundaries are determined by combining with population development scale, city construction land requirement and ecological space integrity. The northern part could be controlled in a suitable construction area with a slope of less than 25%; the southern part could be controlled to the G301national road and partial still takes mountain as the boundary with less than 25%; the eastern part boundary takes the eco-sensitive northeast tiger park as the boundary.

4.3.2 Improve road traffic

The scale, portion and layout of the original road should be kept within scope of historic space. Non-historic roads should be broadened without affecting the historic spatial characteristics of the block. The traffic road network selects and determines lines on the original road network and is parallel to the central streets. According to the texture and terrain of old and new cities, the mixed road network structure and three-leveled road classification are constructed (see Table 8) in combination with courtyard division and land saving. Among them, parking is not allowed for trunk roads and the branch roads advocate bus first.

Table 8 structure of road network

Road network structure	Road classification	Road width	Road function
mixture	Trunk roads	16m	Connects external traffic
	Brunch roads	12m	Organize public traffic
	Allies	6m	Construct pedestrian system
		4m	

Parking lot and squares. The requirement for parking within township is considered while taking account into the demand for public space from citizens. At the area with large pedestrian flow, 7 parking lots are set up with 9 recreation and squares. Public traffic. The relationship between internal bus lines and external long-distance bus lines are dealt with. The selection of bus stops should fully consider the surrounding land use layout and public service facilities to ensure bus accessibility with the service radius less than 300m. Pedestrian traffic. The effective width, continuity and flatness of the pedestrian roads on both trunk and branch roads are ensured. The accessibility of pedestrian roads and crossing facilities are required to strengthen the maintenance, management and supervision of pedestrian system. Additionally, the pedestrian space is added specifically to cover the space of entire old streets. Waterfront space and central greenland park.

4.3.3 Upgrading of greening system

Within historic space, the cultivation of trees and shrubs should be terminated as appropriate. Other measures include beautify environment, control land use construction and protect cultural relics from destroying. The set-up of various facilities within historic blocks should fully refect the principle of sustainable development and focus on greening space organization to strive to minimize the pollution on air, water and soil and restore good ecological environment. Within river channels on sides of Hengdao River4, the flood-tolerant trees and grasses should be selected without affecting flooding. The greening should be strengthened with the attention to vegetation combination and landscape composition, making it an original ecological waterfront park for citizen and tourists.

The following measures are applied to improve the greening quality and ecological quality of the cities: firstly, with the street-facing buildings position, several small open spaces are

4 Hengdao River is an important geographical element for city construction, as well as an crucial part for greennign and ecological environment. And its water quality can reach to the 1st level, which is precious ecological landscape resource. The essential ecological environment should be conserved for Hengdao River.

formed with appropriate trees planting to enhance the vitality of the city. Secondly, the courtyard greening of residential houses on both sides of street is enhanced. The single ornamental plants are planted to form sight attraction to further improve residences' landscape aesthetics with rational arrangement of the courtyard greening. The third point is to conserve historic trees. The historic trees are the important natural landscape resources to reflect regional environment and history. Satisfying the conservation, the subsequent supervision, management and maintenance work are well done.

4.3.4 Ecological environment remediation

Air environment remediation measures. the unified heating intensity of the city are enhanced to encourage the application of clean energy. The city reconstruction and greening are also strengthened with the improvement of road hardening rate and greening coverage. As the existing industrial structure is transformed, the greening conservation and low-polluted industries are vigorously developed. In addition, the city dust pollution is controlled with technological or administrative ways to improve city greening. The trees species with strong anti-pollution performance are selected to develop plant purification, combined with urban greening planning.

Water environment remediation measure. The construction of sewage treatment plants are accelerated with improving sewage treatment rate. The underground water is protected from the pollution of sewage source. Open channels are governed and restricted from discharging sewage. The sewage pipes are prevented from rupturing, polluting underground accidents. The sewage discharge pipe network is strengthened in its design, implementation and management to ensure the normal operation, reduce pipe rupture and pipe leakage and other accidents. The underground water resource is effectively developed and used.

Sound environment remediation measures. The supervision and management of sound environment remediation measures are strengthened to establish public participation system. Around sound-sensitive areas, the speed limit zone and horn limit zone are set up. The tonnage of the passing vehicles is limited to improve the surrounding sound environment. For the area near sound-sensitive area, the noise radiation direction is properly arranged with reasonable building structure. The three-dimensional greening of the factory-dominated areas is strengthened and if necessary, the sound insulation walls are built to minimize noise.

5. Conclusions

Through a series of practical exploration including the identification, conservation and construction of historic space, the author preliminarily puts forward the ways to realize the sustainable cultural heritage conservation and regular city development during the urbanization process. In general, it's indicated from the research results that the contradictories and interest claims are finally satisfied among historic building conservation, regular city construction and citizens' life. The positive development strategies are preferable to the future development of the city.

In conclusion, this research is both theoretically and practically meaningful.

In practice, to realize the sustainable cultural heritage conservation and regular city development, several suggestions are put forward for historic space identification, conservation and construction. Firstly, sustainable conservation. Cultural heritage conservation calls for continuous attention. The long-term and effective conservation mechanism is formulated to avoid the protection of dead sheep; secondly, sustainable utilization. Cultural heritage utilization is the most directly refection of its various values. Without affecting its conservation, the value of cultural heritage should be maximized and reflected. The third point is sustainable development. Cultural heritage conservation and utilization should also be considered with city development to realize coordinated development of cultural heritage and city construction. The fourth point is sustainable policy. The policy for cultural heritage conservation and utilization needs to be formulated with other relevant polies, such as heritage conservation management, utilization, paid policy for repair, to guide citizen's positive attitude toward the conservation.

On November 9, 2018, UNESCO announced the results of this year's asia-pacific cultural heritage protection award in Bangkok, Thailand, and hengdaohezi town was awarded the honorary award of 2018 cultural heritage protection.

6. References

Zhuo, N.; Wang, Y. (2016)"A Study on the Military Architectural Type of the Main Line of Chinese Eastern Railway". New architecture, No.5(May).

Li, G.Y.; Xu, H.P.; Liu, D.P. (2014) "The Interpretation of Culture Communication of The Buildings along the Chinese Eastern Railway from the Perspective of Cultural Routes" ,Architectural Journal, No.45-51(August).

Zhao, Z.Q.; Wang, Q.L.; Zhang, L. (2016) "The Development and Feature Analysis of Harbin's Historic Space From 1898 to 1945",Urbanism and Architecture, No.54-57(February).

Zhao, T.Y.; Chen, W. (2006) "New Elements in The Planning Design of Renovation of Historical Cultural Block—Renovation Planning of Mid-East Railway Garden Residential Block in Harbin",Huazhong Architecture,11, No.40-43(November).

Zhao Z.Q., Wang Q.L. (2012) "Shaping the vitality of the national list historic culture town based on the theory of urban catalysts. Advanced Materials Research", No.1637-1641(November).

Tang, Y.X.; Shao, L.; Cao, W. (2016) "Evaluation of Heritage Corridor Tourism Development Potential: Zhongdong Railway Case",Planners, No.96-101(February).

Tang, Y.X.; Shao, L.; Wang, R. (2017) "Building of Heritage Spatial Network from the Perspective of the Preservation of City Context--With the Building of the Spatial Network of the Colonial Heritage of Chinese Eastern Railway in Harbin as the Example" ,Chinese Landscape Architecture,No.33, 76-81(March).

Research Paper

RESEARCH ON ONLINE PUBLIC PARTICIPATION AND ONLINE PLATFORM CONSTRUCTION FOR HISTORICAL BLOCK PROTECTION IN THE DATA AGE

Yang YANG, ouw@deakin.edu.au; Australia
Jilong ZHAO, zlll0w@sdjzu.edu.cn; China
Qian SUN, 573295334@qq.com; China

Abstract

With the implementation of benefit-oriented urban renewal, many historical blocks have lost their identifiability. The historical block is an external entity that is a presentation of urban culture. The disappearance and homogenization of the historical block have directly led to the city losing its place attachment, with the overall identifiability of urban areas becoming weakened. Therefore, it is essential to develop a strategy to protect historical block identifiability in urban planning. Traditional urban planning is dominated by government and developers and is highly dependent on planners' experience-based judgment but lacks quantitative analysis of public participation. As a result, it is difficult to carry out an objective and comprehensive analysis when facing the complicated situation of historical blocks. The issue of public participation has become an essential issue in the process of urban construction and renewal in China and other developing countries. Based on an analysis of the concept and the characteristics and techniques prevalent in the data age, this article discusses (1) the method and mechanism of public participation in the protection of urban historical blocks and (2) the content and structures of public participation platforms for historical districts. Research indicates that the application of cloud technology and reasonable platform design is the focus of public participation in historical block protection, which can change public participation from passive to active, from "lagged" to "synchronized".

Keywords

public participation, online platform, historical block protection, data age

1. Introduction

In many developing countries, there is an urgent need for an applicable public participation platform for the renewal and protection of urban historical blocks (Wei et al.,2015; Cheng et al., 2015). On the one hand, this need is born from the gradual disappearance and total commercialization of blocks that carry historical value and memory. On the other hand, under the original "top-down" model of historical block protection and development, the

public can only be passive and accept renewal policy that has already been decided. Among citizens, the government, and developers, it is easy for issues like housing demolition and relocation to occur (Liu, 2007). Therefore, for the renewal and protection of urban historical blocks, we need to not only preserve the original historical memory but also develop an open and effective public participation platform.

However, there are many severe deficiencies regarding the modes and technologies of current historical block protection (Feng and Li, 2013). The renewal and protection of urban historical blocks is a complicated urban social issue and requires communication channels and time to organise and update social relations. On the one hand, existing urban public announcement and online comment platforms are often vacant, making public participation an institutional decoration to a large extent. On the other hand, the results obtained from traditional public participation modes are mainly based on voting and writing, which are difficult to analyse and directly categorise (Liu, 2007).

New media platforms in the data age stimulate public awareness of independent participation. In the age of digitalisation and interconnection, with the popularity of new media such as microblogs and WeChat, Internet public participation events such as the PX project boycott event have had an impact on government decision-making, and China has begun to see the burgeoning of citizen network participation politics (Dai et al. 2014). PX is the abbreviation of xylene, and the PX project involves the production of xylene. In recent years, some people have worried that PX is harmful to human health and have organised walks and parades through the Internet and other means to boycott a PX project planned for construction in a locality. Since 2007, such incidents have occurred successively in Xiamen, Chengdu, Dalian, Ningbo, Kunming, and other places. The incidents had a certain impact on the government's decision-making. Most of the above cities announced the termination of relevant PX projects. Meanwhile, the protection of historical blocks has received extensive attention. Besides, with smart handheld devices becoming the main terminals of people's lives, daily life and social affairs are demonstrating diversity and immediacy, gradually changing the mode of public participation in the protection of urban historical and cultural resources from passive to active (Zhou et al., 2012).

Therefore, in view of the current situation of urban historical block protection in China, the establishment of a public participation platform based on new media can enhance the participation of all parties, increase the diversity of public participation modes, and improve cultural information about urban historical blocks available from various channels. This study explores the three aspects of public participation theory, mechanisms, and a platform of the historical block protection, with empirical research conducted in combination with an examination of existing cases.

2. Characteristics of Public Participation in Historical Block Protection in the Data Age

2.1. Interpretation of basic concepts

A historical block refers to a block with a certain scale of historical relics and complete historical features. It is the material carrier of social life and cultural habits during a specific

period. The "Athens Charter", the "Venice Charter" and the "Special Measures for the Protection of Ancient Capitals' Historical Features" all proposed that an essential aspect of historical block protection is the overall protection of the historical, cultural, material, and living environment of the blocks. In the protection of historical blocks, attention should be paid to the structure and customs of subjects and their diverse use of space.

Arnstein (1969) believed that "public participation is a right of the public". In his opinion, public participation can be divided into eight steps: manipulation, guidance, notification, consultation, persuasion, cooperation, authorization, and public control. Public participation in the historical block protection is essentially a multi-step redistribution of the protection rights of diverse subjects such as residents, social groups, non-profit organizations, and individuals (Lane, 2005; Choguill, 1996).

With the increasing popularity of interactive network platforms and smart mobile terminals, more and more commercial and public platforms have begun to feature personalized content based on users' collected preferences and requirements. The real-time interaction of a large number of diverse subjects with information using new mobile media as the primary tool is the main feature of the data age (Yu and Mao, 2015).

From the above analysis, it can be seen that the interaction and integration of multi-subject activities and information, as well as the redistribution of multi-subject protection rights, are the integration basis of historical block protection, public participation, and new media.

2.2. Public participation in historical block protection based on "Cloud"

The Internet provides an interactive interface for public participation in historical block protection. Feng and Li analysed the impact of public participation on the restoration and renovation of Beijing's "Zhonggulou" Square (Feng and Li, 2013). Through the network media platform, the renovation of the "Zhonggulou" Area received widespread attention, and some government decisions were adjusted and modified in response (Feng and Li, 2013). In "Internet-based planning information exchange platform and public participation platform construction", Zhou (2012) stated that the network-based public participation platform is characterised by an "Internet-based user interface" and "information interaction with users". On the one hand, the system transmits visible and understandable results and information to the public; on the other hand, it gathers public feedback and quickly processes it.

New media is an effective tool to intervene in the protection mechanisms of public historical blocks. In "The Mechanism and Exploration of New Media Involvement in Public Participation for Historical Blocks Protection", Wei et al. (2015) introduced attempts at public participation in historical block protection and renewal projects using new media technologies. From the earliest WebGIS to WeChat public accounts and the Heritage Protection APP, he proposed that new media has changed the way information is disseminated and created opportunities for public participation. Through new media, platforms for display and exchange can be built to promote public participation, lower the threshold of public participation, and enhance enthusiasm for public participation.

The application of cloud technology has opened up the era of "cloud" distribution for public participation in the protection of historical blocks. For example, the Beijing Planning and Design Institute developed the CityIF Urban Planning Cloud Platform and proposed that due

to its social characteristics, the new era is a “micro-era”. The CityIF Urban Planning Cloud platform was sponsored by Beijing Research Institute of Planning and Design (Chu et al. 2015). It provides different data and information services for various groups such as citizens, the government, and planners, with the aim of bringing together urban data, planners’ wisdom, citizens’ bottom-up power and government’s top-down power to form a planning cloud platform and a platform for discussing the urban future. To acquire and integrate data, a “cloud platform” that can realize interactive sharing, multi-disciplinary collaboration, and data aggregation should be built. Such a platform consists of three layers of resource platforms: one is an analysis platform that analyses and processes big data; the other is a planning platform that collects the professional intelligence of planners; the third is a dynamic platform for community governance from the bottom up. On this basis, the platform provides three different operational interfaces for three groups: the government, planners, and citizens (Chu et al. 2015). Based on the “cloud platform”, the interaction and integration of multi-agent activities and information and the “cloud” distribution of protection rights can be fully realized for the protection of historical blocks.

In short, the Internet and new media are effective interfaces and tools for the “cloud” distribution of public participation rights. The cloud platform has opened up a vast network space for public participation in historical block protection.

3. Online Technology and Platform Construction for Public Participation

3.1. Limited participation “offline” and unlimited participation “online”

The traditional historical block protection mode can be divided into four categories according to the dominant party. In the first category, the government is dominant. The primary role of the public is to be informed and influence the government's decision-making, such as with the reconstruction of Warsaw after World War II or the renovation and restoration of Beijing's “Juer Hutong” (Hu et al., 2014). In the second category, civil organizations and individuals are dominant. This means that civil organizations or individuals guide the public to participate in the protection of historical blocks, such as the British “Ancient Building Protection Association” or the “Enning Road Academic Concern Group” during the renovation of Enning Road in Guangzhou (Wu, 2014). In the third category, the public spontaneously and actively participates in the protection of a district, such as in the “Community Vision Planning” in Halifax, Canada or the construction of the historical community of Dadaocheng in Taipei City (Macaulay et al., 1999; Xu and Liu, 2012; Liang, 2014). In the fourth category, multiple parties collaborate. This collaboration is initiated and implemented by the above parties, and the public is widely involved and becomes essential. A typical case is the Hong Kong Central Market Conservation Plan.

Among the four methods discussed above, public involvement in the protection of historical blocks can be classified into three main categories: First, property owners, who have a direct interest in the daily management and renovation of historical blocks and are mainly local residents, often do not need guidance and inducement. The space in which they live is the material element of the historical block, and the customs and community structure are also important aspects of protection (Hu et al., 2014). The second is the common interest in the

block, which mainly refers to experts, scholars, professional organizations, and non-governmental organizations relevant to citizens' public interest in the block. These entities mainly focus on the value of cultural research and the development, utilization, and valuation of historical blocks. The participation of such entities can effectively avoid the intensification of social conflicts or the excessive commercialization of neighbourhoods. The third category includes other individuals without a direct interest. Since there is no direct interest, they generally do not pay attention to historical acts and do not act spontaneously. However, with the development of society, the role of public opinion and action is becoming increasingly important. Through proper guidance, this will benefit the protection and development of historical blocks (Xu and Liu, 2012).

The public mainly participates in the protection of historical blocks in the following three aspects. First of all, it participates in the collection and protection of historical information, the investigation of historical resources, and the completion of data, all of which are essential work in the process of historical block protection. In addition to historical surveys and physical surveys, genealogical information and photos of local residents can provide information about the neighbourhood. This complements the physical form of the building and contributes to complete historical information about a block. Secondly, the public participates in the positioning, design, and implementation of historical block protection planning before the formulation of the plan, so residents and other members of the public have a detailed understanding. Based on the plan, suggestions are put forward. In the design process for a protection and renovation plan for a historical block, the public acts as a judge. After they understand the design plan, people make comments and suggestions, or vote on whether a certain transaction should be implemented (Zhou et al., 2012). Third, the public also participates in the cultural and tourism development of historical blocks. Local residents can preserve the social structure and customs of a neighbourhood and participate in the development of cultural and creative industries and tourism. On this basis, civil organizations and individuals can also hold culture exhibitions and other events promote local culture. In this way, on the one hand, the local culture is protected, and on the other hand, the social economy is developed. In this way, the benign development, protection, and transformation of historical blocks are realized.

At present, there are four main ways for the public to participate in or influence the protection of historical blocks. The first is information browsing in which relevant government departments and other entities publicize information and promote exhibitions to the public, but there is no interaction and poor participation (Liu, 2007). The second is the collection of opinions in which relevant departments obtain questions and opinions through on-site investigations and questionnaires and make plans based on this information, and the public participates in the protection of historical blocks (Zhou et al.,2012; Brown and Raymond, 2014). The third is collaborative participation in which the public participates in planning and design through meetings and expert workshops organized by the government, institutions, or non-governmental organizations in an effort to encourage the participation of residents, civil organizations, the government, and other subjects. This model involves government guidance and multi-subject participation and is the main direction of public participation in the protection of historical blocks in China. The fourth is public leadership in which self-governing community organizations and advisory committees collect public concerns and develop a community vision and action plans on behalf of community

residents and the general public to enable them to participate in planning, construction, and other relevant departments through negotiation and communication (Liu, 2007).

However, in combination with China's actual conditions and existing practices, the following problems must be solved to promote public participation in the protection of those as mentioned above historical in China. First, awareness of public participation is weak, and the Chinese public has little relevant experience with participation (Liu, 2007). Second, the main form of public participation is unclear. For a long time, Hong Kong, Macao, Taiwan, Europe, and the United States had relatively complete public participation systems that included the government, non-governmental organizations, residents, experts, and professional institutions. The public participation system in China remains unclear, and the power of participating entities is not clearly defined or distributed. Third, the content of public participation is limited. At present, management and renovation of most of the historical blocks in China are mainly led by the government, and the designers and developers are entrusted with carrying out planning and transformation. The public plays only the role of being informed, and there are no laws and regulations. Usually, a program has been basically decided when it is publicized, so public participation is of little effect. Fourth, there is a single method of public participation. At present, there are only methods such as on-site interviews, questionnaires, symposiums, and public announcements, and most of the public is passively involved, with one-way notifications. Fifth, there is no feedback mechanism. The key to public participation is interaction. At present, many historical block protection plans do not allow for feedback, so naturally, the public cannot influence decision-making or the formulation of plans and policies.

3.2. Online public participation platforms in the data age

New technologies emerging in the data age provide new methods to solve the above problems. Under the support of new technologies, management and operation models such as “crowdfunding”, “PPP”, “Joint planning and Joint management” began to be introduced into historical block protection (Yu, 2014). The online public participation platform not only provides citizens with convenient access to participate in the decision-making process but also provides opportunities for planners and citizens to interact (Yu, 2015). Compared with traditional public participation, online public participation based on data technology has the following advantages:

Historical information dissemination methods are diversified. The development of new media and the popularity of mobile smart devices have enabled the rapid dissemination of information, and new media directly push content to personal devices that spread quickly among the public through forwarding. Using QR codes, the public can link to WeChat, Microblogs, news pages, and other platforms to obtain and forward information about historical block protection anytime, anywhere.

Diversified ways of participation. In traditional public participation, feedback is mainly based on questionnaires and voting, and data is in a single form. In the era of data-based information, mobile phones, tablets, and desktop computers can be used to create online maps of historical block maps by means of webpages, WeChat, Microblogs, and other platforms. The public can directly participate in the design, make comments, or take photos of historical blocks with location information that reflect the status quo. Through data

information platforms, the government can also timely obtain public opinions on the protection of historical blocks and realize interactive information.

Participation of diverse groups. From the original government, residents, and experts to the whole society, participants include students, teachers, folk history protectors, non-governmental organizations, and other individuals and groups concerned with the protection and development of historical blocks. This reflects the popularity and whole process of public participation.

Diversified content of information. A significant feature of new media is the diversity of content and form. Data platforms can use any digital media content such as videos, 3D models, and panoramic images. New media and the SoLoMo service have expanded the way information is delivered and allows it to be presented more intuitively, allowing the public to interact with content. SoLoMo is composed of the first two letters of three words: “Social”, “Local”, and “Mobile”. “So” stands for all kinds of social networks, such as Sina microblogs and Facebook, “Lo” stands for all types of services based on geographical location, and “Mo” stands for mobile Internet. SoLoMo is the combination of the three.

Diversified data resources. The era of big data has promoted governments’ database construction and data availability, and many government agencies are digitizing information and gradually making it public. Data-based information platforms can use the cloud to access various types of information. For example, in the historical block protection process, the land management database of the national land department, the project management and design plan library of the planning department, and the database of historical building protection information can be linked. A variety of content can be added to online maps to increase the public’s understanding of issues.

3.2.1 Technical means of public participation in the data age

Specifically, in the data age, there are many technical means that can be applied to public participation in historical block protection.

The first is the QR code. QR code transforms textual information such as serial numbers, website addresses, and item characteristics into QR black and white images that can be directly recognised by computers and can be read by simple image input devices (such as mobile phones with a camera function). With the help of the QR code, the functions of information acquisition, web page jumping, and mobile payment can be realised. With the popularity of smart devices such as mobile phones, QR codes have become an essential way for the public to obtain information. In recent years, Shanghai, Harbin, and other cities have begun to post QR code on the nameplates of historical buildings, conveniently allowing the public to connect to a detailed network introduction page and solving the problem of limited nameplate content. Moreover, the public can directly comment on, suggest, map, or upload other relevant information, such as old photos and documents, through QR codes. In this way, the public can participate in the collection of information on historical blocks.

The second is the web service API. Network Service API is an open platform for network services. The allocation of traditional Internet resources is unbalanced, and a large amount of data generated by users is gathered by enterprises or institutions, resulting in other enterprises or industries being limited by the lack of user resources and data. To realize the sharing of resources, many enterprises have set up an open platform for network services to

open up their own resources to ordinary developers to a limited extent. The web service API is a resource interface provided by data holders (such as large Internet companies) that enables developers to access or use their resources. With the opening of the web service API, government agencies and public organizations will be able to create online public participation platforms more easily. For example, through the Baidu map API, developers can use Baidu map data and apply them to various map data services. The system that the author of the present paper developed offers costs savings in terms of data storage and transmission, reduces the time required to write a large amount of program code, and also transforms the main work of the public participation platform builder from collecting data and writing code to conceptualizing and realizing the function logic of the public participation platform. The public can also use the API service to browse the city's historical information and map markers and engage in public discussion and other participation behaviours. This reduces the public's learning costs and promotes public participation.

The third is virtual display technology. Virtual reality (VR) is a technology that allows users to immerse themselves in a computer-generated, interactive three-dimensional environment. Augmented reality (AR) is a technique for calculating the position and angle of camera images in real-time and adding corresponding images to combine real images with virtual images. In the historical block protection process, if the general public, which lacks professional knowledge and experience, is involved, there must be an intuitive and easy-to-understand way of displaying information. Virtual displays based on computer graphics technology not only allow the public to intuitively understand history and culture but also display historical block renovation plans, enabling the public to understand design plans and make suggestions. In recent years, data acquisition technology has advanced by leaps and bounds, with advancements including three-dimensional laser scanning and panoramic photography. With the development of network technology, the threshold of 3D data display is becoming increasingly low and low, particularly through WeChat, Microblogs, APP, and other platforms that allow viewing and access anytime, anywhere. In recent years, the VR and AR6 technologies, which have received much attention from the industry, have allowed the public to understand historical streets and their renovation plans immersively and to provide opinions and suggestions.

The fourth is big data technology. Technologies such as data mining and cloud computing are rapidly evolving. People are increasingly using mobile smart devices, generating a lot of spatial data. Spatial distribution and semantic analysis of these data can be used to derive behavioural patterns and the views of the public. On the other hand, public participation will generate necessitates downloading and uploading massive data, which requires excellent data processing algorithms. At the same time, cloud platform technology is rapidly evolving, improving data processing efficiency and ease of use by linking and integrating different databases. A typical example of big data technology is Location Based Social Network (LBSN). LBSN is a social network based on location. Compared with traditional social networks, LBSN can track and share real-time location information of people in addition to using network technology to realize virtual contact between them. LBSN uses the massive data it collects to combine data mining and cloud computing technologies and analyse the public's use of historical buildings or neighbourhoods in a certain city so that the public “unconsciously” participates in history. The protection and renovation of blocks through this method has a positive impact.

3.2.2 Public participation platform carriers in the data age

At present, many network service platforms have integrated the above-mentioned key technologies. Online platforms for public participation in historical block protection can be completely built on the basis of “the platform of platforms” using “carrier platforms” to avoid a large amount of time and energy required for bottom-level development. At present, there are the following relative mature “carrier platforms” in China:

One is the information visualization web page. With the development of technology, the information content of web pages has moved from graphics and videos to interactive and operable web pages. The information conveyed by web pages should be easy to understand as well as visual and interactive. This idea also corresponds to online public participation platforms in historical block protection.

The second is the microblogs. Its main advantage lies in its broad range of audiences. Through Microblogs, the public can understand the protection and renovation plans for historical blocks. Recent years have witnessed the phenomenon of the destruction of outstanding historical buildings in many cities. Local residents, experts, and scholars have appealed to society through Microblogs, forming a public opinion environment that enables the government to listen to the opinions of people and accordingly adjust their policies and programs.

The third is WeChat, mainly WeChat public numbers. The WeChat public number service is open to organizations, groups, and individuals. Based on this platform, specific functions can be developed to realize information push and interactive feedback. According to a 2015 report by Tencent, WeChat covers more than 90% of smartphones, and monthly active users reached 549 million. Its popularity is evident. Using a WeChat public account, it is possible to build a historical block protection participation platform that can be used whenever and wherever possible. Such a platform makes the public willing to participate more actively in discussions on urban construction affairs and policies. Planning departments can also collect and understand public opinions and adjust their historical district protection policies and plans.

The fourth is the independent APP (Application). As APP relies on mobile devices such as mobile phones, it has greater flexibility than traditional web browsing or entity modes. Compared with microblogs and WeChat public number, APP is relatively independent and unrestrained and can realize more abundant and easy-to-use functions. For example, using the Tianjin historical style building APP, the public can combine the GPS function of mobile phones to locate historical buildings conveniently. At the same time, explanations of the historical background of a building or block help to cultivate the public's sense of historical protection. At the same time, the discussion platform can be set up through the APP, and the public can send feedback information to the planning bureau and other departments or institutions through the APP.

These platforms have significant differences in information collection mode, information storage mode, and interaction mode. Therefore, different platforms have different advantages and disadvantage in terms of participatory degree, content richness, and types of participation modes (see Fig 1). Thus, the design of online public participation platforms

for historical blocks protection needs to design an independent technical framework based on specific content.

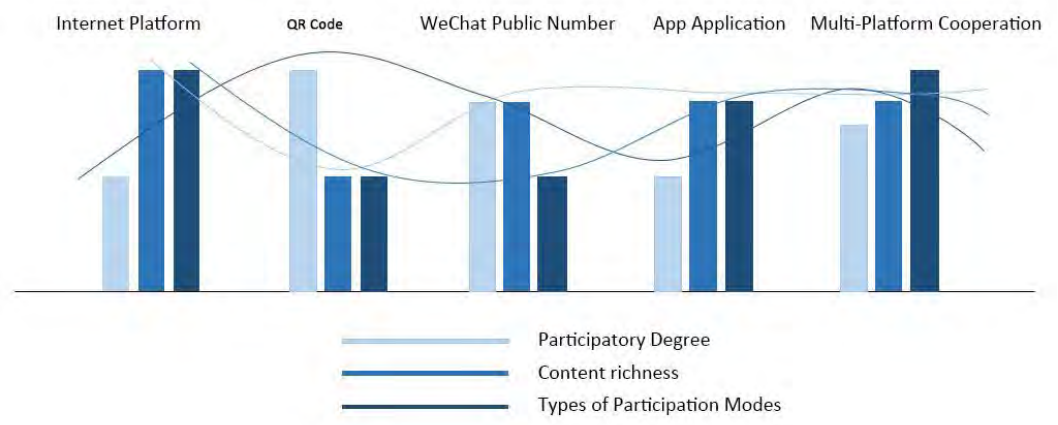


Fig. 1 Comparison of Public Participation Platform in the Data Age (Source: Author)

3.3. Construction of online public participation platform for historical block protection in the data age

3.3.1 Content of public participation platforms for historical block protection

There are three main types of users involved in online public participation platforms for the protection of historical blocks. The first is the government, developers, and designers that build, manage, and operate the platform. They are also important users of the platform and have the responsibility of communicating to the public the orientation, objectives, background, and presentation of design schemes for the protection or renovation of historical blocks. On this basis, public opinions are collected, and feedback is given. The second is community representatives, who are direct participants. This includes representatives of residents and industry, who use the public participation platform mainly to gather public opinions and questions and transmit them to relevant departments. The third is indirect participants, which includes civil protection forces, experts and scholars, academic institutions, civil scholars, cultural security personnel, and non-governmental organizations. These participants use the platform to organize diverse activities and establish links between the general public and government agencies, which are significant forces that cannot be ignored in the protection of historical blocks. In addition, the general public in urban and other areas can gain understanding, engage in discussion, and provide feedback through the public participation platform throughout the process of protection and renovation of historical blocks, thereby influencing policies and planning.

In view of the functional requirements of the types mentioned above of users of online public participation platforms, such a platform should include the following functional modules:

The first is the sub-platform of historical information collection and display. This sub-platform has four functions: The first is collecting historical and cultural information and

relevant historical pictures, text, audio, and video from members of the society and establishing a historical information resource bank concerning the blocks. The second is publicizing historical and cultural displays using virtual display technology to show the history of the blocks to the public. The third is the recommendation and identification of historical buildings. Recommendations, voting, and other means are recommended activities to ensure excellent historical buildings or blocks, and professionals are invited to investigate and identify the buildings. The fourth is the social supervision of historical sites, which involves reporting destructive behaviour in an effort to protect cultural relic and sites and ensure well-preserved historical buildings by uploading photographs and commenting on them.

The second is the sub-platform of planning design and implementation management, which includes four functions: The first is the preliminary investigation and discussion of planning. The public's questions and opinions are collected through WeChat, microblogs, and other means and are used as the basis for the formulation of the planning scheme. The second is the design and discussion of the planning scheme. Through this platform, the public can understand in detail the current situation and future orientation of the blocks. At the same time, the public can put forward opinions on planning through stippling, discussion and other means. After collecting opinions of the public, they can be analysed. This forms the basis of the planning scheme design. The third is the evaluation of planning efforts. Through the public participation platform, the public can participate in evaluating the results through voting, commenting, and other means and comprehend feedback from public opinion. The fourth is the implementation and management of planning. The government formulates short-term implementation plans, initiates activities and discussions with the public through the public participation platform, and coordinates conflicts between construction and residents' lives. At the same time, the construction situation is announced to the public in a timely manner. This allows "cooperative co-construction" between residents and the government to be gradually realized.

The third is the sub-platform of cultural activities and tourism development in historical blocks, which includes three functions: The first is the interactive display of tourism information, which allows tourists to quickly and conveniently understand tourism information on blocks and realize an "experiential" tour. Second, cultural and creative industries are displayed to propagandize and promote cultural and creative industries in historical blocks. The third is organizing and publicizing cultural activities, which enriches the cultural life of the blocks by inviting scholars or artists to give lectures and seminars.

3.3.2 Technical framework for public participation platforms in the data age

According to the mode, subject, and content of platform participation, the technical framework of such a platform in the data age is shown in Fig. 2.

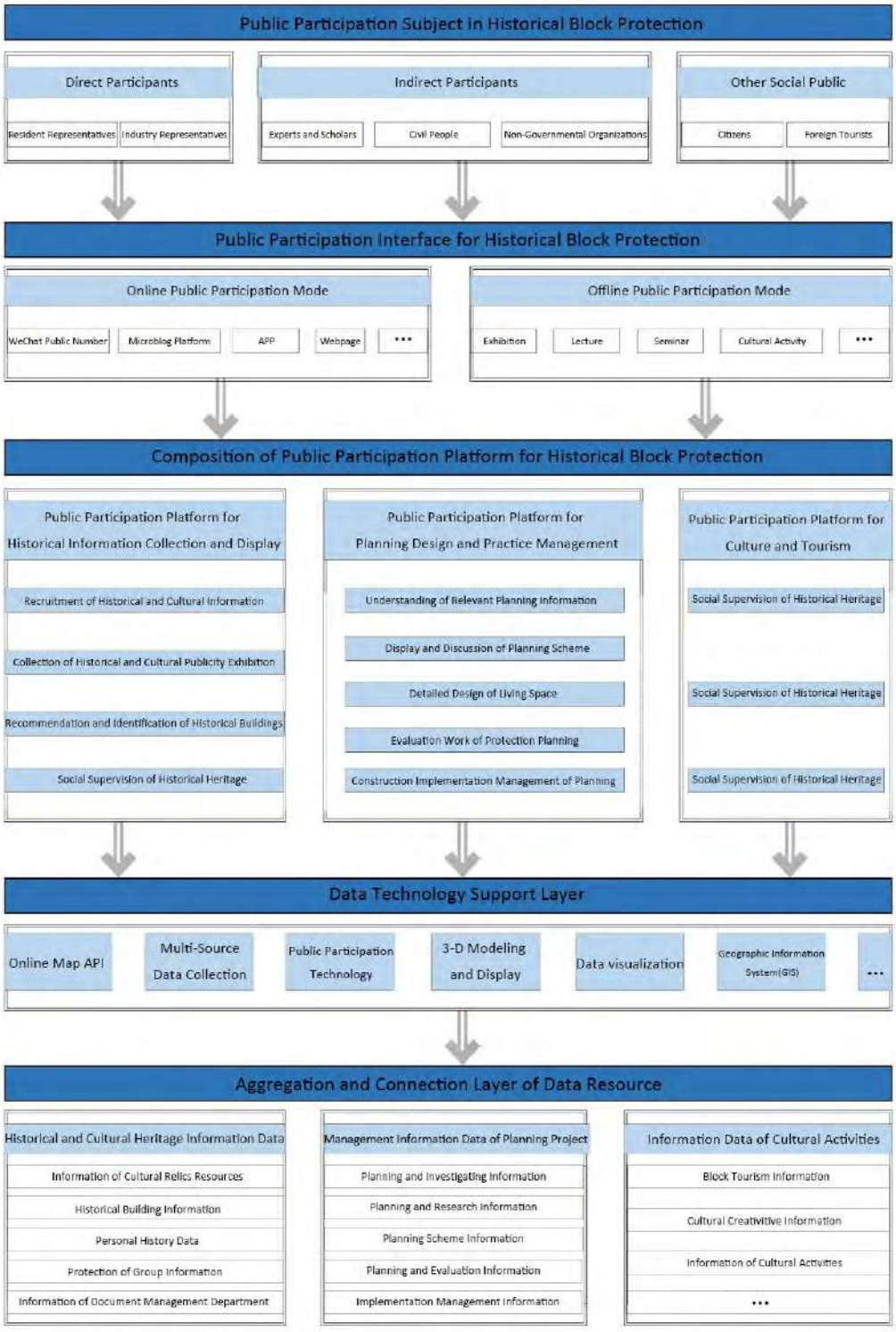


Fig. 2 Technical Framework of Public Participation Platform in Data Age (Source: Author)

4. Practical Analysis of Cases of Public Participation Platforms

4.1. Public Participation Platform for Historical Resource Management —— Beijing Historical and Cultural Heritage APP

Beijing has a significant cultural heritage distributed in large and small streets and communities. However, geographical locations and other information are mainly stored in cultural relics in department or institution exhibits, and it is difficult for the public to have a comprehensive understanding of them. At the same time, many historical relics are located deep in the streets and alleys, and it is difficult to visit them only with the textual address information. In addition, many historical relics are scattered and cannot be fully monitored and managed. The uncivilized behaviours of individual tourists and their illegal demolition by developers often cannot be stopped in time. Besides that, threats that historic buildings face can be varied and extraordinary. Due to the prevalence of wooden building materials, corrosion and aging are severe problems of many historic buildings. The fact that ancient Chinese buildings usually have delicate architectural details makes corrosion and aging more destructive. Structural details such as tenon and mortise joints become corroded by rainfall or damaged by worms even with a protective layer of lacquer on the surface, and paints on these buildings may be damaged by the weather, including rain, snow, wind, and even sunshine. Another problem of wooden structures is the risk of fire, and the situation is especially severe in light of the traditional compact arrangement of buildings in China. Fire usually spreads rapidly both inside the building and between buildings, and the narrow streets limit the success of modern fire-fighting methods. Therefore, building a platform for the public to understand the distribution of cultural relics and related information intuitively and to provide timely reports on the damage of cultural relics has become an important direction of public participation.

The Beijing Cultural Heritage APP developed by the Technology Innovation Center of Tsinghua Tongheng Planning and Design Institute is such a platform. This platform includes information on 336 existing cultural protection sites in the eastern and western urban districts of Beijing, including the World Cultural Heritage of the Forbidden City and the Temple of Heaven. The software uses Baidu maps as a geographic information platform and displays multi-level cultural protection content through different layers.

In addition to showing the overall distribution of heritage sites, the software also displays information for each heritage site separately. Clicking on the corresponding icon allows users to view detailed information, including relevant photos. Using the API of Baidu Street View Map, the street view around a building can be seen, creating a stronger sense of presence.

In addition to providing images and textual information on cultural heritage sites, the platform also encourages the public to upload photos they have taken and add comments to enhance interactivity. The platform also includes an alarm function for cultural relics, providing a channel for public supervision, so that people can directly report the damage to cultural and stop illegal demolition and illegal construction in a timely manner.

4.2. Public Participation Platform for Planning, Design, and Implementation Management—— WebGIS Network Public Participation Platform for Beijing's "Zhonggulou" Area

The "Zhonggulou" area is located near the "Di'anmen" area, which is in the eastern urban district of Beijing, on the city's central axis. Along with promotion of the renovation of old urban districts in Beijing, an upgrade plan for the "Zhonggulou" Area was proposed in 2010. According to the plan, the nearest Hutongs from "Zhonggulou" were to be demolished. The news spread rapidly through the Internet, and a large number of experts and scholars began to call for the protection of the texture of Hutongs and the landscape based on the central axis. Under this circumstance, in December of the same year, the renovation project was officially terminated, and the scope of the renovation was reduced to less than one-tenth the original, for a partial renovation.

During the renovation process, in addition to the appeals of experts and scholars and media reports, a special team played a huge role, namely the "Zhonggulou" Area team. The team intended to safeguard the rights and interests of local residents and continue the area's history and culture. Most of the team members met through microblogs, and a large number of student volunteers were recruited. They collected data through household surveys, interviews, the study of ancient books, and other means and disseminated protection information through microblogs and other platforms. After analysing the collected data, they developed a public participation platform for the "Zhonggulou" reconstruction community with the help of WebGIS technology. This allowed the team to integrate all kinds of data into the platform to facilitate residents and the public to understand the current situation and future of the area fully. The platform also enabled discussion and voting to investigate and analyse public opinion.

The participation platform relied on research and data collation and used WebGIS as a technical means to present the results in the form of an interactive platform for community residents and the public. The platform was spontaneously formed by non-governmental social teams. Although it did not play a decisive role in the development of the area, it provided an interactive channel for social cooperation and community participation to facilitate residents to understand policy information and preserve the style of the blocks through a visual platform.

4.3. Public Participation Platform for Cultural Activities and Tourism Development ——WeChat Public Number for "Slow Products in Shanghai Hunan Community" on Wukang Road, Shanghai

Wukang Road, Hunan Street, is located in the centre of Shanghai. Due to its rich historical and cultural anecdotes and buildings, it is known as the "Celebrity Road that condenses the history of Shanghai in the past 100 years". There are 14 excellent historical buildings along the road and 37 preserved historical buildings. On June 11, 2011, it was selected as a "Famous Street of Chinese History and Culture".

On June 15, 2014, Shanghai piloted the "E-age" historical building protection project in the Hunan community, which involved posting a QR code on the nameplate of excellent historical buildings and creating the "Slow Products in Shanghai Hunan Community" WeChat

platform. That was the first in China, and some other cities in China have also promoted it since then.

Relevant information about historical buildings and the past can be found only on display boards or archive exhibition halls, with limited display modes. Obtaining information through QR code breaks through the shackles of traditional media. By scanning a QR code linked to a created historical building display page, a voice introduction and dynamic display can be accessed.

The public participation platform for "Slow Products in Shanghai Hunan Block" is managed and operated by the Hunan Street Office. The aim is to build a public platform for intelligent communities. The platform and consists of three main sections: The first is "Historical Hunan", which mainly records historical buildings and information for the convenience of the public. The second is "enjoy Hunan happily", which integrates data on activities and special services of community and municipal cultural centres, and characteristic businesses to facilitate residents' lives and cultural leisure activities. The third is "Impression of Hunan", which is an interactive platform for residents and tourists to share their memories of the community by photos, travel notes, paintings, videos, and other means, and to make suggestions on the development and renovation of the community so that the public can participate in the development process.

Platform Type	Platform Name	Participation Mode	Participation Subject	Contents of Public Participation
Historical Resource Management	Beijing Historical and Cultural Heritage APP	APP Application	Social Public	1. Interview and Understanding of Cultural Heritage Information 2. Supervision and Protection of Cultural and Recreational Sites
Planning Design and Implementation Management	Community Planning Participation Discussion Website of Beijing Bell and DrumTower Renovation Project WEBGIS	WEBGIS Webpage	Non-Governmental Organizations Experts and Scholars Student Teams Residents	1. Non-governmental organizations such as social teams established historical block information database through social research 2. The public through the network platform to understand the condition of block renovation and preservation of historical resources, and to discuss hot issues
Cultural Activities and Tourism Development	Slow Products in Shanghai Hunan Block	WeChat Public Number	Residents Tourists Government Art Teams	1. Obtain historical building information through two-dimensional codes 2. Participate in community life and cultural activities 3. Save and upload community memories and make suggestions

Table 1 Case Comparison of Public Participation Platform in Data Age (Source: Author)

5. Conclusion

Historical block protection includes the material cultural heritage of the block and the social structure of the block. It is a complicated social management process, and it is necessary to invite multiple subjects to participate in the process of the management and renewal of historical blocks. At the same time, according to the 'ladder theory' of citizen participation (Arnstein, 1969), public participation in historic block protection requires that the public participates in the process of collecting historical information and planning and design related to historical blocks. As the conditions for public participation in China are not yet ripe, it is necessary to guide and standardize the content and forms of public participation through building a public participation platform.

In the data age, public participation platforms for historical block protection use new media and technologies such as WeChat, microblogs, and APP. There are three stages of public participation: the collection and display of historical information, planning design and

implementation management, and discussion of the block culture and tourism development. Establishment of such a platform will enable the public to shift from passive to active participation and from lagged participation to synchronized participation. Based on cloud technologies such as cloud computing and cloud storage, as well as "micro" technologies such as lightweight platforms, low-cost equipment, and low learning costs, users can simply and quickly participate in historical block protection anytime, anywhere.

With the development of society and the strengthening of consciousness of public participation, in the process of historical protection and cultural inheritance of the city, individuals and teams play a considerable supporting role and have made significant contributions to the protection of urban historical culture. How to integrate the resources and strengths of the government, related institutions, and the public to achieve a "crowdfunding" protection participation model is the focus of the construction of a public participation platform for historical block protection in the data age. This requires the government's "top-down" guidance and the "bottom-up" resource construction of the public from all walks of life. The construction process of the platform itself is also the content of public participation. Only by allowing the public to participate in every process of the protection of historical blocks and platform construction can social resources be effectively integrated to achieve substantive participation of the public.

6. Reference

Wei, Jia; Wang, Peng; Wang,Wei (2015)" The Mechanism and Countermeasures of New Media Involvement in Public Participation in Historical Block Protection", Annual National Planning Conference, China, Urban Planning Society of China.

Cheng, Hui; Mao, Mingrui; Yu, Wencheng (2015) "Internet public participation in urban rural planning", Planners, Vol. 31 No. 11 (November).

Liu, Jing (2007) "The origin of public participation and its development in historical and cultural heritage protection", Sichuan Architecture, Vol. 27 No. 1 (February).

Feng, Jiaqi; Li, Jingsheng (2013) "The public participation in the urban historical block's renaissance: Beijing case", Planners, Vol. 29 No. S2 (July).

Dai, Jia; Zeng, Fanxu; Huang, Shuo (2014) "Rumor propagation in the shadow of the environment: the enlightenment of PX event", Journal of China University of Geosciences(Social Sciences Edition), Vol. 14 No. 1 (January).

Zhou, Kai; Yan, Yan; Song, Bin (2012) "A web-based information exchanging and public participation framework under informationism", Urban Planning International, Vol. 27 No.2(April).

Brown, G; Raymond, CM (2013) "Methods for identifying land use conflict potential using participatory mapping", Landscape & Urban Planning, Vol. 122 No.122(November).

Arnstein, S R; (1969) "A ladder of citizen participation", Journal of the American Institute of planners, Vol. 35 No.4(July).

Lane, M B; (2005) “Public participation in planning: an intellectual history”, Australian Geographer, Vol. 36 No.3(November).

Choguill, M B G; (1996) “A ladder of community participation for underdeveloped countries”, Habitat international, Vol. 20 No.3(September).

Chu, Yan;Mao, Mingrui; Tian, Le; Wang, Chaolun (2015) “CityIF planning cloud platform”, Landscape Architecture Frontiers, Vol.3 No.3(May).

Hu, Jiapei; Hu Shuyang; Gao Zhihui (2014) “From Symbol to Essence: Public Participation in the Reconstruction of Historical Streets——Taking Beijing Juer Hutong and Yangzhou Cultural Street as Examples”, Annual National Planning Conference, China, Urban Planning Society of China.

Wu, Zuquan (2014) “Effect of third-party participation in urban planning: a case study on enning road in Guangzhou”, City Planning Review, Vol.38 No.2(February).

Macaulay, A C; Commanda, L E; Freeman, W L; et al (1999) “Participatory research maximises community and lay involvement”, Bmj, Vol.319 No.7212(September).

Xu, Feng; Liu,Tao (2012) “Public participation in planning in Canada and its enlightenment to china”, Urban Planning International, Vol.27 No.1(February).

Liang, Jing (2014) “Study on the renaissance of historic districts in Taiwan from the perspective of community construction——Taking the historic district of the Dadaocheng in Taipei as an Example”, Annual National Planning Conference, China, Urban Planning Society of China.

Yu, Tao (2014) “The case analysis of ngos participating in Beijing old city protection”, Beijing Planning Review, Vol.28 No.5(September).

Yu, Wencheng; Mao, Mingrui (2015) “The large number is the opportunity and response of the time planning public participation”, Urban and Rural Development, Vol.60No.11(November).

Research Paper

Research on Humanistic Technology of Urban Design of Historical Blocks in Harbin

Dian ZHANG[1], Suning XU[2]

[1,2] School of Architecture, Harbin Institute of Technology, Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, China

Abstract

Nowadays, with globalization sweeping across cities, more and more cities tend to develop in the same way, while the sense of existence of local identity becomes weaker. It is often the preferred choice of the city government to construct distinctive characteristics with the help of urban design. Historical blocks have their own unique cultural connotations. How to make them retain their own traditional context in the rapid urban renewal and maintain vitality with the development of the city is an urgent problem to be solved in urban design.

In this paper, the research objects are two historical blocks in Harbin which is a representative historical city located on the Northeast China. One of objects is the Central Street of Harbin, which attracts countless foreign visitors every year as a popular tourist area. The other object is the Chinese Baroque Historical Block, which is deserted after renovation and planning. On the basis of urban design, this paper makes a comparative analysis of two historical blocks from the perspective of social humanities, and puts forward the humanistic technology of urban design. Humanistic technology are divided into two technical routes: human and culture. The study of human includes the living needs of local residents, the behavioural feelings of foreign users, the control and management of government development and the distribution of interests of investors. The study of culture includes the combing of the history and culture of the block, the embodiment of space culture and the promotion of value culture. This paper attempts to build a universal theory framework. Humanistic technology will be used as research foundation for urban design in the renovation and conservation planning of cultural heritage.

Keywords

humanistic technology, historical block, urban design, Harbin

1. Introduction

Every city has its own history. In most modern cities, the material carrier of history is more scattered historical buildings or historical blocks. Some cities have better preservation of historical relics and large scale, which can show their unique historical and cultural values and characteristics. In China, such cities are known as historical and cultural cities. Since 1982, China has established the system of "historical and cultural cities", and promulgated

the Law on the Protection of Cultural Relics, the Law on Urban and Rural Planning, and the Regulations on the Protection of Famous Towns and Villages of Historical and Cultural Cities. In the past 30 years, 134 cities have been approved as historical and cultural cities by the State Council. A large number of cities with rich cultural relics and historical value have been conserved, but in the course of conservation, conservators have also experienced many frustrating explorations, and continue to move forward with reflections.

With the social transformation of China, urban planning and construction has shifted from extension to intensive, refined and cultural development. Cities are paying more and more attention to creating high-quality living environment to meet people's needs, which have gradually risen from the past material needs to spiritual needs. The conservation of historical cities has experienced from "constructive destruction" to "conservative destruction", from the past large-scale demolition to the current "renovation as old". However, can such conservation truly preserve the historical heritage and continue the urban context? Everyone can realize that historical heritage is valuable, but what kind of value is it and how should it be conserved and developed? The real purpose of heritage conservation seems to be lost in the heat wave of urban economic and industrial development needs.

The conservation planning of historical blocks is a complicated project, which involves not only the conservation of historical relics, historical buildings and other physical spaces, but also the requirements beyond the scope of conservation planning, such as cultural inheritance, improving livelihood of people, driving urban economic development and increasing urban vitality, which can be achieved through urban design to satisfy. The urban design of historical blocks is different from that of ordinary cities. More importantly, it is necessary to consider all aspects related to urban humanities. This paper puts forward the humanistic technology of urban design, focuses on the humanistic elements of historical blocks, and explores urban design at a higher level from the perspective of sociology and other humanities disciplines, so as to excavate the essential significance of urban design.

2. Investigation

2.1. Introduction of Harbin

Figure 1 The location map of Harbin and historical blocks of Harbin

As one of the representative cities in Northeast China, Harbin became one of the third batch of national historical and cultural cities approved by the State Council in 1994 (Figure 1). Harbin is a young city. At the end of the 19th century, Russia built the Middle East Railway in Northeast China, making Harbin the central city of Northeast China. Due to the influence of western culture in the early stage of city construction, the urban texture of Harbin, architectural style and urban humanities are completely different from traditional Chinese cities. The characteristics of "European Style" have been extended in the urban development of Harbin which enjoys the reputation of "Oriental Moscow" and "Oriental Little Paris". Harbin is located in the northeast plain, with distinct landscapes in the four seasons, combined with the forthright temperament of the Northeast people, which makes Harbin a historical city with an exotic style and a more distinct personality.

However, with the rapid development of urban modernization, the historical imprint of Harbin has slowly disappeared in urban construction. In 2011, government formulated and implemented the Regulations on the Conservation of Historical and Cultural Cities in Harbin to strengthen the conservation of the authenticity and integrity of historical heritage in the city. In these years, with the efforts of the government and conservators, the urban style of Harbin has gradually unified into European style, ranging from the facades of main streets to the sketches of landscape facilities. Moreover, the government plans to renovate large-scale historical blocks in the city, hoping that through the renovation, the features of the historical blocks can be reproduced and used in the development of urban commercial tourism ,and then become the landmark of the city image. However, the situation of different historical blocks after renovation is quite different. What causes such a result?

2.2. The historical block of Central Street

The Historical Block of Central Street was formed in 1989. Its length is 1450 meters. The street starts from Jingwei Street in the South and extends northward to the Songhua River and ends at the Flood Control Monument in Daoli District. As the only remaining stone street in Harbin, the central street is the most characteristic street in Harbin, which still maintains the square granite pavement constructed in 1924. The European-style buildings on both sides of the road make people feel as if they have come to Europe. The exotic style of the whole street is strong, forming a city space and environment with historical characteristics, which has very high historical value and artistic appreciation value (Figure 2).

Figure 2 The location map and photos of Harbin and historical blocks of Harbin

In 1997, Harbin Municipal Government carried out the conservation and renovation of the historical block of Central Street, positioning the whole historical block as a pedestrian street to reduce the interference of external public transport to the block. It also renovated the building facade along the street, enriched the public activity space, increased the landscape facilities, and made the Central Street into a city characteristic public space integrating commerce, culture and tourism. The Central street has become a veritable architectural art gallery, as the miniature of Harbin image, attracting many tourists every year.

2.3. The historical block of Chinese Baroque

As the birthplace of Harbin national industry and commerce, the Chinese Baroque historical block in Daowai District witnessed the rise and fall of the city from the early stage of development to the end of the 20th century. It is an indelible memory in the hearts of the older generation of Harbin people, which concentrated the old Daowai culture of Harbin. The Chinese Baroque architecture with Chinese and Western style is the biggest bright spot in the block, the Baroque style facade along the street and various details of relief decoration with Chinese traditional meaning are very regional and cultural. The architectural features of "front stores and back factories, upper houses and lower business" made the block one of the most prosperous commercial blocks in Harbin. The traditional old brands in the block are deeply rooted in people's hearts, and they are also an indispensable part of the old Daowai culture (Figure 3).

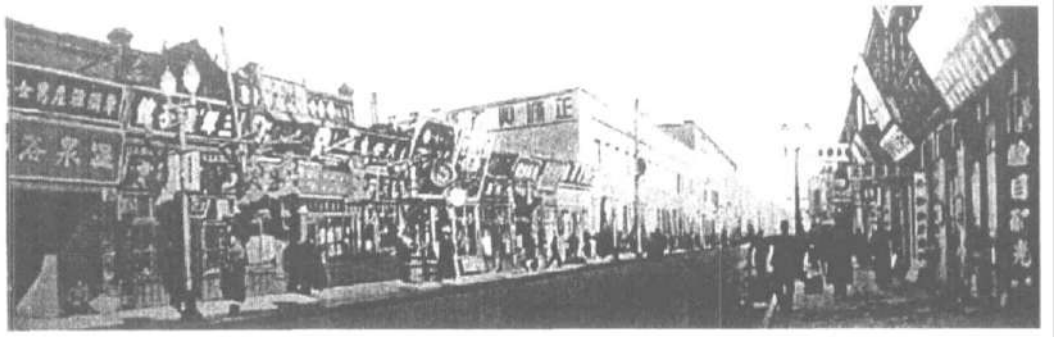


Figure 3 The old photo Chinese Baroque historical block

In order to preserve and continue the historical value of the block and make better use of it, the government began to carry out the conservation and reconstruction project in 2010, and planned the block as a commercial pedestrian street. So far, the first phase has been opened, the second phase has been completed but not put into use, and the third phase of the largest reconstruction area is in progress. However, the effect of the renovation is not satisfactory. Most of the Chinese Baroque buildings in the block have become dangerous houses due to old disrepair, which cannot be repaired. The government took the "rescue of dangerous houses" as the reason, and all the residents in the neighbourhood were forced to move out, so that all the commercial and residential blocks were used for commercial development. The internal structure of the block has been completely changed, only some main streets have been preserved. The building facades along the streets have been rebuilt, leaving only a few historical buildings. At present, some businessmen are stationed in the block of the first phase, and there are many vacant houses in the second phase project. The nine-year-long renovation project is still fragmented (Figure 4).

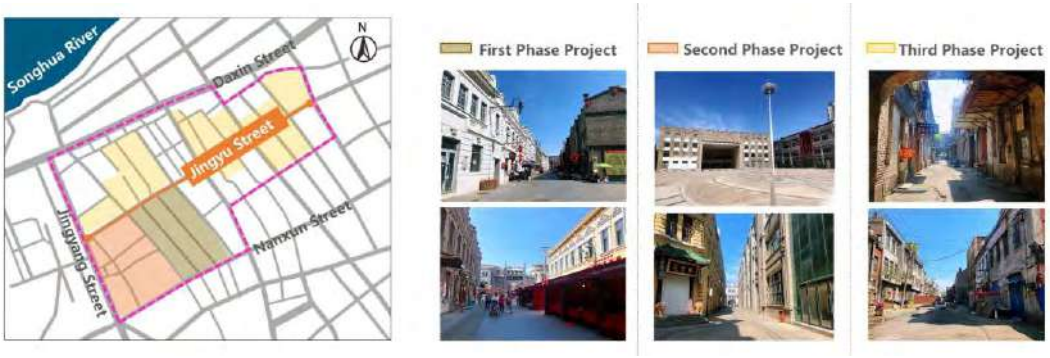


Figure 4 The location map and three phases photos of Chinese Baroque historical block

3. Comparative analysis

3.1. Existing problems of the historical block of Chinese Baroque

Compared with the Central Street and the Chinese Baroque historical blocks, they are also European-style buildings with distinct features and they have similar fish-bone street texture and spatial scales. The transformation model of Chinese Baroque block followed Central Street to transform the whole block into a pedestrian commercial street. It seems that everything should be done in a natural way, but the effects after the transformation are quite different. What did this happen?

From the point of view of renewal mode, although the Chinese Baroque historical block is developed by stages, not large-scale demolition and construction, but the scale of renewal is still not small, belonging to a short period of time to replace the old with the new, rather than small-scale gradual mode. In the process of block renovation, there is a sharp contrast between the north and south sides of Jingyu Street. The buildings on the south side for commercial purposes have obviously lost their humanity, although the structure, function and facilities of the renovated buildings have been greatly improved. And the north side of the street has not yet been renovated so that it retained the residents and their way of life. Although the buildings have been dilapidated, but the market in the block, old brand snacks still attracted a large number of people every day, maintaining the vitality of the block. Such a contrast, which lasted for several years in the process of renovation, which inevitably caused a huge visual and psychological gap between the outsiders and the internal residents (Figure 5).

Figure 5 Contrast photos of north and south sides of Jingyu Street

The government also had problems with the treatment of the residents in the renovation project. Removing all the inhabitants of the block for commercial development could be said to be a fatal wound in the renovation of the historical block. The government required residents to be placed in new areas far from the block, and used monetary compensation to move the old shop away from the original site. Historical and cultural heritage is not only the conservation of material space, but also the bearing of human beings. The daily life of local residents makes the neighbourhood alive and the recollections of the past of old people can be passed down from generation to generation. The relationship between historical blocks and people is in the same line and inseparable. Moving away from the residents, the historical block is like no soul, empty and indifferent.

3.2. Advantages of the historical block of Central Street

Why is it that the Central Street can maintain its vitality and become the focus of the city when both blocks are used as commercial development? The author believes that there are three reasons.

Firstly, Central Street has been given the function of commercial and residential integration since the 19th century, but with the development of the city, the residential function has gradually degraded, and the value of the commercial centre has been established. With years of development, Central Street has retained many old brands and replaced many new commercial functions, devoted to maintaining the original functions while adding the new functions, and strived to form a historical block with centralized and orderly commercial functions. But the Chinese Baroque historical block has always been dominated by traditional small workshops and retail wholesale business. The ownership of buildings in the block belonged to the residents. The renovation project completely changed the traditional living mode of the block in a short time, which would inevitably lead to the confusion of functions.

Secondly, as the urban culture of Harbin, Central Street has been deeply rooted in the hearts of citizen, becoming the pride of the city, and also the preferred choice for local people to recommend to outsiders for travel. This is the so-called urban culture, which has been passed down from generation to generation for many years without propaganda or slogans. It just exists naturally in the hearts of the people. Although the Chinese Baroque historical block is also well known, its location in the minds of people is just where to taste delicious food. And because of the dirty and messy environment before the renovation, it would inevitably make people disgusted. In addition, the government did not realize the importance of neighbourhood culture before, and there are also deficiencies in the strength of cultural propaganda, leading to a bad impression of the block in the public mind.

Thirdly, due to the different times, the transformation of the Central Avenue into a pedestrian street 20 years ago was a big event in the city and was expected by everyone. At that time, the social environment was different from that of the era when information was developed and flooded. People were relatively lack of understanding of various information resources and had great enthusiasm for new things. Therefore the renovation of Central Street had a great impact on the whole city in that era, and received positive feedback. Perhaps the renovation of the Chinese Baroque historical block would have been successful 20 years ago.

It can be seen that the factors affecting the conservation of historical blocks are extremely complex. How can the reconstruction projects be recognized, attract people, and increase

the vitality of the city, the role of human beings is crucial. Urban design has been committed to creating a high-quality urban space environment. During the transition period of Chinese society, when the ideology and values of people have undergone tremendous changes. Urban design needs to follow the pace of the times and consider how to better meet the needs of people from a human perspective.

4. Humanistic technology of urban design

As a special research branch of the conservation and renovation of historical blocks, the humanistic technology of urban design breaks away from the traditional thinking mode of urban design and pays attention to the relationship between people and historical blocks from the perspective of sociology. On the basis of urban design, humanistic technology need to use sociological research methods, from pre-design survey to post-feedback, through data access, field visits and observation, questionnaire survey and other methods to understand the cultural background of historical blocks and the lifestyle of local residents. Humanistic technology regards people engaged in practical activities in historical blocks as the main body, classifies and studies the people involved, and understands the inherent needs and real feelings of different types of users. The research is divided into two technical routes of "human" and "culture", which discuss the human behaviour needs, psychological perception and the significance of culture to human (Figure 6). Through excavating the humanistic elements in the urban design of historical blocks, the reconstructed historical blocks can not only retain their own historical and cultural values, but also meet the needs of users and become meaningful places.

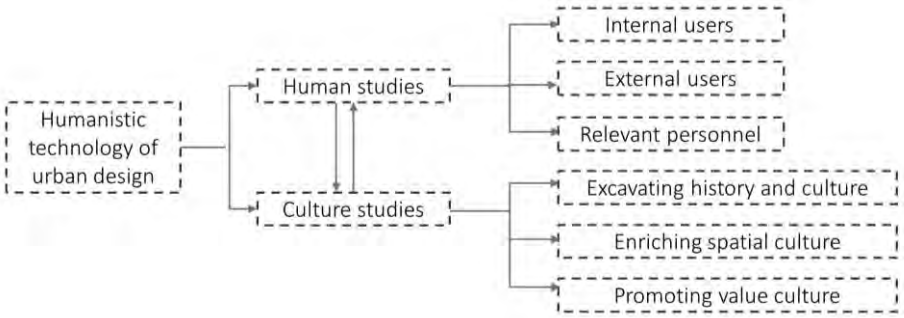


Figure 6 Picture of technical route

4.1. Human studies

(1) Internal users

For historical blocks, people living in them undoubtedly have the most direct and close relationship with them. The daily activities and communication of residents make the neighbourhood more vigorous. They are an indispensable part of the historical block. With the improvement of the living standards of people, the material and environmental conditions of blocks should also be improved. However, due to the long history of buildings, poor quality of buildings and internal environmental conditions, and imperfect hardware facilities, it is difficult for residents to carry out professional renovation of historical blocks themselves, and it may also damage the integrity of historical buildings. It is urgent for the government to provide help to solve the problems of basic livelihood of the people. Therefore, in the renovation project, the people are most concerned about protecting their

own interests after the renovation, hoping to improve the quality of life through the renovation, which is the most important and basic needs. In the reconstruction of the Chinese Baroque historical block, when the government solved the livelihood issue of people, the overall thinking was wrong. The government relocated the residents of the block as a whole and carried out commercial development, which did not meet the needs of the residents. The residents of the historical block were placed in the residential areas far from the city centre, and the self-employed businesses in the block were relocated from their original sites. These practices are contrary to the wishes of the residents, resulting in many difficult contradictions in the process of renovation.

The humanistic technology of urban design emphasizes the concern for people and the relationship between people and environment. The daily life of residents in historical blocks makes the static space alive and makes the culture of historical blocks more vivid. The practice of removing residents in the renovation is to separate the environment from people. Even if the buildings and streets are repaired, the block culture which has lost the mark of traditional social form will not be able to continue. The relationship between blocks and people is mutual. People give vitality and meaning to blocks, and blocks also bring people spiritual perception. The sense of belonging to blocks is a profound cultural rooting for the residents, a historical story and collective life memory handed down from generation to generation. This sense of belonging will unconsciously rise to a sense of responsibility and pride, and this precious humanistic spirit can be used as a positive factor in the renovation of historical blocks. On the basis of improving the living needs of residents in blocks, the government should communicate with them so that they can play a positive role in the renovation of blocks, including the renovation of buildings, the improvement of the environment, and the cultural dissemination of the public, and use their special identity and sense of mission to help the government departments to promote the progress of the renovation work smoothly.

(2) External users

External users include tourists in historical blocks and passers-by on weekdays. The humanistic technology of urban design focuses on the experience of these people in the block. Unlike internal users, they need more from spiritual and psychological perception, including multiple experiences of space, culture, consumption and so on. Spatial perception should be the most direct sensory impression of the block for users, and also the first impression of the historical block after urban design and transformation. The unique architectural style, the rich and varied streets, the traditional landscape, all the elements in the space can be related to the perception of users. Although different people have different feelings about the same place, a good place can provide stable visual symbols, so that people can reach a consensus on their sensory experience to a certain extent, and this consensus is that the experience rises to another height - spiritual experience. The sense of history, culture and deep thinking brought by the renovated historical blocks are the ultimate significance of urban design and the core value of humanistic technology of urban design.

In addition, it has to be mentioned that with the increasing level of consumption, historical blocks have become the gathering place of commercial tourism consumption. The change of the concept of product consumption to experiential consumption has made many people pay little attention to the significance of historical blocks themselves. The concern for their

own value and leisure grade transcends culture and history. Consumption in historical blocks is regarded as the embodiment of elegant aesthetic pursuit. This is because with the development of the times, the values of people are changing. We cannot control this trend, but the humanistic technology of urban design can make corresponding measures according to this phenomenon, strengthen the propaganda of humanistic spirit in historical blocks, and guide people to correct the values of historical culture.

(3) Relevant personnel

The government is the leader of renovation project of historical blocks. It not only has all the powers from urban planning, land expropriation, land use right transfer, financial allocation to project review, but also monopolizes the decision-making power of social policies for the allocation of various public resources. Because of the own economic value of historical blocks, commercial tourism development is the most common mode in the transformation. Developers pay most attention to economic benefits. Whether the government seeks a balance between developers and residents or forms a community of interests with developers determines the future development trend of a historical block. The renovation of Chinese Baroque historical blocks is a typical urban development in which the government and developers work together with land efficiency as the goal. In this process, in order to pursue short-term interests, the renovation of historical blocks was carried out blindly, regardless of the rights and interests of residents, resulting in a series of collateral contradictions and irreparable consequences.

The humanistic technology of urban design need to take restrictive measures to the government, set up supervision groups in the government, and require the government to focus on improving the livelihood of people, listening to public opinions, and doing a good job in public participation. At the same time, in cooperation with developers, the government should take into account the overall situation, achieve the common development of historical and cultural conservation and commercial tourism development, meanwhile, manage and control development projects. Moreover, the government should strengthen the understanding of urban culture for developer, do a good job of publicity and guidance, and make investors realize the importance of conserving historical culture.

4.2. Culture studies

(1) Excavating history and culture

Each historical block has its own historical and cultural background and traditional regional characteristics, which should bring people unique cultural experience. However, in China, many historical blocks have been developed as commercial tourism, which has become increasingly homogeneous. In order to achieve short-term economic benefits, developers neglect the real cultural connotation of historical blocks. Designers know little about the conserved objects and make blind decisions based on subjective assumptions. Policymakers are eager to make quick successes and profits, and they are keen to create theme cultural tourism brands. The reproduction of various spaces and collage of cultural symbols lead to the engulfing of some local characteristics.

The humanistic technology of urban design requires the government and designers to do a good job of historical and cultural investigation in the early stage of reconstruction. Researchers need to study the background culture of historical blocks by consulting a large number of documents and feel the local culture by on-the-spot investigation, through the

external form to discover its intrinsic essence and integrate the form of historical blocks with the spirit of culture and context. In order to provide an important reference for the preliminary study of urban design and renovation, the humanistic research reports of the corresponding historical blocks should be sorted out before the renovation.

(2) Enriching spatial culture

When space is endowed with culture, it becomes meaningful. Spatial culture in historical blocks is manifested in the physical environment on the one hand, and in the daily social life of the residents on the other. The decorative elements in architecture, the texture of traditional lanes and the landscape environment left behind by history are objective material cultures. The humanistic technology of urban design emphasizes that these cultural symbols should be retained to the greatest extent, and their authenticity should be restored as far as possible in the process of renovation, and these cultural symbols can be applied to the surrounding environment to coordinate with historical blocks.

The daily activities of people in the space are the lively embodiment of the culture of historical blocks, including the living life and customs of people in the blocks, activities of traditional festivals and so on. It can be seen that the living cultural inheritance can better reflect the humanistic spirit of the historical blocks. If the residents of the historical blocks are moved away for commercial development, even if the traditional cultural activities are joined, they cannot make people really feel the traditional living form and folk customs of the historical blocks. So, the humanistic technology of urban design adheres to the principle of "coexistence of people and houses" in the transformation, retains living customs of the local people, so as to inherit the cultural context and make the culture alive.

(3) Promoting value culture

The essence of urban design is to enhance the physical environment of the city to have a positive impact on lives of people, and the ultimate goal is to arouse people to think about the meaning of life. Most people know the need to conserve the cultural value of historical blocks, but this is only an idea for people, and cannot affect their behaviour. Humanistic technology of urban design is not only static conservation of historical blocks, but also promoting the shaping of humanistic environment in historical cities through the alive culture of historical heritage, so as to have a lasting and profound impact on the citizens. To a great extent, values of people will affect the conservation and planning of historical and cultural heritage. Enhancing the public sense of identity and pride in urban history and culture, avoiding cultural apathy, and advocating that residents of historical blocks become the insiders and beneficiaries in the conservation word, are also the core issues to be solved in the humanistic technology of urban design.

5. Conclusion

This paper investigates and studies two historical blocks in Harbin. Through comparative analysis, it is found that the existing problems are not only the level of urban design itself, but also related to human, social and other reasons. In view of various contradictions in the renovation of historical blocks, this paper puts forward the humanistic technology of urban design, hoping to examine urban design from a new perspective and make up for the lack of humanities in conventional urban design. This kind of technology needs designers to read a

lot of humanities materials, and be familiar with the use of sociological research methods, which is a challenge for designers. Designers need to have keen observation, be good at communicating with people, and find problems in the city. How to make the humanistic technology of urban design more standardized and specific needs further research, so that it can be used as a necessary special procedure in urban design.

6. References

Lu Jiwei; Cao Changzhi; Zhang Fan; Hu Yan (2019) "Conservation of historic cultural cities and urban design", China Ancient City, No. 1 (January).

Yin Haijie; Wang Xueyang (2014) "Culture Dying in Urban Historical Block Modification Works: A Case Study of Historical Block of Daowai in Harbin", Modern Urban Research, No. 6 (June).

Lynch Kevin (2001) The image of city, Beijing, Huaxia Publishing House.

Tiesdell Steven (2006) Revitalizing Historic Urban Quarters, Beijing, China Architecture & Building Press.

Cheng Xinyu; Zhang Yong (2015) "Analysis on Transformation of the Historical Block on the Basis of Consumer Experience Perspective", Huazhong Architecture, No. 6 (June).

Shan Jixiang (2007) From Functional City to Cultural City, Tianjin, Tianjin University Press.

Bian Baolian; Cao Changzhi (2009) "Morphological Protection and Context Succession of Historic City", Urban Development Studies, Vol. 16 No. 11 (November).

Mumford Lewis (2009) The Culture of Cities, Beijing, China Architecture & Building Press.

Xie Dixiang; Zhu Xuemei (2014) "Social Conflict, Interest Game and Historic Districts Regeneration: A Case Study of Enning Street in Guangzhou", Urban Development Studies, Vol. 21 No. 3 (March).

Zhang Ruxiang (2019) "The Symbiosis of Cultural Space and Urban Complex in the Era of Experience Economy", Chinese & Overseas Architecture, No. 1(January).

Case Study Paper

REGENERATION OF RAILWAY INDUSTRIAL HERITAGE

Implementation evaluation and development strategy of Hengdaohezi town protection and renovation project

Jie ZHANG, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Zhiqing ZHAO, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Xiaofeng ZHANG, School of Architecture, Harbin Institute of Technology; Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology; China

Abstract

With the rapid development of Chinese railways, the renewal and reuse of railway industrial heritage is an important part of remembering urban history and inheriting urban culture. Hengdaohezi Town in Heilongjiang Province of China is the historical heritage in the period of Russia "building railways by borrowing land" in Northeast China at the beginning of 20th century. Many railway industrial heritage such as train engine house, churches and residential blocks of railway workers are completely remained in the town. How to correctly treat the historical products of the invaded period and move towards the future is of great significance for the development of the town. So taking Hengdaohezi Town Conservation Project, which won the 19th UNESCO Honorary Prize for the Protection of Cultural Heritage in the Asia-Pacific Region in 2018, as an example, this paper analyses the historical, cultural, economic and social value of the railway industrial heritage in this town, and introduces the planning and measures of protective development of Hengdaohezi Town at three levels： preserving the historical authenticity of buildings, shaping the historical and cultural features of the historic protected areas, and activating the rational and sustainable development of the town. After that, through questionnaires and interviews with local residents and visitors, Satisfaction evaluation was carried out in six aspects: cultural perception, heritage protection, environmental grace, urban vitality, facility perfection and life comfort. Finally, targeted strategies for the future development of this Railway Industrial Heritage Town are put forward.

Keywords

railway industrial heritage, historic town, culture, Regeneration

1. Historical development of Hengdaohezi town

At the beginning of 1891, in order to control the far east and the northwest Pacific Ocean, the tsarist Russia conference decided to build a Trans-siberian railway across two continents

in Europe and Asia, so as to bring troops and strategic supplies to the eastern city of Vladivostok. If the railway passes through China, construction difficulties can be reduced, the length of the railway can be shortened, and the cost of road construction can be saved. Historical development gave tsarist Russia an opportunity. In March 1895, the Qing government of China advocated uniting with Russia to resist Japanese aggression. Tsarist Russia seized the opportunity and proposed to borrow land to build roads. At the end of the 19th century and the beginning of the 20th century, the tent-shaped railway, also known as the Chinese Eastern railway, was built in northeast China. All the rights to build the railway were monopolized by tsarist Russia, and they illegally occupied farmland and other natural resources along the railway, and oppressed Chinese workers and peasants as cheap labor for the construction of the railway. Therefore, the Chinese Eastern railway, on the one hand, is the witness of China's history of being invaded and colonized in modern times, on the other hand, it greatly promotes the industrial civilization in northeast China.

The Chinese Eastern railway is divided into trunk and branch lines. The main line starts from Manzhouli in the west and goes through Harbin to Suifenhe in the east. The branch line starts from Harbin and goes south through the capital of Jilin province and Liaoning province to Lushun. Various stations have been set up along the route. The main construction section of Hengdaohezi station is from Hengdaohezi to Kaolingzi. Because of the difficulty of crossing Zhangguangcai mountain, a large number of Russian railway construction experts and technicians are concentrated in Hengdaohezi, leaving a large number of Russian architectural in the town.

Figure 1 Chinese Eastern railway station along with Hengdaohezi ‘s location

2. Characteristics analysis of Hengdaohezi town

2.1 Settlement form

The town is divided into four major parts by railway, river and mountain. In the northern part of the railway, there are many russian-style buildings and architectural complexes, which basically retain the early terraced residential form. The space between railway and river is narrow and narrow, and some early russian-style houses are scattered here and there, and the residential form is banded. South of the river and east of the mountain are mainly built after the founding of the People's Republic of China. Surrounded by mountains and rivers, the town is high in the north and low in the south, with the land slope of less than 25% and the local area between 25% and 50%. Relying on the growth and development of railway and river, the architectural form conforms to the scattered architectural layout of Russian villas.

2.2 Street and lane space

Street spatial pattern of small towns is dominated by determinant and radiative pattern, among which the street and lane north of the railway still maintains the early determinant pattern, and the street and lane spatial determinant developed after the founding of the republic of China south of the railway is mixed with radiative pattern, which basically forms naturally according to the topography and topography. The scale of old streets and alleys in the north of the railway is pleasant, and the width (D) varies between 2m and 5m, and the height (H) of eaves of buildings on both sides is usually 3m and 4m.

2.3 Architectural features

Hengdaohezi town's historic buildings are mainly small houses and public buildings. Small residential plane relatively neat, double slope roof, black iron sheet; Metope yellow, wall base stone miscellaneous laying bricks or stones, corner white embrace Angle shape line Angle; Green wooden door, outside door has small eaves; The vertical feature of wooden window is obvious, the window wall is smaller, herringbones gable, chimney out of the roof. Public building plane one shape, L shape, mountain shape, Latin cross, black iron sheet double slope roof.

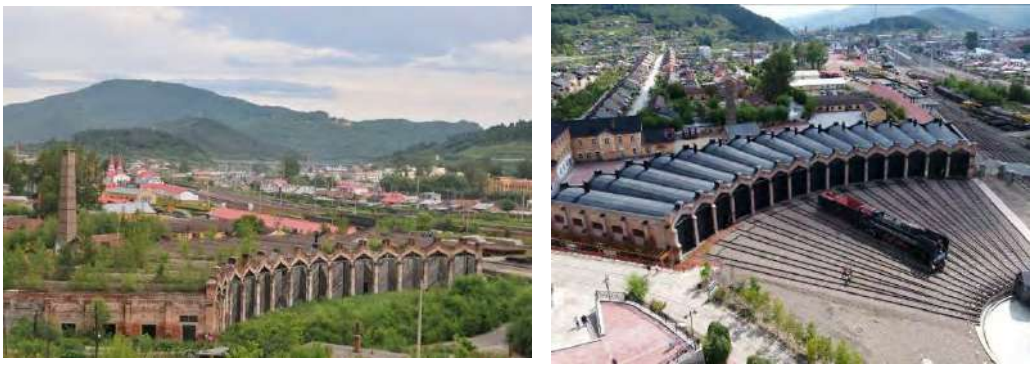


Figure 2 Hengdaohezi town settlement form

2.4 Decorative arts

The architectural decoration of the small town has strong cultural characteristics of different regions, which is manifested in various aspects such as plane modeling, roofing material, wall, door and window decoration and foot contour. Typical examples include Russian onion dome, tetrahedral tower drum base, Russian flat plate woodcut and carving patterns, etc. The application of these detailed components and decorations reflects many style features of Russian architecture.

2.5 folk culture and customs

The town's population is predominantly Han, with a small number of Man and Korean residents. Russian customs, food culture, life customs, folk arts and crafts are mixed and permeated with each other, forming a rich and colorful folk culture. At present, the town still has the characteristics of Russian national customs in terms of food and clothing (drinking beer, fruit wine and strong liquor, eating ham sausage and bread), which fully reflects the inheritance of the town's culture.

3 Heritage status and value assessment

3.1. Heritage survey

There are more than 100 cultural relics buildings in Hengdaohezi town, among which there are five national key cultural relics protection units (table 1) and 18 municipal cultural relics protection units, which are mainly distributed in the north of the railway.

No.	Name	Historical age	Photos	Heritage status
1	Hengdaohezi engine house	1903		Hengdaohezi locomotive depot is located in the middle of Hengdaohe town, Hailin city, with a building area of 2160 square meters. The plane is fan-shaped, with 15 parking Spaces and garage doors on the inner elevation, facing the locomotive shunting platform in the direction of fan-shaped center.
2	Church	1902		The church is located at the foot of Dongshan, Hengdaohe town, Hailin city, with a building area of 614 square meters. The main body of the wood carved structure, the plane was a Greek cross; Modeling, structure, technology, decoration and other early Russian architectural style.

3	Great white building	1905		Russian building with brick walls and tiled roofs, white at the corner of the window eaves, yellow at the rest, three-story building. At first for the Chinese Eastern railway east section of the road command center, after the use of hengdaohezi railway management organs, is now a railway workers housing.
4	Railway police station	1904		Russian style building with brick wall and tiled roof, stone corner, two-story building. At first, it was the site of the Russian railway guard stationed in Hengdaohezi, and now it is the residence of railway workers.
5	Russian cabin	1897		All wooden structure, fine carving and decoration, typical Russian architectural style. At first for the Russian senior road workers living, until the russians moved away, is now the railway workers housing.
6	Historical residences	1830		Most of them are residential buildings, and a few are abandoned. The roofs are pitched with iron sheets or linoleum roofs. The walls peel off and the roof rusts obviously.

Table 1 Status table of important historical relics

3.2. Value assessment

1. Historical value

Hengdaohezi town has nearly 100 Russian-style cultural relics and buildings, which is an important demonstration of the invasion of northeast China by the Russian imperialists, and the physical remains of the world's understanding and facing up to history, with a good

historical readability. Among them, Hengdaohezi locomotive depot represents modern industrial construction civilization. Railway white building is the original Chinese Eastern railway experts housing and office building. Notre Dame cathedral is the only surviving wooden church in the three northeastern provinces. Old Russian street is the most complete preservation of the Russian style historical block. These architectural heritages are completely and intensively preserved, which can completely reflect the historical features of the tsarist period and the Japanese and puppet period, and is the historical witness of the Chinese Eastern railway.

2. Scientific value

The historical relics of Hengdaohezi town are the most well-preserved part of the Chinese Eastern railway, which is an important material for studying the development of Chinese Eastern railway in China. Locomotive depot, Notre Dame church and Russian wooden house all retain the original layout and early Russian traditional architectural forms, materials, colors, decorations and styles, which are important contents of the study of Russian cultural history, local cultural history and railway industry culture.

3. Social value

The protection and planning of Hengdaohezi town can not only reflect the respect for history and foreign culture, but also help to shape and improve the image of local culture, and promote the people, especially the young people, to learn historical knowledge and patriotic education. At the same time, protecting the historical buildings and cultural relics in this town is conducive to promoting the international cultural exchanges between China and Russia, driving the development of the local tertiary industry, driving economic growth, creating more jobs and improving public service facilities, which plays a great social positive role for local residents.

4. Artistic value

The historical buildings in Hengdaohezi town, no matter industrial building locomotive depot, religious building Notre Dame church or historical dwellings, all have unique structure and shape, giving attention to functional and aesthetic needs. The doors, Windows, walls, pillars and eaves of triangulated mountain flowers, etc. of the buildings all have extremely Russian architectural art style [2]. A large number of Russian architecture has left the most authentic side for human beings, with high artistic appreciation value.

Value	Hengdaohezi town industrial heritage value assessment factor
Historical value	architectural age, architectural history, architectural function, architectural heritage integrit
Scientific value	architectural culture, architectural artistry, architectural construction technology
Social value	traffic conditions, reuse potential, educational value, building management, population capacity
Artistic value	value artistic uniqueness, artistic influence, artistic history, artistic native

Table2 Hengdaohezi town railway industry relic value evaluation factors

4 Existing problems and development opportunities

A large number of Russian-style buildings in Hengdaohezi town have gone through centuries of suffering. Most of the buildings have been subjected to natural erosion and man-made changes, mainly reflecting the following aspects.

4.1. The historic building lacks the necessary repairs

There are a considerable number of buildings and structures that destroy the historical environment features in the historical blocks. It is very common for residents to build or rebuild the historical buildings and ancient dwellings at will. Building density increases, some areas not only can not see the original face of Russian architecture, broken the original Russian architecture "one house one courtyard" garden-style layout pattern, and buried a great fire hazard. The overall economic strength of Hengdaohezi town is relatively weak among the towns and villages in Hailin city. Faced with a large number of historical relics of the past, there is a shortage of funds, and the current situation of cultural relic protection is worrying.

4.2. Historical town protection zoning is unclear

Improper zoning of the protection scope and construction control zone of existing cultural relics protection units, failure to meet the requirements of the safety and integrity of cultural relics protection, and poor operability of management and implementation.

4.3. Development and construction are not in harmony with the historical environment

The rapid and disorderly development of small town's construction and the old city reconstruction for the purpose of real estate development, the newly built residential areas and some modern buildings do not consider the spatial scale relationship of streets, and are rarely coordinated with the surrounding buildings. The improper architectural scale and block layout affects the overall landscape.

4.4. The living environment and facilities of residents are poor

Due to the poor condition of municipal facilities, so that the garbage heap disorderly fall, sewage directly into the street, soil and gravel pavement caused serious dust environment. There is little green space or public space. There is no protective green belt between No.301 national road and old street, which makes old street suffer from dust and noise all the year round. The present market occupies the road management, seriously affects the town traffic and the environment.

5 Protection strategy

The purpose of town protection is to effectively protect excellent historical and cultural heritage, improve the living environment in areas with historical and cultural features, improve municipal infrastructure, and drive the development of tourism and other related industries. According to the requirements of relevant planning regulations for the protection of famous historical and cultural cities in China, the following strategies are proposed for the protection planning of small towns.

5.1. Protect the historical authenticity of the building

Cultural relics and historical environment not only provide intuitive appearance and architectural form of information, but also is the physical carrier of historical information, which can convey historical and scientific information that is not known today but may be known tomorrow. Cultural relics and historical environment are not renewable, and protection is the first choice. Therefore, the protection of historical buildings on the basis of authenticity.

Taking Hengdaohezi town engine house as an example, different structures adopt different protection measures to protect the authenticity of historical buildings.

1) Load bearing

In the repair process, the original steel column support structure should be retained as much as possible, and the columns that affect the safety should be strengthened. The traditional materials, forms, structures and practices should be used to reinforce the framework. The replacement materials should meet the requirements of fire rating and mechanical strength.

2) Wall

Wall repair adopts traditional technology, structure and bricklaying of traditional brick materials. The wall bricks that are reduced are plastered, removed, repaired or replaced, and the paint that falls off is restored according to the original shape.

3) Doors and Windows

The repair of the doors is restored in accordance with traditional symbols, patterns and original shapes.

4) The roof

Roofing should be laid in traditional form, replacing bare and corroded steel frame. According to the traditional pattern, the original authenticity of the building is maintained, and the smoke exhaust facilities and cornice are completed.

The historical authenticity protection of engine house building is also reflected in the construction and management, paying attention to material selection, construction technology and experimental inspection. The original red brick of the building was analyzed, and the wall brick repair material was configured. All construction timber is dry anticorrosive material; All the steel used are national standard materials. Water-based paint and oil decoration and the project also collected more than 40, 000 bricks from the same period as wall materials. The traditional process method is adopted in the construction, and the manual operation is carried out in accordance with the principle of original restoration. The cleaning and repair of the wall ,stone and iron parts are all carried out by means of small area experiment, inspection and comprehensive construction.

Figure 3 Comparison before and after repair of engine house

5.2. Harmonizing the Historical and Cultural Style of Towns

Any historical relic exists at the same time with its surroundings. Losing the original environment will affect the correct judgment and understanding of its historical information. The historical and cultural features of Hengdao Hezi Town are embodied by its urban pattern, neighborhood texture, street space, historical buildings and traditional buildings, facilities and structures, ancient trees, etc. Therefore, the protection of Hengdao Hezi Town's historical and cultural towns is not only to protect individual cultural relics, but also to protect the relics and historical blocks. The surrounding environment and historical atmosphere.

1. delimitation of the core protection scope of small towns

Firstly, historic areas are divided into core protection areas, construction control zones and construction coordination zones from the level of small towns. The historic areas with complete traditional pattern and historical features and concentrated historical buildings in the town are classified as the core protection areas, and the construction control areas are reasonably delineated beyond the core protection areas.

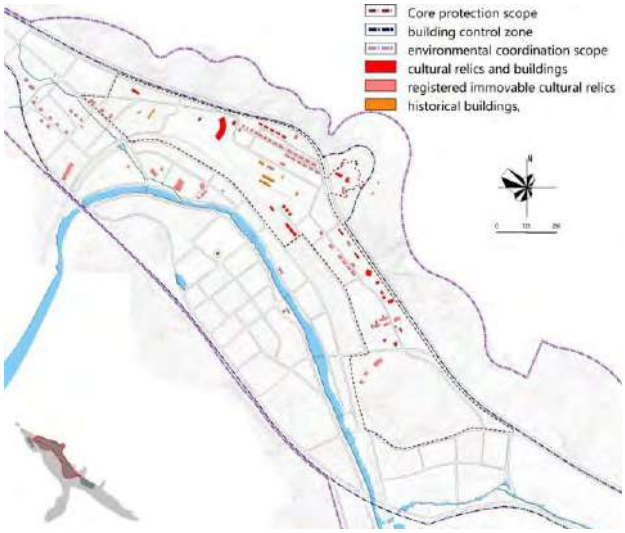


Figure 4 delimitation of the protection scope in hengdaohezi

2. delimitation of the scope of protection of cultural relics protection unit

Secondly, according to Heilongjiang Provincial Regulations on the Administration of Cultural Relics, special protection zones, key protection zones and general protection zones are delineated for historical buildings and cultural relics. Around historic buildings, two to five times the height of the main building is the protected area, and four to eight times the height of the main building is the construction control zone.

Among them, the important control regulations of key protected areas are as follows:

1) No new structures and buildings are allowed to be constructed within this scope, and they can only be updated according to the overall environmental planning. According to the National Law on the Protection of Cultural Relics, the layout and space features of building groups are strictly protected.

2) Implementing a complete set of environmental remediation measures. Buildings that have adverse effects on cultural relics within the scope of protection, such as those with insufficient fire protection spacing, should be demolished step by step. Cables and wires are buried or moved.

3) For cultural relic buildings, the monomer color and materials of the buildings should be standardized. The maintenance, repair and reconstruction must be carried out in accordance with the original style or special detailed planning, especially the details of doors and windows.

4) Photo filing, fine design, construction with modern technology, restoration of the original building facade shape, color, material, pattern, etc., to achieve the original flavor, stable structure, solid decoration, complete sanitation and Hydropower facilities.

5) No unit or individual can change the main body, accessory facilities and courtyard green space of the protected building without authorization.

6) All land related to the safety of cultural relics is requisitioned and purchased by the state, and the nature of land use is changed to "land for cultural relics and historical sites". The nature of other land use is strictly controlled as non-construction land.

7) No activities detrimental to the cultural relics shall be carried out; no construction projects or blasting, drilling or excavation shall be carried out.

8) Implement effective security and protection measures, including fencing and drainage ditches, installation of monitoring equipment where necessary, and deployment of special guardians.

9) Cultural relics renovation projects must be submitted for approval in accordance with legal procedures.

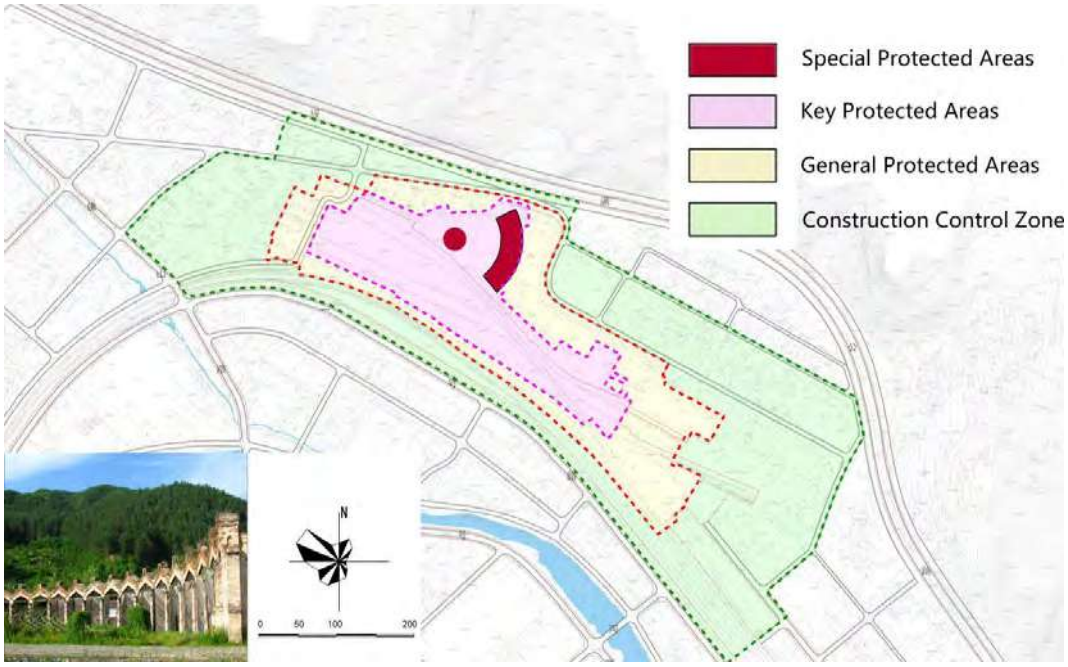


Figure 5 Protection Zone Around engine house

3. Classification and delimitation of other buildings in small towns

Finally, according to the current situation of the buildings in the protection area of small towns, the historic buildings are divided into renovation buildings, improvement buildings, preservation buildings and renovation buildings.

Conservation buildings shall not be demolished, but shall be actively maintained, repaired and reused; any construction activities within the scope of the protection of cultural relics units must comply with relevant provisions; specific requirements for conservation buildings should be specified at the level of detailed planning or planning plan.

Rehabilitation buildings retain the original pattern, appearance repair; interior appropriate updates, increase health design. Allow appropriate changes to the internal structure. No unauthorized demolition or relocation shall be allowed, and special circumstances shall be considered and adopted; renovation plans shall be considered and approved by relevant administrative departments; new, expanded and reconstructed buildings shall be in harmony with historical buildings and shall not affect the normal use of retained historical buildings.

Improved buildings should not be demolished as a whole, but should be repaired and reused. When demolished under special circumstances, they should be rebuilt according to the original building height, location and style. They should also retain their distinctive building components and features, which are in harmony with the overall features of small towns.

Retention buildings require painting and decoration of the exterior facades of buildings, and gradually transform them.

In the case of land reconstruction, municipal and road facilities construction, green space construction, overall development of land blocks and other circumstances, renovation buildings shall be demolished according to the requirements of planning and management.

The demolished open space shall be constructed in accordance with the requirements of protection planning.

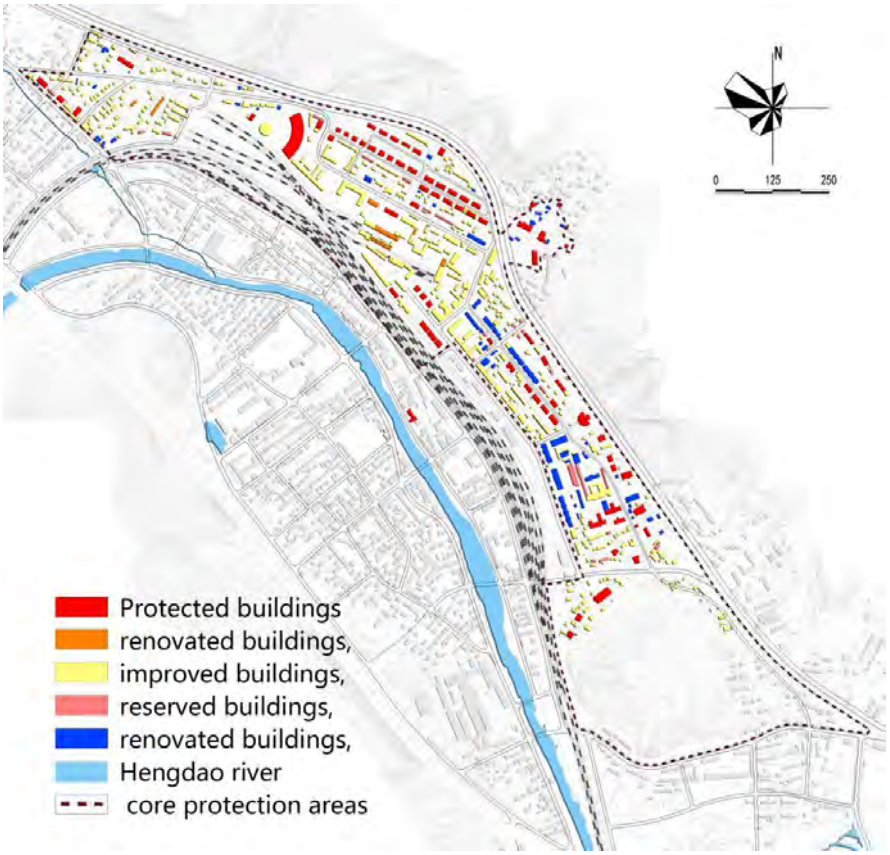


Figure 6 Classification and delimitation of other buildings in hengdaohezi

5.3. Activating the Reasonable and Sustainable Development of Cities and Towns

The utilization of historical and cultural heritage should not be quick for quick success and instant benefit, nor simply pursue economic interests. The current way of utilization should ensure the sustainable development in the future. Historic and cultural heritage has become the core resource of tourism development, and the protected area of historical and cultural features is also the area where local residents live for a long time. We should coordinate the relationship between the protection of historical heritage, the improvement of living environment and the development of tourism industry, combine protection with utilization, give priority to protection, and formulate a region with sustainable development significance. Protection planning. The construction of the new area should be coordinated with the protection of the old city. At the same time, attention should be paid to improving facilities to meet the needs of urban economic and social development and improving people's living environment.

Through the protection and regeneration of railway industrial heritage, Hengdao Hezi Town attracts many photographers and film producers to take photos in the town. At the same time, there are many sketch enthusiasts, surveyors and mapping personnel to the town for architectural sketch and mapping. After the renovation, the tourism function of Hengdao Hezi Town derives other service facilities, such as Museum management, souvenir shops, youth hotels, restaurants and so on, which can stimulate local employment. In addition,

Hengdao Hezi Town constantly attracts painting and photography enthusiasts, and even cooperates with relevant art courses in universities to maximize the value of architectural art and culture; after the town is protected, the local residents feel better, and in order to adapt to the development model of the town, they take the initiative to learn cultural knowledge, and then continue. Promote the exchange and development of Sino-Russian culture and railway culture. In March 2018, Hengdao Hezi Town signed an agreement of friendship and cooperation with Taiwanese market towns with similar railway culture. In the light of their respective railway industrial heritage, they jointly excavated the cultural connotation of railway industry, jointly created the brand of Railway Cultural tourism, and continuously promoted the development of railway industrial heritage culture.

6 Implementation Assessment and Strategy

Through a one-week questionnaire survey conducted in Hengdaohezi Town in June 2019, 100 questionnaires were distributed to local residents and 50 questionnaires were distributed to tourists. Six aspects of Hengdaohezi Town's current cultural awareness, heritage protection, environmental grace, urban vitality, facility perfection and living comfort were investigated. An investigation was carried out.

Types of Evaluation	Satisfaction Influencing Factor	Score
Cultural Perception	Russian Cultural Perception	4.2
	Chinese Eastern Railway Culture Perception	3.8
	Cultural Experience	2.7
Degree of Heritage Protection	Satisfaction with Rehabilitation Effect of Industrial Heritage	4.1
	Reuse Degree of Industrial Heritage Buildings	3.6
	Readability of Heritage Buildings	3.3
Environmental gracefulness	Satisfaction of Environmental Landscape	4.4
	Satisfaction of Artificial Landscape Sketches in Small Towns	2.2
	Satisfaction of health environment in small towns	2.8
Vitality of Towns	Richness of Tourism Facilities	2.4
	Vitality of Public Space	1.8
Facility perfection	Satisfaction with leisure and recreational facilities (commercial facilities, recreational facilities, recreational facilities, etc.)	1.5
	Basic-service satisfaction (public toilets, street lights, etc.)	1.7
Living Comfort	Summer Climate Comfort	3.9
	Job satisfaction	1.2
	Economic Income Satisfaction	1.1

Table3 Hengdaohezi town railway industry relic value evaluation factors (1-Very unsatisfactory 2 unsatisfactory 3 general 4 satisfied 5 very satisfied)

In terms of cultural perception, the existing Russian culture and the Chinese Eastern Railway culture have been well perceived, but the cultural experience is not high and there is a lack

of practical cultural experience activities. For example, to increase the open experience of traditional Russian dwellings, to increase the experience activities of railway construction operation culture, etc. Increase related cultural and creative activities.

The overall evaluation of heritage protection degree is high, which shows that Hengdaohezi Town has achieved good results in the protection of railway industrial heritage. However, the readability construction of railway industrial heritage should be strengthened for tourists, and the propaganda, explanation and guiding signs of architectural history should be increased so that residents can understand the small town rather than just watch it.

In terms of environmental gracefulness, the natural environment of small towns has been recognized, but the artificial environment is not satisfactory. The artificial landscape style of small towns still needs to be strengthened. Especially for the core protection area and key protection area of historical areas, which are the main tourist sightseeing routes and active areas, the greening and landscape should be strengthened. Shaping sketches can improve the sanitary environment of small towns and create clean and beautiful towns.

In terms of urban vitality, the satisfaction of residents and tourists is low. Because of the insufficient richness of tourism facilities, the number of tourists attracted is insufficient, and the vitality of cities and towns is poor. In addition, because of the lack of supporting facilities, the attraction of urban public space activities is insufficient. Therefore, through the increase of tourism facilities and the holding of special activities, small towns should introduce people into cities and towns to stimulate their vitality.

The degree of satisfaction of facilities improvement is low, especially the related commercial entertainment facilities are obviously insufficient. To solve this problem, we should develop characteristic commercial activities in small towns, increase leisure facilities, pension facilities and so on. At the same time, planning public toilets, trash cans, street lights and other infrastructure.

In terms of living comfort, the city has better climate comfort in summer, which can increase publicity efforts to attract people to spend summer. However, the poor job and economic satisfaction is mainly due to the small town's tertiary industry is still in the initial stage of development, a large number of people are still farmers or workers. In the process of Railway Heritage protection, through the development of core areas, people's employment will be stimulated, and the development of small town economy will be driven by tourism and tertiary industry.

Case Study Paper

The Road Of Rebirth——Place making in Bidur from the Perspective of CulturalLandscape

Weisi Zhou , WLSP; CHINA
Qi Hong, WLSP; CHINA
Wei Xiong, WLSP; CHINA

Abstract

Bidur is located in north-central Nepal, which used to be the royal capital of Nepal in18th century and is now working as the capital city of Nuwakot. In 200 years, the urban development has moved from the mountain to the valley at both sides of the Trishuli River, developed from north to south and gradually formed Bidur, Battar and other groups, which constituted the ancient and modern development axis. As the capital of history, The city boasts prosperous historical and cultural resources, endowed with superior landscape and features. However, due to the limitation of natural conditions and the level of economic development, the level of urbanization is still in its infancy. The city has been in a fix of various problems such as scattered urban space distribution, backward living and service facilities, insufficient economic power in the city, serious damage to historical sites and so on .So how to protect historical and cultural resources and understand cultural values in the process of urbanization, how to use the unique resources of the city to improve the vitality of the city and how to prevent and predict the earthquake, flood and other natural disasters and ensure the safety of cities are the three most important aspects in place making for such poor citys like bidur.

Basing on the culture, ecology, landscape and value as the breakthrough point, and taking the protection and construction as double means into consideration, this paper aims to put forward some ideas to improve space environment, living standard, while enhance city vitality and create more vigorous living place for such underdeveloped citys. Firstly ,the new three major development concepts:organic growth, elastic cluster and coexistence of the old and new have been put forward from the SWOT analysis, the paper also identified the urban spatial structure and clarifying the urban functional zoning. Secondly ,the paper put forward from the aspect of cultural protection, public services, ecotourism and urban design four aspects we put forward respectively strategies such as building up classified and level-by-level culture protection system with orderly guidance and control, hence to build an equally shared and easily accessible public service system, Developing a Management—Usage Combined and Ordered Tourism System and Forming a distinctive landscape system with both ancient and modern attractions. Finally, we point out the two paths to realize place making . The first one is to explore the urban context a and continue the urban pattern on the basis of historical protection, while the second is to implant the tourism project, activating the urban economy; the third is to improve life as the goal, in which the life quality will be promoted in the process of respecting cultural differences, improving the quality of the site.

Weisi Zhou
Qi Hong
Wei Xiong

Place making in Bidur from the Perspective of CulturalLandscape

Keywords

Nepal Place-making Culture Ecology

1. Project background and overview

1.1. Project background

Nepal is one of the developing countries in the world, which suffers from unstable political situation and lacks of complete urban planning system. The earthquake in Nepal in 2015 caused the demolishment of Zhangmu Port at the border between China and Nepal and led to rise of Gyirong Port in the north of Bidur. Therefore, as a bridge connecting Gyirong and Kathmandu, the capital of Nepal, while the rising Bidur will usher brand new development opportunities.

China has launched the "Belt and Road Initiative" to join hands with the countries along the belt and road to develop together. In this context, invited by UN-HABITAT, Wuhan Land Use and Urban Spatial Planning Research Center (WLSP) and Wuhan Planning & Design Institute (WPDI) formed a joint design team of one and a half years to prepare the Integrated Development Planning of Bidur in Nepal, a country along the belt and road. This project is not only an action guide for the post-earthquake reconstruction of Bidur, but also a strategic blueprint to highlight the location of Bidur and the characteristics under the superposition of multiple opportunities.

1.2. Bidur Introduction

Bidur lies in Central Nepal and is the capital of Nuwakot, which is some 30 km northwest of the Kathmandu Valley and 60 km away from Gyirong. Since ancient times, it has been a major economic and cultural exchange hub and traditional border trade market between China and Nepal. Now this city falls into 13 districts (across the city proper and five rural development committees) and comes up to 130 km2.

In 2017, the city's had a total population of 54,351, with about 20.14% of them were urban residents and enjoyed a 2.35% annual growth rate. From 2001 to 2011, the urban population rose from 21,193 to 26,750, up 2.35 YoY. And the local economy is still based on agriculture and grows about 2% YoY, being left behind in the national economy.

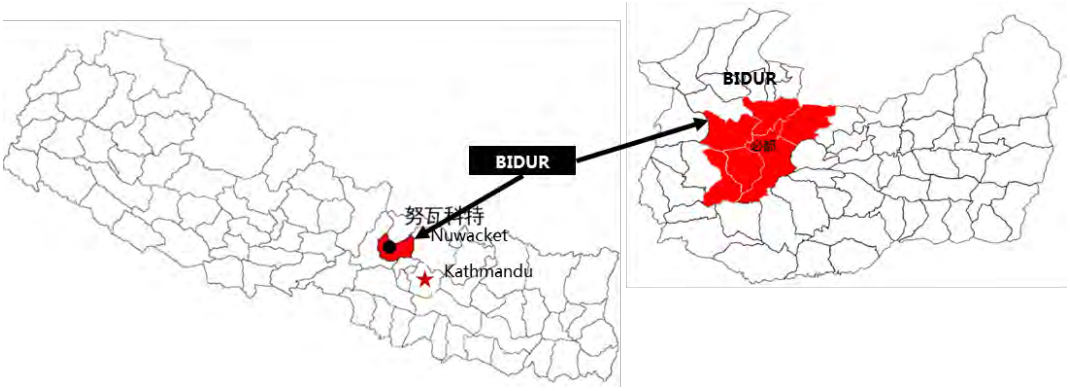


Figure1 The Location of Bidur

2. Core characteristics and Key issues

2.1. Core Characteristics

Mountain- based origin and Profound cultural heritage. The city is originated from the mountains. Since the construction of the Imperial Palace and the Sutta Tula Durbar Square along the Eastern mountain of Bidur in 18th centuries, the city has developed into a chain of clusters including Trishuli, Bidur, Battar scattered along the valley from north to south as we see today. Nowadays, The Hindu and Buddhist temples and characteristic buildings are scattered throughout the city. And the scenic spots and historical sites are mainly concentrated in TRISHULI and the Palace area where many Palace complex and many important temples are preserved.

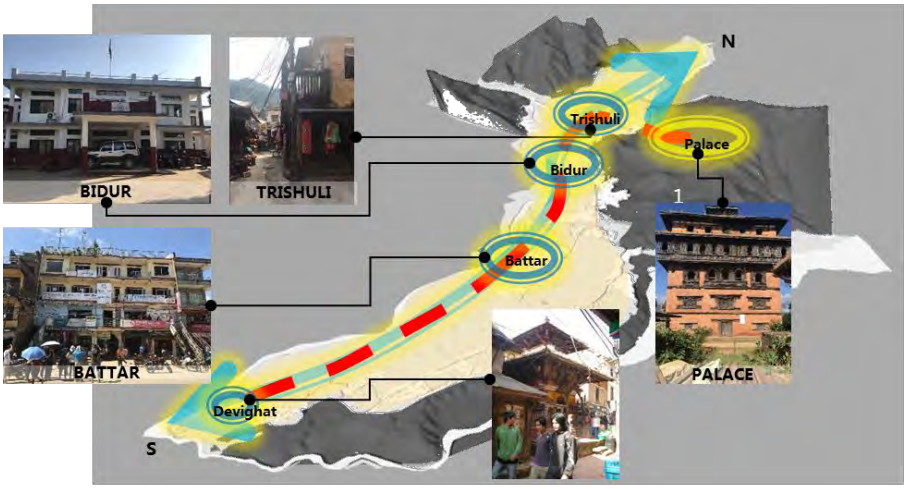


Figure2 Bidur's Historical Evolution

Alternating landscape with mountain and river, superior ecological environment. Located in valley area surrounded by two rivers and three mountains, Bidur is adjoined with Nepal Langtang national park, and China's Tibet Everest national nature protection zone, and there are abundant natural ecological resources and biodiversity diversity. The city's average elevation is about 690 meters ,with the characteristics of "low south and high north, low east and high west". Limited by natural conditions, the city centralization area where people live along the river shapes like ribbon scatters along the river from south to north.

Mixed landscape, public space endowed with significant religious characteristics. As urbanization and industrialization have advanced continuously, modern urban functions have emerged and disrupted the old agricultural way of life. New buildings of urban areas are intertwined with old dwellings of rural areas while the traditional public spaces are venues of various activities such as communication, entertainment, fetching water and others which makes it takes more unique local characteristics.

2.2. Key issues

Preserve the Historical and Cultural Resources and Recognize their Values. The history of the city culture is the soul of the city as well as the important wealth in the process of urban history.The city faces many problems such as badly damaged historical relics, lack of mining of historical resources because of lacking of the protection system and the historical

resources protection and utilization standards. According to the international principal of the protection of cultural relics buildings such as the Venice charter international principles, historical relics construction is valuable and plays an important role. Hence, the realization of sustainable development involves in several aspects, including the relationship between the modernized and the traditional, heritage protection and utilization, and the relationship between city function and traditional landscape to develop the historical and cultural value, activate the city function and improve the quality of the city.

Boost Urban Vigor with its unique urban Resources. Subject to the natural conditions and economic development level, the development of urbanization is still in its infancy.The present situation of Bidur is given priority to agriculture while second and third industry development is relatively lagging behind. The absence of motivation in industry development makes the city hardly provides large-scale jobs and attracts enough population. Natural ecological resources and human resources are the important advantages in the development of the Bidur. The lessons that gained from others countries have tole the truth that historical and cultural tourism helps to improve the city's economic vitality, realize the protection of cultural heritage, and promote the harmonious atmosphere and national spirit. Basing on the identification of local cultural resources value, the Integration of various kinds of tourism resources, and the Development of multi-types, multi-level, multi-experience of tourism activities help to achieve cultural revitalization of the city.

Take Actions against Natural Disasters and ensure a Safe city. The city's safety is the basic requirements of urban development and the residents' life and work. From the point of elevation, 70% of the city's land is 600 meters. With the terrain fluctuates greatly, the urban construction space is limited greatly. When the city's rising water situation is simulated through the water sea level rise 20 meters, the area below the altitude of 520 meters will be I flooded. From the point of slope, In addition to the central valley, the whole city is all around mountain steep, a maximum gradient of up to 67 °.So the high ecological sensitivity and high natural disaster risk make the area in the city unsuitable for the urban construction. Meanwhile, the terrace of soil and water loss caused by the mountain vegetation destruction have threatened the ecological environment of the city.

3. Concept and framework

3.1. Concept

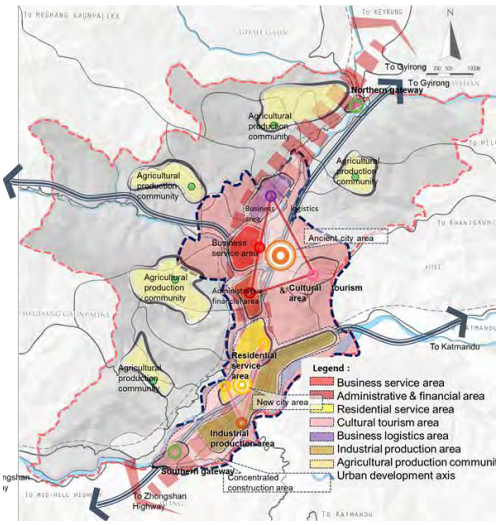
The international charter on cultural tourism launched by ICOMO in 1999 mentioned that "Domestic and international tourism which continue to be the most important tool of cultural exchange can be a positive force of natural and cultural protection, create economic benefits for the cultural heritage. The management with the purpose of protection can be fulfilled by collecting money, educating the community and influencing policy.The new urban agenda promoted by the The United Nations "habitat 3"2016 also put forward the declaration of human for the purpose of social inclusion and poverty eradication of sustainable urban development. So based on the local urbanization characteristics, we put forward the place making strategy of "Promotion with Protecting ,Form with Function" to explore the developing country or region urbanization development path. The "P+P,F+F" means first ,protect the historical context to continue the current urban spatial layout;

Second, Introduce tourist projects to invigorate the local economy; Third, Revere cultural differences to improve the quality of public spaces.

3.2. Integral Development Framework

Identify the four development positioning. Based on SWOT analysis, we proposed Prosperous and Vibrant City, where people Lives in the Natural Environment and enjoys Equal and Shared Services. The Harmonious and Inclusive Atmosphere includes four major visions for future development "finding the motivation, respecting the ecology, improving the people's livelihood and highlighting the culture" to guide place making. We hope to build Bidur into a prosperous and dynamic city with thriving industry and population, a friendly homeland that can resist natural disasters and a society that every people can have convenient access to the equally shared service and people of different cultural background and class can live in harmony and respect each other.

Build the protection framework. Following the urban space development logic that the historical growth pattern a city should be develop from the mountains towards the plain and along the river from north to south to extend. Respecting the natural and ecological background of the city, arranging the functional clusters, and promoting the harmonious coexistence and elastic growth of the city and the nature; Protecting distinctive historical resources, developing new functions, and planning old and new cities and tradition and modernity in an integrated manner, so as to create a city picture in which both old and new city areas can co-existed. Based on three Value orientations of the thrive Organic growth, Elastic cluster and Joint thriving of old and new city areas, a general spatial structure with two level, namely the river valley "concentrated construction area" + "large-scale agricultural community" in the mountains, and "network of one belt, double T expansion, two zones, seven sub-area and five communities will eventually formed" .Also, Combined with the whole city function layout, Planning will be in accordance with the "over the mountain water, farmland fragrant" natural ecological landscape as the base, the palace, old business district and the administrative as region spatial carrier, Injection of cultural tourism, public services, trade business, and other functions, make traditional culture golden triangle to realize double revival of urban morphology and function.



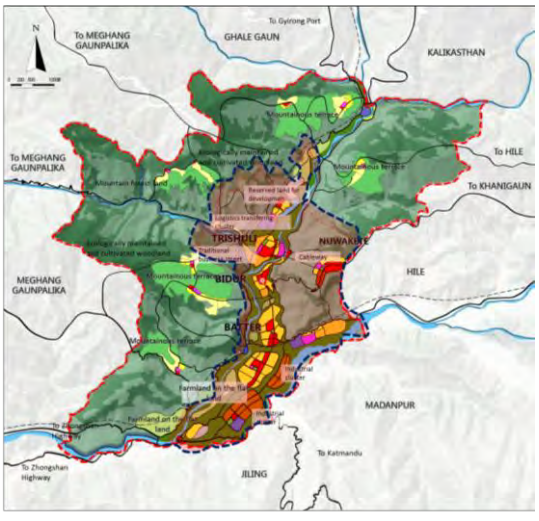


Figure3 Spatial Structure Planning **Figure4 Layout of Land Use in Bidur**

4. Development Strategy

4.1. Strategy1: Establish a system for classification and cultural preservation

with“the central old city density, north and south portal agglomeration, scattering peripheral villages".As we know, historical cultural heritages need different methods of protection and protection requirements vary because of Various types , different carrier, diversified saving and pluralistic value.therefore, according to the spirit of traditional features of blocks and streets landscape protection requirements in Venice Charter,Charter ON THE BUILT VERNACULAR HERITAGE(1999), International Cultural Tourism Charter and other Charters, we should Establish a system for cultural preservation which adheres to the principle of the authenticity, authenticity and sustainability.

Define Major Historical Architectural Complex, Traditional Streets and Major Historical Facilities.According to dating, shape design, protection, characteristics and values, the historic heritages of Bidur can be divided into the following three types:historical and cultural buildings, traditional cultural blocks, important historical and cultural facilities.

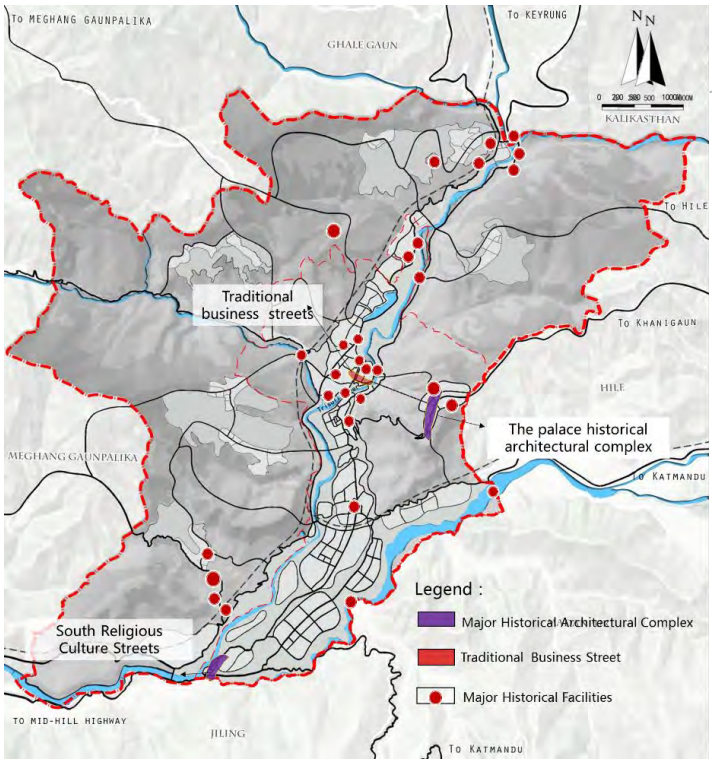


Figure5 Historical and Cultural Resources Distribution and Evaluation of Bidur

Table 1 Bidur Historical Resources Evaluation and Grading

Grade	Name	Value
Major Historical Architectural Complex	Palace Historical Architectural Complex	In the past, the building complex included palace, chamber and other annexes.
Traditional Streets	TUISULI Traditional Business Street	It represented the glorious success of TUISULI.

Grade	Name	Value
	South Religious Culture Street	The southern block involves temples, monasteries, and underlying history and culture.
Major Historical Facilities	Tibet-Nepal Friendship Monument	Monument to Marriage between Tibet and Nepal
	BATTER Central Facilities	The Toothache Tree, the Well, the Temple, the Site, etc.
	Hindu Temples and Other Temples	Nepalese religious culture and major sights alongside the route

Establish a three-grade protection system with Historic core conservation area, Construction control zone and cultural preservation area. The core protected zone will be established to cover all historic buildings, and any new building of the zone should be strictly controlled to have a similar style as the palace complex. A construction controlled belt will be established 100-200 m outside the core protected area and either residential or commercial building of the belt should not be higher than four stories and also have the same style as the palace complex. A coordination zone will be established 200-500 m outside the controlled belt and any building of the zone should not be higher than 4 stories and also have the same style as the palace complex.

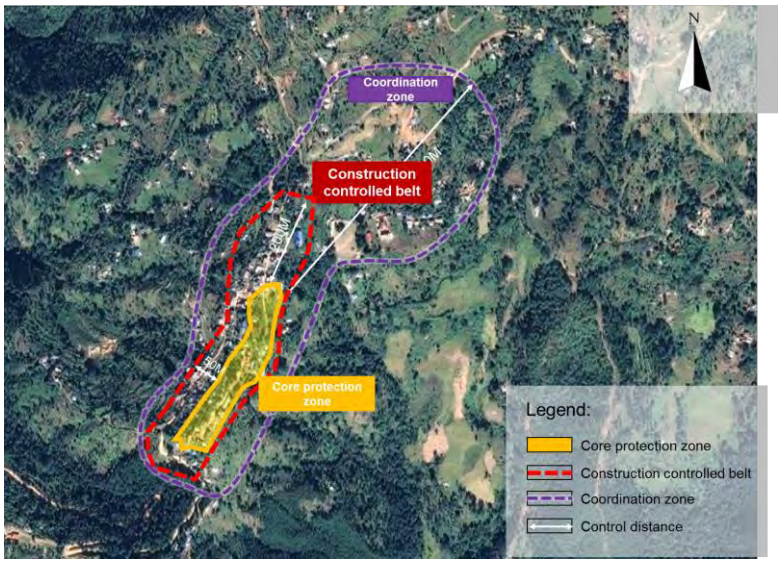


Figure6 Historical and cultural resources distribution and evaluation of Bidur

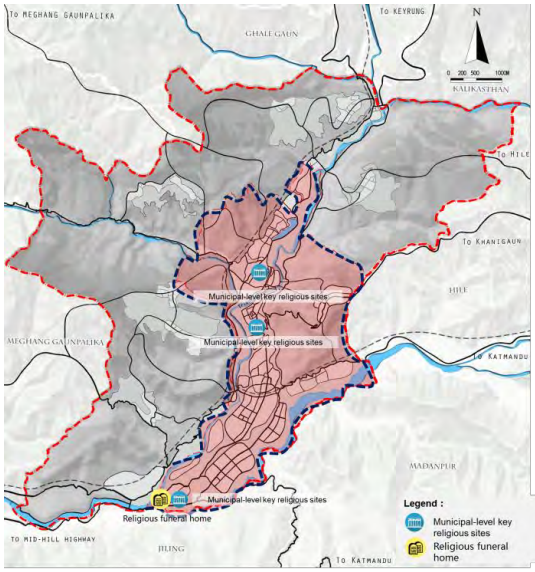
Promote the protection and utilization of intangible cultural heritage. On the premise of maintaining the authenticity of traditional festivals and other intangible culture, it should be combined with urban parks and public activity centers. tourism and trade activities should be carried out in public places during festivals, which aim to explore the potential economic value of local traditional festivals, spread and display intangible cultural heritage, promote vitality through culture and improve the quality of urban public space.

4.2. Strategy2: Establish a public service system for all

Bidur has weak public service facilities and health care system education and other basic living facilities service level is low, and lack of movie theater, entertainment facility and so on from the current situation. The focus should be the establishment of a public service system and inclusive religious activity place where all citizens have access to an equal and convenient medical treatment, education, cultural entertainment, social welfare and other services.

Establish municipal and community public service facilities. Build the "municipality-community" two level public service system based on Planning Norms and Standards 2013, with reference to experiences of China and India and other developing countries and according to requirements on equal access to public service facilities. The system shall involve “one center and multiple facilities”, consisting of medical care, education, social welfare, culture, religion, sports, food market, and public space and services to the whole city. Community comprehensive service centers will be arranged with 1,000 meters as the service radius, and 6,000 people (2 Neighborhood) as the standard of population served, to provide community services such as medical treatment, social welfare, culture, religion, and sports for residents in the neighborhood. Each community comprehensive service center will have a footprint area 2 of no less than 0.2 hectares and a construction area of no less than 350m .

Build characteristic religious cultural facilities.From the experience of LIshui in China , we should Construct a variety of religious activity space to meet different ethnic and religious belief of citizens and tourists demands cultural habits and religious activities and fulfill the space morden culture function to suit time life needs at the same time. Bhairabi Temple, Jalapa Devi Temple and Sugatpur Temple will be selected as municipal-level key religious culture space for holding major congregations; and a religious funeral home covering an area of over 0.5 hectares will be arranged in Devighat cluster, to meet religious funeral demands.To enrich the citizens' spiritual life, a municipal-level library covering an area of over 0.5 hectares will be arranged in Bidur cluster; and a municipal-level museum/art gallery/exhibition center covering an area of over four hectares will also be arranged; one hall will be arranged in each cluster of the river valley concentrated construction area to provide citizens with multiple functions like congregation. There will be seven halls in total, each covering an area of over 0.2 hectares.



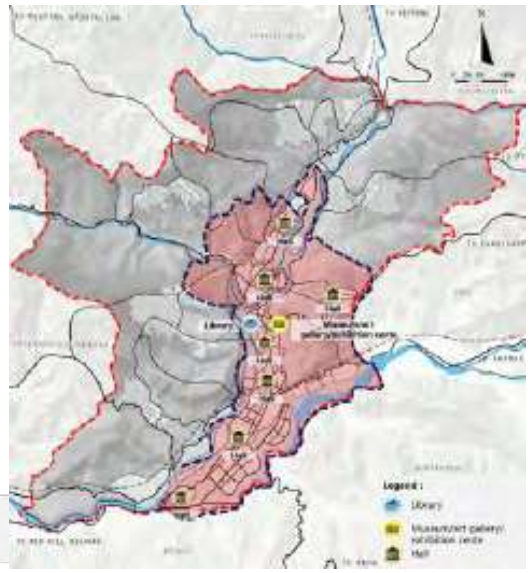


Figure7 Layout of Religious Sites of Bidur Figure8 Layout of Cultural Sites of Bidur

Create riverside public spaces. Many public spaces will be built around the rivers of the city. First, the plan provides 50-150 m wide green belts on the Trisuli and Tadi Rivers as Riverside Park, and provides a more than two ha Civic Square at the center of the city. The primary protection areas are River and lake shorelines, natural mountain boundaries, ecological protection areas and animal channels. The plan also provides farmland eco-landscapes at the southern and northern waterfronts, and provides riverside trails and terraces at the mid waterfronts. During the construction process, river and lake shorelines, natural mountain borders, ecological reserves and animal routes should all be preserved as first-class protection zones. So, any act affecting the natural flow of a river or the natural border of a mountain, or violating any regulation involved should be prohibited; any act of massive construction should also be prohibited to preserve the ecosystem of the city.

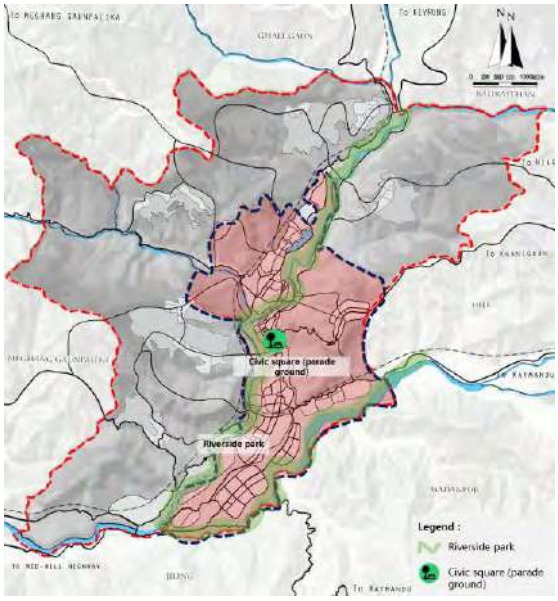


Figure9 Layout of Municipal-level Public Space of Bidur

4.3. Strategy3: Establish a civilized and orderly tourist system with utilization and management integrated

Bidur has similar historical and cultural and natural landscape resources as Bokhara's., We can integrate various ecological and cultural resources, and take agriculture as the root and tourism as the expansion to develop cultural tourism and logistics business with unique theme and routeIn the process of this strategy Industrial development will provide a large number of jobs, promote the continuous growth of the population, and create a vibrant atmosphere of prosperity.

Build"Cultural Tourist Loop + Boutique Ropeway". Various historical and cultural resources will be integrated. In the near future, the plan provides mountain highways and trails to connect Traditional Streets, Palace Historical Complex and the Administrative Service Center, and provides many tourist utilities of traditional cultural themes. In the long term, the plan provides one ropeway between the streets and the palace complex.

Build"Eco-Tourist Loop + Adventure Road". Eco-tourist experience will be enriched. First, the plan provides river drifting, kayaking and other tourist activities on the TUISHULI and TADI Rivers. And the plan also provides riverside tourist utilities, riverside greenways and mountain hiking routes.

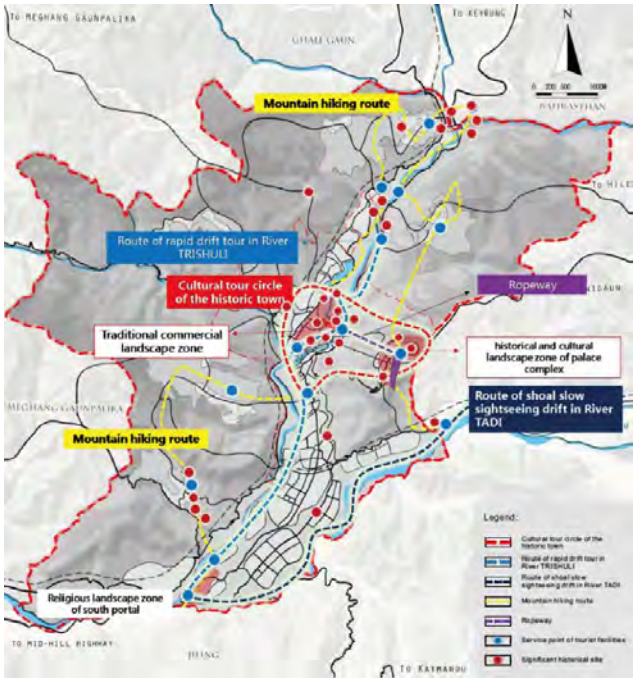


Figure10 Systematic Planning Map of Ecological and Cultural Tourism in Bidur

4.4. Strategy4: Create a characteristic traditional-modern landscape system

By comprehensive analysis of the regional characteristics, plan elements, the relationship between the surrounding landscape view and urban functions, the plan will construct a holistic mountain, water, street, city landscape features, while highlight the characteristics of a booming city built on hills and surface water.

First,Restructure the spatial layout. A new building layout should be created by rearranging the current buildings and roads. **Second, Establish public space paths** .Riverside landscape

nodes and public function centers should be created to increase the coverage of public spaces to 30% so that a neat-looking spatial structure can take form. **Last,Restore the traditional building layout.** In the Traditional Streets, the buildings should be partly preserved and reconstructed with a height of two or three stories so that courtyards and compounds will take form along the streets, and the streetscape, windowsills, balustrades, window supports and roofs should be repaired and redesigned as for the characteristics of the streets.

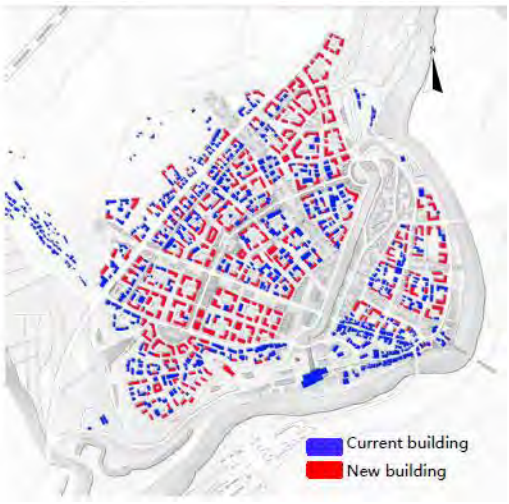


Figure11: New and Old Building Layout Map of TRISULI

Figure12: The Plan of TRUISHULI Traditional Commercial Landscape Zone

5. Summary

High quality of urbanization is the guarantee of sustainable development both for city and humans. So,the key of place making is not only to provide more green space and public space material for local residents, but also to provide more economic vitality and function for the city. The planning set the "Develop with Protecting ,Form with Function" as concept, use cultural preservation from the aspects of protection and construction, public service, ecological tourism, and urban design four paths, expecting a long-term effective on regional economic and ecological sustainable development, effectively creating multiple equal employment, providing fair and equal public service facilities and open beautiful living environment.

6. References

[1] UN-Habitat(2016) “International Guidelines on Urban and Territorial”,Planning.City Planning Review,Vol.12(September).

[2] UN-Habitat(2016)”The Future We Want, The City We Need”,http://unhabitat.org/the-future-we-want-the-city-we-need/.

[3] Elly Harrowell,Alpaslan Özerdem(2019)"Understanding the dilemmas of integrating post-disaster and post-conflict reconstruction initiatives: Evidence from Nepal, Sri Lanka and Indonesia". International Journal of Disaster Risk Reduction, Vol.36.

[4] Shou-Tsung Wu,Ching-Hsing Chiu,Yeong-Shyang Chen(2019)."An evaluation of recreational benefits and tribal tourism development for aboriginal villages after post-disaster reconstruction - a case study of Taiwan". Asia Pacific Journal of Tourism Research, Vol.24 No.2.

[5] Lipman(2007)"The Declarations of Venice of 1983 and 2006". Journal of Pain & Palliative Care Pharmacotherapy Vol.21 No.1.s

Paper

FOREVER FRENEMIES: BUILT HERITAGE, MEGACITIES AND NEW TECHNOLOGIES

Planning for culture

Natasa ZIVALJEVIC-LUXOR, National Heritage Foundation; Serbia

Petar MITKOVIC, Faculty of Civil Engineering and Architecture, University of Nis; Serbia

Abstract

Knowledge about how built heritage and megacities interact is still limited. At this stage of development, it is not yet clear what are winning approaches, how to measure performance, which data should be collected and how, and what is optimal way of using potentials of new technologies for that purpose. EU invested substantial resources into defining policy framework for culture and puts further efforts on its thorough understanding, which points out its huge estimated importance for societal well-being. Built heritage is most evident component of it, being usually "hardware" for all other cultural industries, and, at the same time, being the most threatened by growth of cities. In this paper we focused on modelling – with its core in interaction between megacites and built heritage. From one side, there are heritage experts who value their legacy according to success in preserving heritage, and on the other side – there are planners facing new economic and societal challenges due to historic growth of urban population. In addition, there are new technologies which develop faster than the capacity to apply them adequately. We analysed collecting and processing data which are required for clear insight and objective evaluation of an outcome. We discussed methodology – combination of methods and technique which may lead to desired outcome – full understanding and control – within planning and management of existing and emerging megacities. Having in mind that size determines economic performance, quality of life and subsequently future of designated megacity, including if there will be any, understanding this correlation substantially helps good governance.

Keywords

Megacities, Built heritage, ICT, Big data, Spillover

1. Introduction: Heritage as Nucleus of Megacity

Megacity, urban agglomeration, metropolis, city, town, village or any other urbanity consists of small(er) elements which one may call "cells" (with implicit comparison to living organism) or "digits" (as part of matrix in "metromatrix", i.e. in an associated abstract, numerical model (Ortiz, 2017)(Fig. 1. Left); the essence or the "heart" of such cell, a nucleus, is always a heritage, and usually it is built heritage but not necessarily so ((Luxor-Zivaljevic N., Kurtovic-Folic N., 01-04.02.2015.). Depending on local characteristics, "cell" may have different shapes, as shown on the right of Figure 1. Once such huge "organism" has been developed, a nucleus may be considered redundant, because it already served its main purpose. However,

a “heartless organism” may hardly survive, and even if it does, common sense says it must be in a way which is “not natural” e.g. with some artificial substitute, or even in some inverted or cancerous way. In this paper we assume that **similar happens to megacities without their built heritage.**

Figure 1. From nucleus to cell of metropolitan (Ortiz, 2017)

The reasons for abjuring built heritage, as genuine nucleus of an urban structure - in particularly after metropolitan area was generated, are numerous and not different than those at other levels: demographic pressure, land use efficiency need, redundancy of buildings without function, attractiveness of locations fully equipped by infrastructure, pressure of stakeholders, necessity of stable economic growth founded on urban developments, instant acceleration of economy, high costs of research, management and maintenance of heritage sites etc. With increase in size it is expected that pressure gets higher and such arguments seem to get stronger. Fortunately, arguments in favour of heritage are also unchanged and numerous: smart development, preserves diversity, strengthens identity and social cohesion, helps prevention of social problems, increases employment, efficiently improves local household incomes, provides better alternative for environment, educational benefit, has potentially catalytic effect on regional economy and positive demographic impact, helps improving quality of services, serves as “hardware” for other cultural industries etc. Most of listed benefits do not come from “existence” of built heritage, but from good heritage management, which requires knowledge, effort, operational skills and more, and that is a game-changing difference, which is undoubtedly present at all levels. **Therefore, our research question is how heritage management changes with size beyond metropolis.**

Knowledge about how built heritage and megacities interact is still limited. At this stage of development, it is not yet clear what are winning approaches, how to measure performance, which data should be collected and how, and what is optimal way of using potentials of new technologies for that purpose. In this paper, our hypothesis is that heritage management will change following overall human perception of space with size of urban agglomeration, and that it will emerge in intersection of three spheres: heritage value preservation, urbanization pressure and ICT development.

2. Importance of Year 2018 for Europe and Beyond

2.1. European Year of Cultural Heritage

Following radical changes of perception of space and comprehension of heritage values, existing urban development and heritage protection theories were substantially not

prepared for surprisingly rapid urbanization, huge number of new heritage sites and numerous new challenges of socio-economic development, or for seemingly unlimited opportunities of digital world. Therefore, impact of international doctrine became bigger than ever, with numerous documents adopted internationally, nationally and sub-nationally. Its latest milestone is European framework for Action on Cultural Heritage) (HEREBITS 2017) adopted less than a year after European Heritage Strategy for the 21st c (Europeana 2019) by EU members and 9 partner countries in May 2018. In those documents, innovations and new digital solutions are pointed out in several cases.
In the new European agenda for culture, the European Year of Cultural Heritage has been described as "a pivotal opportunity to increase awareness of the social and economic importance of culture and heritage". EAFC descends agenda from 2007, in an ambitious way.

2.2. European heritage strategy for 21st c

European Heritage Strategy for the 21st century "is based on three components:

1. The "social" component – harnesses the assets of heritage in order to promote diversity, the empowerment of heritage communities and participatory governance.
2. The "territorial and economic development" component – seeks to strengthen the contribution of heritage to sustainable development, based on local resources, tourism and employment.
3. The "knowledge and education" component focuses, through heritage, on education, research and lifelong training issues, by establishing heritage knowledge centres and centres for training in heritage trades and professions, by means of appropriate teaching, training and research programmes." (HEREBITS 2017)

The second of those components "focuses on the relations between cultural heritage and spatial development, the economy and local and regional governance with due regard for the principles of sustainable development" whose challenges include:

1. Building a more inclusive and cohesive society
2. Developing Europe's prosperity by drawing on its heritage resources
3. Ensuring that Europeans enjoy a high quality of life, in harmony with their cultural and natural environment
4. Implementing the principle of integrated conservation
5. Ensuring that heritage is taken into account in sustainable spatial development strategies and programmes
6. Developing the ability of public services to address sustainable spatial development issues by means of better use of heritage
7. Preserving and developing the ability of public services to address heritage issues
8. Increasing the use and reuse of heritage

Among recommendations how to respond to those challenges, there is recommendation to:

"Use (of) innovative techniques to present cultural heritage to the public, while preserving its integrity: Innovative techniques and approaches must be used to the full in showcasing operations but must be used judiciously in order to meet the dual challenge of preserving the integrity of the cultural heritage and making it accessible to as wide a public as possible",

as relevant for challenges 3, 4 and 5.; courses of action include informing heritage players, in co-operation with specialists, about the new technologies, including their potential and their limits, carrying out pre-restoration work studies using non-invasive technologies (digitization, augmented reality, 3D scanners, modelling, drones, LiDAR, etc.), using non-invasive exploration techniques to study inaccessible or fragile areas, developing representations of heritage by means of the new technologies (modelling, 3D printing)". (HEREBITS 2017)

The European Framework for Action on cultural heritage is based on five pillars:

1. Cultural heritage for an inclusive Europe: participation and access for all;
2. Cultural heritage for a sustainable Europe: smart solutions for a cohesive and sustainable future;
3. Cultural heritage for a resilient Europe: safeguarding endangered heritage;
4. Cultural heritage for an innovative Europe: mobilizing knowledge and research;
5. Cultural heritage for stronger global partnerships: reinforcing international cooperation.

Each pillar corresponds to clusters of actions.

2.3. Smart solutions for a cohesive and sustainable future

Following lead of United Nations 2030 Agenda for Sustainable Development, the second pillar recognizes "culture, including cultural heritage and the creative industries an important role in achieving inclusive and sustainable development"; its three clusters of actions aim at a) regenerating cities and regions through cultural heritage; b) promoting adaptive re-use of heritage buildings; and c) balancing access to cultural heritage with sustainable cultural tourism and natural heritage. It means in practice, there are numerous projects supporting cultural heritage through EU-funded projects for urban and rural regeneration and sustainable development (European Structural and Cohesion Funds, URBACT, Erasmus+ and Horizon 2020)".
In addition to many pragmatic solutions, in 2019, European Spatial Planning Network (ESPON) 2020 Cooperation Programme co-financed by the European Regional Development Fund, has initiated research for **empirical evidence on the impact of material cultural heritage on the most important economic sectors in 10 selected countries and regions;** ESPON initiated targeted Analysis "The Material Cultural Heritage as a Strategic Territorial Development Resource: Mapping Impacts through a Set of Common European Socio-economic Indicators" and study "Cultural Heritage as a Source of Societal Well-being in European Regions". (HEREBITS 2017)

"At the end of 2018, a Declaration on "Adaptive re-use of the built heritage: Preserving and enhancing the values of our built heritage for future generations" was adopted by stakeholders on 23/11 in **Leeuwarden** as a legacy of the European Year of Cultural Heritage initiative "Heritage in Transition". (HEREBITS 2017)

2.4. Innovative Europe

The forth pillar includes following cluster of actions:

"Digital technologies offer unprecedented opportunities for us to improve public access to cultural heritage assets and allow for their curation and re-use. Innovative technologies, such as virtual or augmented reality, can also enhance people's experiences with cultural

heritage, while digital tools such as 3D scanning play a major role in the preservation and restoration of physical heritage assets. Innovation is not only technological; it also takes place in the social sphere. The role of communities living with cultural heritage assets is changing…To address the challenges above, the Framework entails three clusters of actions aiming at a) capitalising on technological tools for innovation on cultural heritage; b) fostering social innovation; and c) strengthening skills in the field of cultural heritage." (European Commission 2018)

The correlation of cultural heritage with urban development is considered under also Pillar 2, which refers to applications of new technologies in urban scale.

The overall change towards creating new digital environment calls for new management. Innovative techniques are indirectly mentioned among four principles of the European framework for action on cultural heritage - evidence-based policy making: "Evidence-based decision-making is as necessary in the cultural heritage field as it is in other policies. In that respect, the Framework entails several actions aimed at measuring the impact of actions on cultural heritage. Through its statistical office, Eurostat, the European Commission will also keep improving the methodology and tools to collect data for cultural statistics, in cooperation with the statistical offices of EU Member States." (European Commission 2018)

2.5. Scientific challenge and significance Beyond Europe

The general intention of numerous European actions, whose small part is described the above, can be summed up as action to increase resilience of European (built) heritage which is considered one of the most important European assets regarding wellbeing of its inhabitants.

European year of cultural heritage hosted 11 700 events with 6 260 000 participants in 37 countries.

Europe declared openness for international cooperation and also set new standards in heritage preservation and urban development worldwide.

Cultural heritage has been classified as tangible, intangible, natural and digital. There are high expectations from ESPON and implementation of **Leeuwarden Declaration.** Huge funds have been assigned to: Creative Europe, a programme of European Commission supporting cultural and creative sectors, between 2014 and 2017, nearly 27 M€ were dedicated to heritage, and in 2018 5 M€ were dedicated to it with 2 objectives: reinforcing a sense of belonging to Europe and Promoting cultural heritage as source of inspiration for artistic contemporary creation and innovation (EUROPA NOSTRA 2018).

In scientific way, we would particularly like to withdraw significance of the programme **European city of culture**, which was established in 1983 (EC, 2019). It is one of the longest living European projects, and it essentially enforces development which comes naturally to some cities, commonly known as "cities of art". As remarked well long time ago: "…what distinguishes the cities of art from the others it is not so much the presence of artistic and cultural values as the degree of influence that these values exert on the city environment." (Lazaretto & Cinti, 2001) As an example, "Florence is unanimously considered a city of art and Turin no, despite the artistic richness of Piedmontese villas, both architecturally and on the sculptural or pictorial level." (IB).

European city of culture generates valuable database (2017 Edition of the Cultural and Creative Cities Monitor is available at: https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/ and 2019, the European Commission releases the second edition of the Cultural and Creative Cities Monitor), tool aimed at facilitating peer-learning processes between peer cities based on similar population, income and employment.

In a specific study applied to Venice 3 decades ago, it was noted that the city of art is "a complex cultural asset with its own unitary economic characteristics of which we study the demand and supply function, the cultural and non-cultural investment processes, and mechanisms of formation of collective decisions, phenomena of development and decay for historically differentiated models, the different instruments of public intervention and their effects" (Mossetto, 1992, p. 4) (Lazzartti , et al., 2001). Having many "Venices" as points of reference, many new possibilities opens. In economic terms, phenomenon of "city of art" is related to phenomenon of spillover which is considered generally unplannable and unpredictable. European capital of culture program provides valuable database for further research.

3. Role of new technologies

3.1. Overview

Nowadays, everyday novelties of ICT are extraordinary, inspiring, reinforcing but also overwhelming; therefore, for the purpose of this paper we will point out some key features for rough classification. For some of them, key role has "hardware" – in sense that they are based on inventions, or new provisions of it, regardless if it is satellite, petabyte storage or else, and those with key challenge in "software" – which essentially means collecting and processing data; for scale of "metropolis and beyond", in both case particularly interesting are those which are sensitive to size.

For example, interesting applications recently come from analysing night light, from urban to metropolitan scale (data were always "there" and collectable since the begging of satellites, but nowadays they are easy accessible to public and can be applied on entire regions beyond legal jurisdiction). This application is size sensitive, based on hardware invention and software which is freely accessible for scientific purpose.

Another example refers to (numerous) econometric methods for heritage, which were developed in last 2-3 decades, and developed successfully as spatial on urban scale, now need to be adopted to metropolitan scale which requires demanding new software solutions regarding processing huge amount of data.

Another classification that may be useful refers to inductive or deductive approach. There are numerous global phenomena – like Blockchain, which "also" can be applied on megacities and heritage, and others scientifically developed for the purpose from scratch. Same data can not be reached from outside but only within certain channels and they may provide urban reality of its own.

3.2. Collecting data

The Laconic answer to the question which data we should collect to follow impact of culture on society would be: "All". More specifically: Web, (seems to be infinite source of data);

Social networks (e.g. very valuable for discovering preferences related to cultural tourism), Satellites, Digitalised communal infrastructure, Econometric data and much more. In other words, data sources include: Sensor Networks, Social Networks, Digital Libraries, Multimedia Collections, Web Data Service (Amati et al. 2017)

3.3. Processing data

Even small urban entities generate huge amount of data. Having too many data is as useful as having none: it means being at the beginning. Empirical analyses of huge urban entities are impossible without data processing. In overwhelming amount of data, data mining is name for "the process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems… an interdisciplinary subfield of computer science and statistics with an overall goal to extract information (with intelligent methods) from a data set and transform the information into a comprehensible structure for further use." Big data is misnomer, because they are not big, but may appear "too big" for designated capacity at the time. At this time, synonym for Big data is petabyte, but soon it will be exabyte or zettabyte.

It proves that megacities can not be managed without proper processing of Big data.

Similar to our tendency to rely recently more on heritage doctrine and not on theories (because we do not have them), we tend to rely on empiric data of urban reality instead on theoretical models; using empiric data could be thwarted without methods for **collecting and processing** Big data.

4. Scenarios of extremes

4.1. Between urbanization, heritage and new technologies

Following our initial hypotheses, in ideal megacity, urbanization, heritage and new technology are perfectly balanced, generating successful and progressive society. Let`s see what happens in cases of extreme dominance of one of those components.

"Zero built heritage in heartless megacity" is scenario in which urbanisation dominates; we assume that pressure of urbanization reaches such level that pressure from stakeholders wins in favour of new development. It can be done in early stage – as soon as demographic pressure becomes high or at later stage, once all the spatial relations are defined, in an urban entity that reached its demographic maximum. Difference in outcome may be relevant. In first case, reconstruction would bring along fully new spatial relations and, in time, memory of the heritage would be fully lost. In second case, all functions would remain the same, according to original spatial hierarchy, but may start to deteriorate in time without symbol of community`s cohesion, similar to a hive without queen bee.

"Beyond psychical structure: virtual built heritage as substitute in overcrowded megacities" is a scenario in which advanced technologies technics and come to "rescue" of heritage values although not of heritage itself. There could be many variations of this scenario. As in many other examples of virtual reality, in this case focus would be on sensations, "experience" of built heritage, instead of genuine structure. One version of it includes that built heritage becomes fully privatized and commercialized trough a blockchain of its digital version (which in time may become its only version). Then, the focus would be on the appearance and it is highly questionable if dematerialized built heritage (eventually

reduced to ordinary artefact) may keep performing its social and economic role and how. Virtual built heritage would mark "techno-heritage" singularity of urban agglomeration.

"Smooth but slow sliding into future behind appearance of an open air museum" is a scenario in which built heritage fully wins although that social-economic development of society is severely diminished. If it means slow development, it is not certain if it can realistically survive in the world with very fast pace.

4.2. Concept of substitutes

All those differences would supposedly happen at level of "cities", so the question is how those cities would interact within a megacity. If different scenarios happen in one megacity, it may mean new "zoning", according to which cities take over function which quarters have in a city (and we are fully aware of good and bad sides of it).

5. Discussion: Looking for empirical proofs

5.1. Efficiency as precondition for size

The comparison with living organism (by Pedro B. Ortiz, (Ortiz, 2017)) explains why bigger means more efficient in case of urban entities. Existence of metropolises or megacities can be justified only if they would be more efficient then before. That should mean practically that if there is synergy between compounds i.e. that there is beneficial correlation. Sinergy in economic terms means a spillover, which can not be planed or predicted but it could be measured. Econometric methods for measuring spillover exist, although they are not considered fully sufficiently developed yet ((Yang & Wong, A spatial Econometric Approach to Model Spillover Effects iin Tourism Flows, 2012), (van Duijn & Rouwendal, 2013)). Spillover may be based on heritage (e.g. provided by cultural routes; it may be measured by following economic performance before and after cultural routes have been established/branded or other spillover effects i tourism flows (Yang & Wong)). In that sense, proving existence of metropolis to megacities means looking for signs of spillover. Another proof may come from researching cultural tourist preferences (e.g. if they visit sites in other part of assumed megacity within the same tourist visit).

5.2. Data and methods

Big data draws a lot of attention (agedly, in particularly after CCC- **Computing Community Consortium** established in 2006 – leading organization voice of USA computing research community, pointed it out in 2008.), and it is thoroughly researched as being considered by some scholars "the next big thing"; processing large amount of data usually means remote sensing database, generated from images (Wang et al. 2016) (Merino et al. 2016). Lot of data are generated from Google Earth Engine in cooperation with different map sources (Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community) (Amato et al. 2017) (Agapiou 2017); also by The Defense Meteorological Satellite Program/Operational Line-scan System (**DMSP**/**OLS**) which "collects visible and near-infrared **light** from the Earth's surface at **night** without moonlight. It generated "effective **time series** data for mapping the dynamics of urban expansion" since 1992. (Agapiou 2017) Data can be further processed based on aspects as the saturation of luminosity, the blooming effect, the intercalibration of time series, and their temporal pattern adjustment (IB). Processed data can further be used

e.g. for analysing urbanization around heritage sites or still earthed archaeological finds, i.e. data can be further processed trough Spatial interaction model is popular method for analizyng areas with size of megacities. This method belongs to Structural equation modelling (SEM), developed for social sciences "as a form of causal modelling that includes a diverse set of mathematical models, computer algorithms, and statistical methods that fit networks of constructs to data **The structural equation method** belongs to a high level statistical category of multi-variety statistics, reallocates the factorial analysis and path analysis, tests the relationship of dominant variate, latent variable, interfere or errors included in the model at the same time (Shi 2016). SEM may include confirmatory factor analysis, confirmatory composite analysis, path analysis, partial least squares path modelling, and latent growth modelling. Semantic web is applied the "intrinsic relationship for questionnaire design, which improves the reasonability of analysed results" (IB).

The aim of such research is to find patterns in empirical data which would serve for modelling of future megacities. (Marrocu & Paci, 2013).

Other researches are based predominantly on econometric data, i.e. irregularities which are expected to be caused by cultural heritage interventions, e.g. proofs of spillover as mentioned previously.

5.3. Principle of Substitutes

At this time, we could not scientifically tell how to intentionally create city of art, but it would be useful to know it in case cities within megacity start getting "roles" and if at least one of them would have role of "city of art".

Empirical analyses on urban scale showed that heritage is required, but that built heritage may have substitutes. Substitutes may get bizarre appearance reduced to symbol (e.g. in famous historical case of Las Vegas in middle of 20th century, which later became role model for many cities, and e.g. because of which nowadays exist 50 copies of Eiffel Tower in the world) or that role may play tangible heritage of different kind or natural heritage (e.g. ship wrecks and natural heritage, in case of Sharm el-Sheikh, small but globally positioned town on far western fringe of Asia. We did not find examples of intangible heritage playing such role but it does not mean such examples do not exist. If they do, it would make easier to accept that such role could be played by digital heritage in the future, as well.

6. Conclusion

In well balanced urban agglomerations, which we want and act to have in Europe, built heritage is expected to keep the role it has nowadays. However, in many cases built heritage may be in danger of being dematerialised and replaced with its digital copy.

Those are only some of examples indicating that European policy makers are aware that the applications of new innovative methods require new approach in collecting data from the field, and different management of overall process.

It is expected that heritage management becomes more "digital" as well as heritage itself. As direct consequence, and it is expected to be more scientific: subject of Big (remotely-obtained) data processing and high-end statistics.

7. References

Agapiou, Athos. “Remote sensing heritage in a petabyte-scale: satellite data and heritage Earth Engine© .” International Journal of Digital Earth, 2017: 85-102.

Amato et al., “Big Data Meets Digital Cultural Heritage: Design and Implementation of SCRABS, A Smart Context-awaRe Browsing Assistent for Cultural EnvironmentS.” Journal on Computing and Cultural Heritage (JOCCH) Special issue on Digital Infastructire for Cultural Heritage, Part 1 10, no. 1 (2017).

EU Commission in the Recommendation on the digitisation and online accessibility of cultural material and [Report]. - EU : [s.n.], 2011 . - 2011/711/EU.

European Commission European Framework for Action on Cultural Heritage [Online] // ec.europa.eu. - European Commission, 5 12 2018. - 19 4 2019. - https://ec.europa.eu/culture/sites/culture/files/library/documents/staff-working-document-european-agenda-culture-2018.pdf.

Europeana. 2019. https://www.europeana.eu/portal/en. (accessed 2019).

Where past meets future, Europa nostra

HEREBITS. 2017. https://www.sp.unipi.it/wp-content/uploads/2018/03/LOCANDINA_HERIBITS.pdf. (accessed 2019).

Lazzartti Luciana and Cinti Tommaso La valorizzazione del patrimonio artistico delle citta d1arte: il restauro artidtico a Firenze [Book]. - Firenze : Firenze University press, 2001. - ISBN 88-8453-013-X.

Marrocu, E. & Paci, R., 2013. Different tourists to different destinations. Evidence from spatial interaction models. *Tourism Management,* 39(December 2013), pp. 71-83.

Merino et al., “A Data uality in Use Model for Big Data.” Future Generations Computer Systems, 2016: 123-130.

OMC Participatory governance of cultural heritage [Report]. - [s.l.] : OMC , 2018. - Report of the OMC working group of Member states.

Ortiz Pedro B. Mtropolitan Discipline. - 2017.

“PORCreO.”2017.https://www.sp.unipi.it/wp-content/uploads/2018/03/LOCANDINA_HERIBITS.pdf (accessed 2019).

Shi, M., et al. “Applying semantic web and big data techniques to construct a balance model referring to stakeholders of tourism intangible cultural heritage.” International Journal of Computer Applications in Technology, 2016,: 54 (3).

Towards an integrated approach to cultural heritage for Europe [Report]. - 2014 . - COM(2014) 477.

UNESCO UNESCO UIS [Online]. - 2019 . - UNESCO UIS http://uis.unesco.org/.

van Duijn, M. & Rouwendal, J., 2013. Cultural heritage and location choice of Dutch households in a residential sorting model. *Journal of Economic Geography,* 13(3), pp. 473-500.

Yang, Y. & Wong, W. K., 2012. A spatial Econometric Approach to Model Spillover Effects iin Tourism Flows. *Journal of travel Research.*

Wang et al.,. "High Performance Cloud Computing for Remote Sensing Big Data Management and Processing." Future Generation Computer Systems, 2016.

Zivaljevic-Luxor N. et Kurtović-Folic N. Managing non existing heritage – case study of Sharm el Sheikh [Conference] // IX SIMPOSIO INTERNACIONAL DESAFÍOS EN EL MANEJO Y GESTIÓN DE LAS CIUDADES. - Camagüey. Cuba : [s.n.], Del 1 al 4 de febrero 2015. . - p. x.

Track 5

Smart futures and sustainability

Planning for innovation

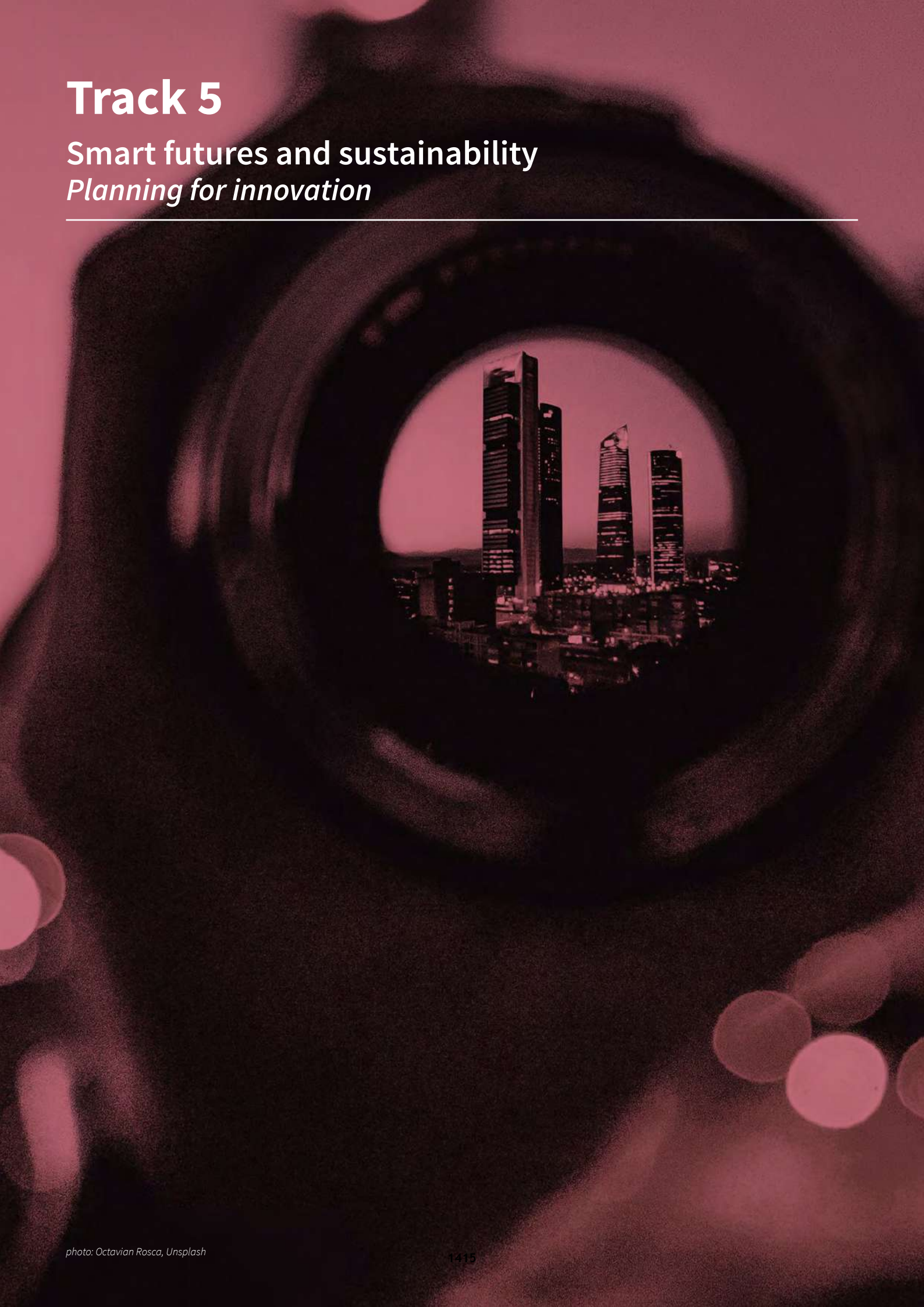


photo: Octavian Rosca, Unsplash

Research Paper

Spaces of becoming - Space shapes public and public (re)shapes their own spaces

Vaishali AGGARWAL, Bauhaus-Universität Weimar; Germany

Abstract

Fights over the 'right to the city' have emphasized the interests of the four main actors within the city development of India since the first cases of revolting social movements in Delhi. The four actors can be classified as the social movements, the public, media and the government. The case of India Gate in Delhi is illustrative not only of how the differences between the actors come into surface, but of also of how these actors change their priorities, their stance and their tools, in order to secure their position in the city. Many scholars have analysed the role of social movements and how it evolves in the process. But what about the role of government as an entity that is in between the interests of social movements, public and media? How and why do they change their stance when a movement takes place? What are their limitations? The India Gate case can give the answers to these questions, as it examines the multiple transformations of this space over time. This paper emphasizes on the idea of Space. ***How space shapes public and public (re)shape their own spaces. India gate. This space has been stuck between the idea of being a space or a branded space.*** *It was assumed that* ***media plays a prominent role in acting like a watchdog in democracies****, but this paper looks at how media if used rightfully can be forced for a good in oppressive regimes and therefore, a vigilant and alert media can act as an external trigger or an emergency- wake up call for the youth of India to take the cause of freedom seriously. Rightfully as put up by Ritish (2012), an external event or issue may allow for the* ***manifestation of a flash fandom in the form of flash activism.*** *Since, social movement's needs mass media attention for amplification of their claims, the media also join the movements too create the news. Lastly, the consequences of the media coverage for social movements, in terms of organisation, reaching political change and obtaining favourable public opinion is comprehended in three different case studies.*

Keywords

Right to the city, Social movements, transformation, democracy, flash activism, flash fandom, Youth of India.

1. Introduction

1.1. Importance

The research aims to broaden the understanding of the importance plazas have in urban conflicts between government, public, media and social movements and conclude how these plazas acts as the spaces of becoming by analysing the case study of one such relevant conflict from the city of Delhi. Looking at the role of plazas as a public space and how movie

from an Indian cinema can take people outrage to the street and influencing series of social movements bounded to the notion of 'right to the city'. It also provides an overview on why social movements need the mass media (and vice versa) and how media activism helps in getting justice. After that, the literature state of the art is introduced in connection with the broader topics mentioned in the theoretical framework. Emphasis is put to the description of actual conflicts between social movements, public and government. The aim of the research was developed on the case of Nirbhaya Rape case in Delhi, based on the former social movement no one killed Jessica and movie Rang de Basanti (Paint it saffron) in 2006. As in the case of Nirbhaya's rape case which turned out to be international sensation as it played a very important and ambivalent role in resolving the gap between the public and the government. However, this particular social movement did not resolve the situation but rather than acting as an isolating phenomenon, it brought a social change. The research questions are formulated to get an insightful view of the processes from the viewpoint of the government. It also provides an overview of the way in which social media and digital networks contextualized and scrutinised the relation between social movement and activism.

2. Theoretical Framework

2.1. Delhi - a contested space

The images of the cities plays an important role in the formation of the urban identity where the conflicts in the city raises the questions about the nature of the 'political' and of local democracies. Urban identities creates a platform, which associates between specific places, the production of places, and visualises the basis of its construction to an extremely unambiguous place, media image and temporary space. According to Enrico (2013), conflicts marks the crisis of the 'political', its void or absence, while it also delineates potentials for its revival. Delhi, a city in palimpsest is a combination of layers of things & identified with the cultural manifestations along with spatial identities. However, in Delhi, these combinations and the cultural identities is more complicated because of the dimension with its colonial past. As a (post) colonial city, Delhi has fragments of colonial spaces.

2.2. India gate - Background

India Gate is such space with a concept that links the mental and the cultural, the social and the historical perspective. Thus, the 'culture of contestation' adds a new dimension along with the 'culture of informality'. City like Delhi hinges the relation between the space and the society. It is an inseparable tangled knot between spatiality and sociality. As Lefebvre (1991: 26) long ago also pointed out the curious condition that space is both a means of production and a product of it. It stands high in the politically dominant area in the administrative seat of India. Every year Republic day parade takes place at this place, which is witnessed by thousands of people, symbolises power and further acknowledges the feeling of patriotism. However, as it evokes in the architectural style and is surrounded by numerous parks, everyone favours this place. Domination over the space > creation of a 'counter-space'.

2.3. India gate as a place for Protestants

The conflicts shapes in a specific spatial and material setting. This is made possible by the placement of things, the system that establishes visibility, accessibility of areas for the

production of human action in the city. Since the discourse about the place is ignored, therefore Lefebvre's "spatial Practice" inhabits my attention (Lefebvre 1991: 33–46) where he certainly does not mean that the representational or discursive is unimportant. He focuses on the reproduction of the spatial and social urban order where subtle behaviour adjustments are more explicit and visible. India gate is a war memorial, which is both inhabited and constructed as a memorial landscape complex. It was erected not only for an attempt to 'fit in' with the existing and traditional spaces of commemoration, but altered and created new spaces that determines commemorative strategies, entertain masses. This sensuous and spectacular nature of war remembrance draws attention to the centrality of sight, sound and touch for the remembrance of activities. Since, the location and the importance of this place makes it suitable for a place to protest, the question of losing the impact also lies there as the space is under heavy security. Thus the 'becoming' of this space also adds to its labyrinthine quality which may cause in losing the controlling gaze of the spatial order and enters a world of escape, mystery, danger and desire.

In line with president's house & Rajpath
Centrality & political importance

Power shows ist dominance
Symbolic place – centre of the city & governmental buildings

Every protest is centralized
Initially used to be a picnic place

Power balance is shown
A place where power plays important role, now acts as a field of conflicts/riots

Figure 1- Protests, conflicts & power dominance at Republic day Parade

3. Social movements in urban sphere

3.1. Why social movements?

Movements are necessary for creating an identity construction about what things were but reflecting aspirations with an idealized past bridging with future. This **conceptualisation of a space endows 'new spaces' without any effort to 'place' vulnerabilities as a consequence** for social relations. Movements produce the idea of **'degenerate Utopias'**, **'dialectical utopianism'** of the **'process'** and **'form'** which helps in flourishing active society. Society is a social creation where Social change is beyond the control of the individual.

3.2. Why social movements?

"Social movements can be viewed as collective enterprises seeking to establish a new order of life. They have their **inception in a condition of unrest**, and derive their motive power on one hand from dissatisfaction with the current form of life, and on the other hand, from wishes and hopes for a new system of living. The career of a social movement depicts the emergence of a new order of life" (Blumer, 1969, p. 99).

A social movement is a form of "**purposive collective actions** whose outcome, in victory as in defeat, transforms the values and institutions of society" (Castells, 2004, p. 3).

A social movement is "the effort of a collective actor to take over the 'values', **cultural orientations** of a society by opposing the action of an adversary to whom he is linked by relationships of power" (Touraine, 1995, p. 239).

Based on these different definitions the most important aspects of social movements are negation of dominant values, institutions, adversary, dissatisfaction, mobilising demolishing structures, etc. Herbert Blumer therefore identified four stages of 'social movement's' lifecycles, which are as follows:

1. Emergence
2. Coalescence
3. Bureaucratization
4. Decline

Since success and failure are two sides of the same coin, the question of why movements fail simply mirrors the question of why movements succeed. On one hand, social movements succeed by gaining attention and raising public awareness, but this does not necessarily influence policy-making. Though over the time, movements may achieve successes and face hindrances which might face counter movements or generate new movement altogether which leads to variety of outcomes, including Institutionalisation, indulgence, suppression, or abeyance until the future period of mobilisation. The cry and demand for 'right to the city' has grown into a global catchphrase that is tossed around by activists and policymakers. While Harvey (2008) claims that 'right to the city' changes oneself by changing the city, the UN on the contrary believes that 'right to the city' demands for instinctive flexible meaning for dignified and secure existence in cities. The 'right to the city' is the right of all the inhabitants to permanently and temporary use, occupy and produce inclusive and sustainable cities for present and future. It's an existing co-operative and diffuse human right that developed from bottom-up approaches and belongs to all the inhabitants of cities on the basis of their common interest. The 'right to the city' belongs to the present and future generations which means involving the access to urban resources, services, goods, and opportunities of city life for all the inhabitants who can participate in the making of city.

As indicated by Lefebvre (1996), urban space offers its inhabitants 'the right to the city'. This right includes openness, flexibility, the recognition of differences, the right to be included, the right to develop an individual or collective identity, and autonomous decision making, alongside an unrestricted access to resources.

3.3. The role of the local governments

In the conflict between social movements and government, four groups could be identified as the main actors: the social movements, public, media and the government where very actor has its own motives and characteristics. The combination of the traditional role of municipalities to keep their citizens content and, in parallel, to implement viable transformations in the urban space is seeking new challenges. Nevertheless, as Hackworth

(2007, p.15) argues, the relatively regulatory state of the mid-twentieth century has been supplanted by a neoliberal version that seems itself to be regulated by local capital.

Even if we look at the role of a local government as 'neutral' in this new era that the **'welfare character'** is replaced by the **'regulatory character'**, there are restrictions that have emerged during the last decades, indicating that a 'neutral' standpoint in dealing with the urban conflicts cannot be achieved easily. However, local authorities don't have neither the economic nor the political power that a state has. Thus, they become more vulnerable to the projections of bond-rating groups,

"The idea that municipal governments should behave as economically efficient, business-friendly, anti-deficit entities is now an axiom rather than a debated policy shift among city managers". So, after all this **'autonomy' comes along with "powerful limitations on the choices that city officials can and cannot make"** (Hackworth, 2007, p.20).

3.4. Power of media leading to a social movement

The social movement and mass media are mutually dependent; it draws the attention and creates newsworthy events. Since the **intensive exposure of internal struggles and irregularities within the movement** eventually resulted in the gathering public support, the former social movement already created a sensation among the people for justice. However, due to **the non-institutionalisation position of social movements,** the relationship between movements and the media is **characteristically more asymmetrical** than the interaction between politicians and the media, which results in a failure of social movements sometimes. For example as happened in the movie influenced social movement.

4. Social movements in the case of Delhi

4.1. How does film affect the audience's perceptions about government and freedom?

As rightly said by Ritesh (2012) Rang De Basanti (Paint It Saffron) was a patriotism- and social change-themed Bollywood film that was strategically released in India and other countries on January 26, 2006, India's Republic Day (which commemorates the day when the Indian Constitution came into effect). Despite the international accolades, Rang De Basanti's greatest legacy is its role (unusual for a Bollywood film) in helping generate civic activism among urban Indian youth.

Figure 2- Still from the movie: Rang de Basanti - 2006

The movie narrated the **gradual transformation** of five college friends from happy, politically apathetic youngsters to anti-government rebels. The death of one of a close friend, a fighter jet pilot, acted as a catalyst, when the Aviation Minister falsely blames the pilot's

foolhardiness for the crash instead of admitting the plane was a model long known to be defective, which the Minister had been bribed to procure. To protest, the friends organize a peaceful candlelight vigil at India Gate, a prominent landmark in the capital, New Delhi. The vigil is violently disrupted by the police, and the last third of the film shows the dramatic repercussions of this violence. The film's provocation is best captured in one line of dialogue: "No country is perfect. You have to make it perfect.

The movie impacted the audiences tremendously, especially the youth, who came to theatres because of its visually attractive ad campaign and star power. Though the director of the movie observed a significant post release that increased the discussion of the political issues in India. The frustration evident on some blogs as Ritesh (2012) said "The society will be ruined by these evil politicians. It's time to have a Rang De Basanti type resurgence"—this also reflected the frustrations showcased in the film's final moments. Within few weeks after the release of the movie, the change was easily seen in the air as people were unexpectedly moved by the film's story and ideology. This movie hence acted as an **emergency-wake up call for the youth in India to take the cause of freedom seriously**.

4.2. Flash activism and flash fandom – Case 1

The movie rang de basanti generated the **civic activism** among the **Urban Indian Youth** who aimed at securing justice in a high- profile murder case.

> *"Movie's most prominent impact was on the ongoing real-life where on April 29 1999 night, lall, young son of high ranking politician shot the 34 year old fashion model who was doubling as a waitress as a part of publicity campaign for a newly opened fancy restaurants in Delhi as she refused to serve him the drinks after the closing time. Since its common in India, the case dragged on in the courts for several years, during which period many witnesses withdrawn and the murder weapon went missing. Here media played an important role in shaping the societies and hence, the news got hyped. A day after the acquittal, a Times of India headline screamed, "No One Killed Jessica." NDTV, a 24-hour news channel, submitted to the president of India the more than 200,000 cell.*
>
> *Few days after the verdict, Tehelka, an Indian weekly, sent an anonymous text message: "If the Jessica case has upset you, show you care. There is a protest gathering at India Gate next Saturday, March 4 at 5.30pm. Be there. Help keep up the pressure. Demand justice." It is not clear whether Tehelka deliberately chose India Gate to draw a parallel to RDB. The following evening about 2,500 people, many of them students, gathered for a candlelight rally at India Gate. This is noteworthy for many reasons. Yet what is most remarkable is that the protest was a replication of the crucial scene of a candlelight vigil at India Gate in Rang De Basanti, which had been released six weeks prior and was firmly alive in public memory and blogosphere discourse. Ritesh (2012)*

Undoubtedly, the **movie became a force, which had a direct impact on the community engagement**. Though nothing happened after the protest, but people witnessed unity among themselves and India Gate then visualised as a place of protest rather than the a picnic spot.

Figure 3 - New public in space

4.3. "Nirbhaya" Rape: Isolated Phenomenon or Social Change? – Case 2

This brutal attack took place on 16th December 2016 where a 23-year-old Jyoti singh, a premedical student who was returning home with her male friend boarded an off-duty bus, which already had six other persons including the bus driver. However, what happened next shook the whole nation, the girl was raped by six men in the moving bus while her friend was beaten up and thrown down from the bus. The victim suffered grievous bodily harm due to the terrible attack and the insertion of iron rod in her intestines caused serious injuries in her abdomen, intestines and genital organs.

Figure 4 - Protests at India Gate

This incident made a huge hype worldwide and gained **international sympathy**. People from all over the world came together for this case and demanded justice for the survivor. This social movement was successful in creating an impact in India's history and demanding the rights for girl and her family. However, media had a mixed reaction in this case due to the political pressure. Nevertheless, because of this popular case worldwide, protestors succeeded in getting the justice sue to which criminals were hanged until death.

5. Key Concepts

5.1. Right to the city

Lefebvre (1996, p.158) summarizes the idea as a "demand... [for] a **transformed and renewed access to urban life**". Harvey (2008) described it as follows: "The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city. A right to the city empowers a new citizen, who is not only simply a user of the city but a participant in its creation and interpretation." Lefebvre (1991, pp.381-383) claims that through a subordinate group's challenge to a ruling group's claim, space is socially produced, contested and the space changed the space itself over the time.

According to Lefebvre (1991) the space is actively produced, not only in its physical disposition but its social meaning, by the activities that go on in it, or that go on in some spaces but not others. He suggests imagining and reconstituting a very different kind of city, which incorporated and enriched its context.

He argued that space must be understood as more than a neutral container of activity. The recognition of a right to the city would make more practical the right of users to make known their ideas on the space and time of their activities in the urban (Lefebvre, 1995: 34).

Figure 5 - Protestors depicting the right to the city on the bridge and occupying the space

Therefore, public space becomes a tool for the not visible conflict to come in surface. However, according Sassen (1991) the huge post-credit crunch buying up of urban buildings by corporations led to significant implications for equity, democracy and rights. While Castell's (1983, pp.319-320) criteria for a successful urban movement was if a space is occupied by the movement then it gives it a physical presence, a location identity, a place that can be identified with the movement that visitors can come to, and where adherents can meet.

5.2. Local government

Chandler (2001, pp.1-34) defines local government as "the authorities and dependent agencies that are established by Parliament to provide a range of specified services and represent the general interests of a specific area under the direction of a locally elected council. [...] They are charged with **powers to promote the 'well-being' of their area in respect to economic, social and environmental concerns**.

The modern local authority is therefore seen to have a wider role than providing a range of services largely concerned with social welfare, but is to be the lead agency in the overall economic and social development of their area".

Figure 6 - Reaction of the government pictured by a news channel

5.3. Social movements

Sociology teaches that social movements go through the natural stages of **maturation**. This is very well explained in the article "exploring the role of philanthropy in **supporting** movements" (Sammen, 2015) that summarizes this phenomenon as:

> *"Movements are fluid and evolve differently based on political, economic, and social circumstances. After they emerge, movements generally coalesce around an identity and vision, and then sometimes they are formalized through public awareness campaigns and network development. Over time, movements achieve successes and suffer setbacks, might face counter-movements or generate new movements, and produce a variety of outcomes."*

Hence the social movement is an effort - a memory that helps in bringing about a change in the society. It may also resist a change or change completely by either acting as reform movements or as revolutionary movements.

Figure 7 - People's reaction even after the denial from the government

5.4. Social Media

Social media is used for both **communication and information, which** involved movement in a variety of capacities.

> *Technology does not determine society: it is society, and can only be understood in social terms as a social practice. This means that the uses of wireless communication are fundamentally shaped and modified by people and organizations, on the basis of their interest, values, habits, and projects.*
>
> *Castells, (2007, p.246)*

> *…Social media have become coordinating tools for nearly all of the world's political movements, just as most of the world's authoritarian governments (and, alarmingly, an increasing number of democratic ones) are trying to limit access to it. In response, the U.S. State department has committed itself to "Internet freedom" as specific policy aim. Arguing for the right of the people to use Internet freely is an appropriate policy for the United States, both because it aligns with the strategic goal of strengthening civil society worldwide and because it resonates with American beliefs about freedom of expression*
>
> *Clay Shirky, (2011, p.1)*

There is a relationship between traditional and social media which plays an important role in commanding the society for social movements.

Figure 8 – Media's reaction

5.5. Assumptions on the literature

The existing literature about the interrelations between the urban social movements, the governments, media and the public, as well as the tensions and the conflict of interests, which finally cause the actual conflicts, is very rich. They also focus in the processes followed by the social movements, in order for them to be **legitimate and -after all- successful**. Nevertheless, their research aims lead them to examine these cases mainly from the point of the movements. Thus, there is a **lack of information and conclusions** about the role of the local governments, their dependence on the private investors and their vulnerability to political pressure. Other scholars (Hackworth, Sbragia, Chandler, etc.) deepen their research in the role of local governments in recent decades and thus, their inability to flexibly adapt to the local society needs.

But their approaches tend to focus on the structural inflexibilities caused by the national or international regulations imposed rather than examining the relation of forces between social movements and local leaderships and how local leaderships can -or can't- adapt to the political pressure from multiple actors/interests.

Figure 9 – Survivor's mother request in the media, asking for justice

6. Conclusions

Spaces are themselves agents for change. Hence, Changed spaces will change the practice. (Dianna,2006, p.1.1)

Both Nirbhaya rape case and No one killed Jessica stands out as social movements because of their unique identity and long lasting influence. Instead of losing its **acknowledgment and acceptability**, the movements have gained some political aspects. These movements helped

in creating a collective identity, which became stronger by time and influenced more people to join. Urban space acts as a 'void' between the building such s streets, plazas an parks that enables the movement. These plazas are viewed as a frivolity, an unnecessary drain on the resources or the use of the precious urban space. These 'places' are chosen by the people for social movements on the basis of the location as they act as major public destination which is built by **precious commodities** in an urban setting like local economies, civic pride , social connection and human happiness. A place is generally identified to something which does not change; their **'sense of place', 'character' or 'identity'** which is relatively stable.

Figure 10 – Strict restriction on public movement & rebellious reaction both by the public & the government

For a successful social movement location also plays and important role in reaching the voice to the masses. The social movement happens either in a place which is used by people on a daily purpose so that it creates the problem for the public and hence the voice reaches the government. On the contrary, the other approach is to select a place which is **historically or politically important**. India Gate fits into both the categories. It is a quest for an essence of a place which is based majorly on the primordial past, a place which is **abstracted** from its instances in everyday life and consciously attempts in creating place making. Since it's located in the city centre, it's a perfect place for the **manifestation**.

While Kilburn may have a character of its own, it is absolutely not a seamless, coherent identity, a single sense of place which everyone shares ... If it is now recognized that people have multiple identities, then the same point can be made in relation to places. Moreover, such multiple identities can be either, or both, a source of richness or a source of conflict. (Massey 1993: 65)

Delhi

Developed as an aggregative identity in perpetual transformation as

True spaces of becoming

in which the

public and the space is continuously transformed & reinvented

earlier as

picnic spot

and now as a

Space of conflict. Protesting space

but later

?

Hence, **India gate is a place of formation, a place in the state of becoming as it is in the state of continuous change.**

7. References

Acharya, S. (2016) Marginalization in Globalizing Delhi: Issues of Land, Livelihoods and Health. New York City, Springer.

Amoroso, N (2010) The Exposed City: Mapping the Urban Invisibles. United Kingdom, Routledge.

Castells, M. (1983) The City and the Grassroots: A Cross-cultural Theory of Urban Social Movements. Berkeley and Los Angeles CA: University of California Press.

Castells, M. (2004). The Power of Identity, (2nd edn.), Blackwell, Oxford/Malden.

Chandler, J.A. (2001). Local Government Today (3rd edition). Manchester & New York: Manchester University Press.

Christiansen, J. (2009). Four Stages of Social Movements. MA: EBSCO Research Starters.

Eder, K. (1993). New Politics of Class: Social Movements and Cultural Dynamics in Advanced Societies, SAGE, London

Eyerman, R., and Jamison, A. (1991). Social Movements. A Cognitive Approach, Polity, Cambridge.

Falahat, S. (2013) Re-imaging the city -- A new conceptualisation of the urban logic of the Islamic city. New York City, Springer.

Fuchs, C. The self-organization of social Movements(2006) Systemic Practice and Action Research, Vol. 19, No. 1 (pp.1-37).

Gamson, W. A., and Meyer, D. S. (1996). Framing political opportunity. In McAdam, D., McCarthy, J., and Zald, M. N. (eds.), Comparative Perspectives on Social Movements, Cambridge University Press, Cambridge, pp. 275–290.

Global Platform for the Right to the City. What's the right to the city? Inputs for the New Urban Agenda. https://www.escr-net.org/sites/default/files/what_r2c_digital.pdf, (10.01.2017).

Harvey, D. (2008). The Right to the City. New Left Review, 53, September-October. https://newleftreview.org/II/53/david-harvey-the-right-to-the-city, (20.01.2017).

Harvey, D. (2012). Rebel Cities. From the Right to the City to the Urban Revolution. UK/US: Verso.

Lefebvre, H. (1968). Le Droit à la ville [The right to the city] (2nd ed.). Paris, France: Anthropos.

Lefebvre, H. (1991). The production of space (N. Donaldson-Smith, Trans.). Oxford, England: Basil Blackwell.

Lowe, S. (1986). Urban social movements: the city after Castells. United Kingdom: Palgrave Macmillan.

Manekar, P. (1999) Screening Culture, Viewing Politics: An Ethnography of Television, Womanhood. North Carolina, Duke University Press.

Melucci, A. (1985). The symbolic challenge of contemporary movements. Soc. Res. 52(4), 789–815

Sammel, J. (2015). The evolution of social movements. Corolado Coalition 03.08.2015.

http://www.ccmu.org/blog/the-evolution-of-social-movements/

Sassen, S. (2015). Who owns our cities and why this urban takeover should concern us all. The Guardian 24.11.2015. https://www.theguardian.com/cities/2015/nov/24/who-owns-our-cities-and-why-this-urban-takeover-should-concern-us-all, (24.01.2017).

Yadav, C (1987) Perceptual and Cognitive Image of the City. New Delhi, India: Concept Publishing Co.

Pautz, Michelle C. (2015) "Films can have a major influence on how people view government", LSE retrived from https://blogs.lse.ac.uk/usappblog/2015/03/12/films-can-have-a-major-influence-on-how-people-view-government/

Clark, Eric (2012) "Social Movement & Social Media- A qualitative study of Occupy Wall Street", Södertörn University retrived from http://www.diva-portal.org/smash/get/diva2:539573/FULLTEXT01.p

Case Study / Project

How Can Cities Succeed and Boom in the Long Run?

Case in Qatar

Jassim AL-SOROUR, Noor ALAMRI

Abstract

As technology is advancing, the places we live in need to be adapted as well. In the modern times, we are bombarded with many gadgets and gizmos that are making life easier and enabling us to do more in less time. How can cities succeed and boom in the long run? They must be able to plan for a smart future using the technological advancements that are occurring in modern times. Some of these technological advancements are presented in the Qatar National Vision 2030. Under the Qatar National Vision 2030, Qatar has promised to deliver Environmental Development and technological advancement. In the QNV 2030's vision and mission statement, it is stated that The Qatar National Vision 2030 aims to direct Qatar towards a balance between developmental needs and the protection of its natural environment, whether land, sea or air. What this means is that building a smart city will require Qatar to invest in advanced smart technologies that can contribute to its modernizing economy. This will help and enable Qatar to progress rapidly and achieve technologically advanced urban development. Temperature monitoring systems are one of the technologically advanced things that Qatar has invested in. To protect and act against high temperatures and changing weather, Doha has had to install many smart temperature sensors across the country in different malls and buildings that set the temperature of the building based on different variables such as outside temperature, people in the area, humidity and various other factors. Doha has been ranked number one in terms of smart building capabilities across all categories of 'Green', 'Safe' and 'Productive'. Doha has scored 70 out of 100 points which analyzed 620 buildings across the middle east, with the average score being only 48 points out of 100. With Doha's sight set on the future with the FIFA Football World Cup happening in 2022, it has planned major infrastructure changes including building major SMART transportation systems to handle the rush that comes with hosting a FIFA world championship.

Qatar has been able to construct many smart cities including Lusail City which has temperature management systems, automatic lightening sensors and smart metros. Qatar is focusing on a smart future. This includes having smart carriages, trains and buses that have temperature sensors installed in them that adjust according to the number of people in the bus, the temperature outside etc. As Doha moves to host the biggest sporting event in the world, it is planning for resilience. Doha has been able to build smart stadiums that would host the 2022 World Cup in higher temperatures. Doha's economy is moving towards compete automatic temperature management systems. Doha has buildings which are LEED (Leadership in Energy and Environmental Design) certified. This includes more than 5 buildings just in Qatar Foundation. LEED is the most widely used green building rating system in the world. This means that Doha is not only smart but also green which makes it very unique and special. To conclude, Doha has many buildings that have LEED certification. Doha is preparing for the World Cup and has many smart mechanisms that will help in managing the temperature of the buildings and stadiums smartly. This paper highlights the steps that Qatar has taken to work towards building a smart future. A smart future is important for Qatar because it is taking steps actively to move from an oil-based economy to a knowledge-based economy. Projects like Education City affirm Qatar's commitment to move towards a smarter future.

Case Study / Project

Startdust Smart City

Project in Trento

Daniele VETTORATO, Adriano BISELLO

Abstract

STARDUST is an EU Horizon 2020 Smart Cities project, which brings together advanced European cities (Trento, Pamplona and Tampere), thus forming into a constellation of 'innovation islands' - exemplary models of smart, highly efficient, intelligent and citizen-oriented cities. Technical green solutions and innovative non-technical solutions are implemented and validated thru an holistic approach, The project offers a holistic approach in transforming the carbon-based cities to smart, highly efficient, intelligent and citizen-oriented cities, or 'Innovation Islands' . These approaches come in the form of both technical and non-technical solutions designed to be bankable and replicable for other cities. On one hand, technical solutions are provided in the following sectors: energy, mobility and ICT. On the other hand, non-technical solutions are addressed directly to the different key players - policy makers, industry, academia, and the citizens - in the form of innovative business models and citizen engagement activities, which ensure the bankability of these solutions. Both types of actions complement each other, providing the holistic mind set needed to define the new Urban Metabolism envisioned by STARDUST.

Energy: The high energy consumption observed among urbanised cities is reduced by introducing smarter technology, methods and materials into their districts and buildings. Retrofitting and innovative heating and cooling systems are introduced to already existing buildings and districts to increase their energy efficiency while providing comfort to local residents. By developing efficient energy management protocols, user-designed interfaces of smart grids and storage systems and open sharing of data between users and other stakeholders, energy usage are monitored and managed by the buildings' inhabitants and by the energy provider. Renewable energy sources and smarter energy storage systems and lighting materials will be introduced to ensure and provide sufficient energy for the cities to make use of. Mobility: Vehicular traffic is currently responsible for about a tenth of the carbon dioxide emissions. More and more cars are expected to be out in the streets due to the growing global population and personal wealth. More efficient means of transport and alternative fuels is tested in the project. Electric vehicles and their charging stations are developed and installed in the involved cities to reduce the carbon emissions predominant in cities. E-car sharing and e-last mile logistic systems are tested in the project. ICT: Information and Communication

Technology (ICT) unlocks the potential of different cities by allowing them to connect and integrate with their operational processes. Its transformative nature amplifies the impacts of other innovations piloted in the city by enabling their scalability, preventing technology and vendor lock-in situations and facilitating collaboration and innovation between stakeholders. The latest generation of the ICT smart city platform, the open access strategy, data centres and infrastructures, and user-driven and demand-oriented city infrastructures is introduced to reduce greenhouse emissions and to promote social innovation and co-creation of ideas between stakeholders. Engaging with citizens to improve urban life: Technical solutions can only do so much to improve the cities' well-being. Indeed, a growing need for a more inclusive public administrations by means of incorporating citizens is needed to re-vitalize their city planning. This will pave the way to developing sustainable citizen-oriented Smart Cities using different approaches that promote citizen engagement via communication channels, activities, and ICT tools. The paper discusses the design and the preliminary results of the project applied in particular the the city of Trento - Italy.

Research Paper

THE LATEST GENERATION OF EU SMART CITY PROJECTS: TURNING "CLEAN ENERGY FOR ALL" INTO "CLEAR BENEFITS FOR ALL"

Adriano BISELLO, Eurac Research – Institute for Renewable Energy; Italy
Daniele VETTORATO, Eurac Research – Institute for Renewable Energy; Italy

Abstract

The European Union is in the process of updating its energy policy and legislative framework under the motto "Clean Energy for All Europeans". This will facilitate the low carbon energy transition, make it fit for the 21st century, and delivering the EU's Paris Agreement commitments.
Besides expected climate-energy benefits, the EU narrative is introducing new elements to persuade citizens and stakeholders to change their perspective, shifting the general perception from mitigation costs to development opportunities. For example, impact assessment of the new directives estimated that they would generate 900,000 jobs and an increase of up to 1% in EU GDP over the next decade. However, this is just one among several multiple benefits that could be gained thanks to the smart energy transition of cities and neighborhoods (e.g. increased value of refurbished properties, improved health and well-being, enhanced social cohesion, etc.)
Starting from this premise, the ongoing research will analyses 12 ongoing EU smart cities and communities projects started between 2014 and 2017, in order to investigate their capability in using the multiple benefits as an effective communication tool, or even including them among the key performance indicators to be used in the assessment phase.
In that respect, the Positive energy district concept that permeates the smart city approach of latest calls for funding provides, even more, an interesting nexus and testbed opportunity for EU ambitions. However, ongoing and future projects need to be understood not only as marketing devices for new energy efficient technologies but powerful tools requiring a radical change in management and planning of cities and urban life. In this way, positive energy districts including good habits and behaviors of urban citizens will provide equitable solutions and clear benefits for all.

Keywords

Smart city, positive energy district, energy community, multiple benefits, energy transition

1. Introduction

Nowadays, half of the global population lives in urban areas and by 2050 up to 70% of the world's population will be living there.

It is therefore clear why the UN Agenda 2030 for Sustainable Development and the COP21 Paris Agreement recognize the pivotal role of cities as drivers of change and calls on them to rapidly reduce greenhouse gas emissions and adapting to climate change.

The European Union (EU) is also committed to achieving the targets posed by the two above-mentioned documents and making cities inclusive, safe, resilient and sustainable according to the Sustainable Development Goal 11.

Many ambitious EU cities already decided to set strict climate-energy goals and to test the implementation of highly integrated and highly efficient energy systems based on the exploitation of local renewable energy sources (RES). The so-called smart urban energy transition, as a consequence of the transposition into the practice of EU legislative package "Clean Energy for All Europeans" (European Commission, 2016) is also expected to deliver a wide range of non-energy benefits in the social, economic, and environmental areas.

As stated by Ürge-Vorsatz *et al.* (2016) *"in the energy and climate change research and policy fields, the concept of ''multiple benefits" (also termed ''co-benefits", ''multiple impacts", ''non-energy benefits", etc.) has evolved as a field of analysis showing that the impacts of low- carbon energy transformations go hand-in-hand with many other societal and economic objectives".*

In this sense, any innovation addressing energy consumption in the building sector – the largest single energy consumer in Europe – or changes in the energy market for better integration of RES in urban areas or enabling energy sharing by prosumers is expected to deliver substantial multiple benefits (Zambotti, Pezzutto and Bisello, 2019).

In particular, EU planners and designers are called to stimulate and enable the roll-out of visionary and holistic smart city projects aiming at increase energy performance of urban districts - including deep renovation of buildings in terms of technologies, processes and business models – while ensuring an increase in the overall quality of life of citizens and a better living environment.

This paper offers a first overview on a research path for the investigation of EU smart city projects under the multiple-benefits perspective, in order to foster the adoption of this assessment paradigm in the evaluation of their results and inclusion among key performance indicators (KPIs)

2. European smart city projects

2.1. Evolution of the approach and goals

Smart city is undoubtedly a sexy buzzword, used and abused in a wide range of contexts, from urban planning policies to advertisements of ICT companies.

Similarly, urban projects labeled as "smart city projects" widely differ. Within this blurry is it possible to identify some projects having recurrent characteristics and pursuing a coherent aim. Since 1984, multi-year funding programs have been developed by the European Union

(EU) to support and foster research and technological development in the European Research Area. In the last decade, the European Union encouraged cross-sectorial urban-energy renewal through specific funding calls, within the sixth and seventh European Research Framework Programme, also known as FP6 and FP7 and later thanks to Horizon 2020.

Such projects, implementing measures on new as well on existing urban districts, overcome the previous single-building approach. Benefits occurring in demonstration sites, in terms of improved energy performances, energy saved, or produced by RES and the tons of CO2 avoided, are widely known (Pol and Lippert, 2010). Moreover, they are used as the main examples to communicate the value of the project to the involved stakeholders, as well as to the general public. Aiming to demonstrate the feasibility of innovative solutions as well as cutting-edge approaches, such projects should involve research centers, universities, and partners from business and industry, and civil society organizations, in order to put into practice the quadruple helix innovation model. Moreover, for projects eligibility in this field, it is mandatory is the establishment of a temporary consortium of partners from various member and associate countries, and the identification of a pool of "demo cities" and some "follower" cities. In fact, having to be implemented into real-world urban settlements, the inclusion of local authorities is required. In some cases, the previous involvement of the city government into the Covenant of Majors is also a preliminary condition.

The pioneering initiative was the so-called "Concerto", between 2003 and 2008, funded by FP6 and FP7, with 28 accomplished sustainable energy districts projects, involving 58 cities and communities. The Concerto initiative has paved the way to the subsequent, and still ongoing, European Innovation Partnership - Smart Cities and Communities initiative (EIP – SCC), which addresses the challenge of pursuing the smart energy transition of cities.

The novelty of the SCC approach lies in a more extensive integration of innovative energy-efficient solutions with information and communication technologies which in fact shift the focus from the sustainable development approach to the smart-city concept. Additionally, more emphasis is placed on scalability and the replication potential of interventions. Under this calls, 12 projects have been financed, involving 36 Lighthouse cities and 42 Follower cities between the year 2014 and 2017. This set of projects is under consideration in this research.

The last evolutionary step of the EU smart city projects is represented by the recently funded projects answering the call SCC in the year 2018 and 2019. These projects will shift the focus from high-performance buildings and energy systems or net zero energy neighborhoods towards the positive energy district (PED) and the smart urban energy transition. A positive energy districts consist of several buildings (new, retrofitted or a combination of both) that actively manage their energy consumption and the energy flow between them and the wider energy system., having an annual positive energy balance. The positive balance is achieved thanks to the exploitation of local renewable energy sources RES, local storage, smart energy grids, demand-response systems, integrated energy management (electricity, heating, and cooling), co-design and user interaction (European Commission, 2018b).

The concept of positive energy district is something quite new, coming from the European Strategic Energy Technology Plan (SET-Plan) (European Commission, 2018a) which aims to accelerate the development and deployment of low-carbon technologies. The SET-Plan seeks to improve new technologies and bring down costs by coordinating national research efforts

and helping to finance projects. The SET-Plan action 3.2 - Smart cities and communities - focusses on PED, aiming to deliver at least 100 of them by 2050 (this target year has been recently revised to 2025), considering the interaction and integration between the buildings, the users and the larger urban and regional energy system.

Unfortunately having been started in 2018-2019, PED projects are in a too early stage to provide enough information or official results. In this sense, the paper considers SCC projects started between 2014 and 2018 the latest suitable set for investigation.

2.2. The subset of investigated SCC projects

Previous research on co-benefits and co-opportunities expected or claimed by EU smart and sustainable city projects has been done by (Bisello *et al.*, 2017) and some of the main findings have been recalled in (Bisello and Vettorato, 2018). At that time, older Concerto and SCC projects have been considered. Figure 1 summarizes the most recurrent benefits; those mentioned by at least half of the projects have solid fill.

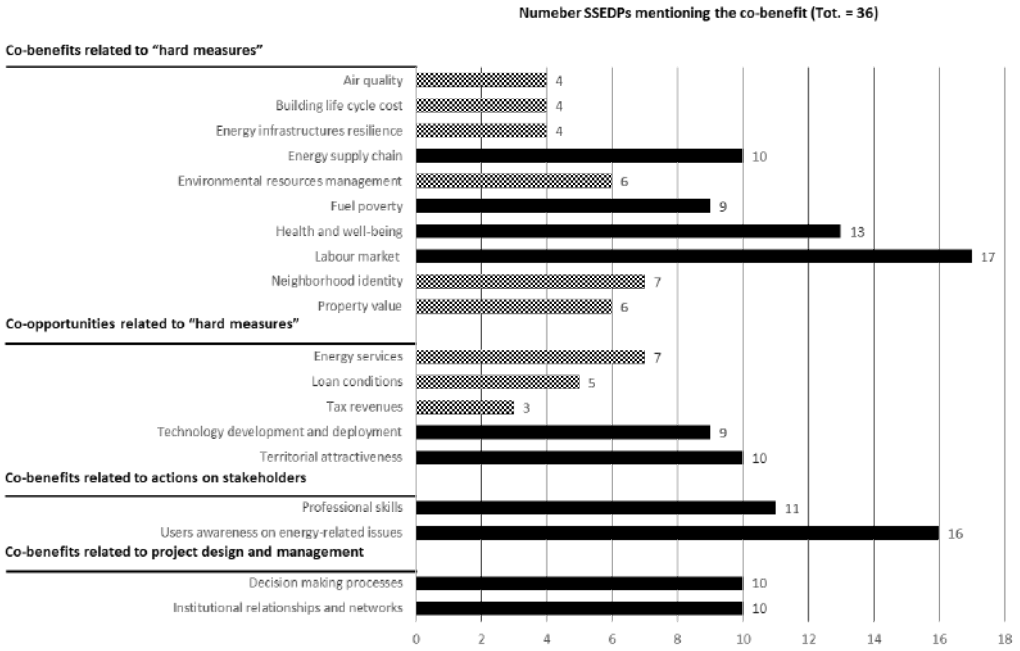


Figure 1: Co-benefits and co-opportunities identified in EU projects dealing with smart and sustainable districts. Source: (Bisello, 2017)

This new investigation focuses, as said before, on 12 SCC projects which have been financed between the year 2014 and 2017, involving 36 Lighthouse cities and 42 Follower cities , as shown in fig. 2.

The most exploited countries are Spain (6 Lighthouse cities out of 10 involved cities), United Kingdom (5 Lighthouse cities out of 7 involved cities), Germany (4 Lighthouse cities out of 6 involved cities), Italy (3 Lighthouse cities out of 6 involved cities), and France (3 Lighthouse cities out of 4 involved cities). This set of projects will have a total cost of 309M€, covered at 85% by the European commissions' contribution (260M€). Each one on average will benefit from 22M€, will last 4-5 years, and some of these projects will unlock up to 20 times more in investment (European Commission, 2018a).

Figure 2: EU Lighthouse and Follower cities (SCC calls 2014-2017). Source: Bartholmes (2017)

3. Multiple benefits investigation approach

3.1. On-line investigation

This section explains the general methodology applied to co-benefits / multiple benefits investigation and details the steps proceed from raw information collection to a reasoned discussion. The following table 1 lists the investigated projects by funding call, providing the acronym, main financial figures and the link to the official website.

Table 1: SCC projects under the calls 2014-2017. Source: SCIS

	Project name	Year of the Call	Project Total Cost (€)	Project EC Contribution (€)	Website
1.	GrowSmarter	2014	34,635,913	24,820,974	www.grow-smarter.eu/
2.	REMOURBAN	2014	23,791,530	21,541,949	www.remourban.eu
3.	Triangulum	2014	29,501,431	25,420,602	https://www.triangulum-project.eu/
4.	REPLICATE	2015	29,250,564	24,965,263	https://replicate-project.eu/
5.	SHAR-LLM	2015	28,068,094	24,753,945	www.sharingcities.eu
6.	SmartEnCity	2015	32,201,606	27,890,139	https://smartencity.eu
7.	SMARTER TOGETHER	2015	29,119,448	24,742,979	https://www.smarter-together.eu
8.	MYSMARTLIFE	2016	21,724,075	18,656,102	https://www.mysmartlife.eu
9.	RUGGEDISED	2016	19,562,868	17,692,858	www.ruggedised.eu
10.	IRIS	2017	20,704,013	17,996,569	https://irissmartcities.eu/
11.	MAtchUP	2017	19,472,388	17,418,339	http://www.matchup-project.eu/
12.	STARDUST	2017	21,093,539	17,939,999	http://stardustproject.eu/

The research method used is rooted in empirical case analysis and literature research. An on-line investigation will be undertaken, based on open-access sources representing the official point of view of project consortia (i.e. official websites of the projects) complemented by the official online repository developed by the EIP-SCC, the so-called Smart City Information

Systems (SCIS, 2018). We expect to find explicit references to multiple benefits, different from pure energy benefits, as they are already mentioned in some project abstracts (see SCIS):

- *GrowSmarter aims to improve the quality of life* […] *while improving the citizens economy by lower energy costs and creating as much as 1500 new jobs (on the demonstration level).*
- *REPLICATE considers also the complexity of cities, the tangible benefits for citizens;*
- *SmartEnCity's* [will] *enable further benefits and secure involvement of citizens;*
- *SMARTER TOGETHER's* […] *Expected results are:* […] *1400 created jobs, 130 M€ investments;*
- *The RUGGEDISED project* […]. *The overall aims are: 1. Improving the quality of life of the citizens, by offering the citizens a clean, safe, attractive, inclusive and affordable living environment.* […] *3. Creating a stimulating environment for sustainable economic development, by generating more sustainable jobs, stimulating community involvement in smart solutions and to boost start-up and existing companies to exploit the opportunities of the green digital economy and Internet of Things*
- *The core idea of the STARDUST project is the demonstration of different "innovation islands" as urban incubators of technological, social, regulatory and market solutions*

Exploring the project's website will give access to all the official and public available reports and materials produced, allowing a deeper investigation through a qualitative approach or text data mining

3.2. Text data mining

Text data mining, or text analytics, is the process of deriving high-quality information from text, typically derived through the devising of patterns and trends through means such as statistical pattern learning. Such process will allow passing from the raw data (e.g. the simple recurrence of the word co-benefits / multiple benefits or explicit mentioning of a precise benefit, as job increase, air quality, property value, etc.) to a specific classification of closely-related statements. This kind of research focuses on the qualitative and quantitative analysis of report contents giving a measure and a meaning of texts. For this purpose software like NVIVO11plus® could be used, as already demonstrated in a recent work done by Balest *et al.* (2018) looking at the main dimensions and aspects of territory that can address its change towards energy transition.

4. Conclusions and further steps.

EU smart city projects are of particular interest due to their large geographical coverage and at the same time similar basic principles. Because of the recurrent funding scheme, structure, and size of consortia composition, they synthesize the findings and expectations of a large population of stakeholders, ranging from researchers to local officers and technicians, and from practitioners to decision makers or NGOs. Therefore, they offer an

interesting overview of the society on the multiple benefits expected from the urban energy transition.

Content analysis of the selected publications will uncover recurrent statements in which the co-benefits / multiple benefits expected from each smart city project are cited, furthermore, this new investigation will allow a comparison of results with those reported in Bisello (2017) about the recurrence of co-benefits.

This will build up the knowledge baseline on with analyzing the assessment methodologies, qualitative and quantitative impacts, cascade effects, and interlinkages among co-benefits / multiple benefits of EU smart city projects for the definition of innovative and comparable Key Performance Indicators (KPIs).

The proposed approach is replicable in assessing other smart city projects outside the EU, which promote a sustainable and smart urban energy transition.

5. References

Balest, J. *et al.* (2018) 'Local reflections on low-carbon energy systems: A systematic review of actors, processes, and networks of local societies', *Energy Research and Social Science*. Elsevier, 42(January), pp. 170–181. doi: 10.1016/j.erss.2018.03.006.

Bartholmes, J. (2017) *H2020 workprograme - SCC 2018*. Brussels: Presentation given on 24th October 2017 at EC infoday.

Bisello, A. *et al.* (2017) 'Co-benefits of Smart and Sustainable Energy District Projects: an Overview on Economic Assessment Methodologies', *Green Energy and Technology*. Springer, pp. 127–164. doi: 10.1007/978-3-319-44899-2_9.

Bisello, A. (2017) *Smart and sustainable projects at the energy-district level. How to assess them based on the co-benefits paradigm*. University of Padova: Ph.D thesis.

Bisello, A. and Vettorato, D. (2018) 'Multiple Benefits of Smart Urban Energy Transition', in Droege, P. (ed.) *Urban Energy Transition*. second edi. Elsevier, pp. 467–490. doi: 10.1016/B978-0-08-102074-6.00037-1.

European Commission (2016) *Clean Energy For All Europeans*. Available at: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans (Accessed: 5 July 2018).

European Commission (2018a) *European Strategic Energy Technology Plan*. doi: 10.2777/293881 KI-07-17-197-EN-C.

European Commission (2018b) *Funding & tender opportunities - Call ID: H2020-LC-SC3-2018-2019-2020*. Available at: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/lc-sc3-scc-1-2018-2019-2020 (Accessed: 5 July 2018).

Pol, O. and Lippert, L. (2010) *CONCERTO. Overall energy performance of the 26 communities. Executive summary*. Vienna: Österreichisches Forschungs- und Prüfzentrum Arsenal GesmbH.

SCIS (2018) *Home | Smart Cities Information System*. Available at: http://smartcities-infosystem.eu/ (Accessed: 5 July 2018).

Ürge-Vorsatz, D. *et al.* (2016) 'Measuring multiple impacts of low-carbon energy options in a green economy context', *Applied Energy*, 179, pp. 1409–1426. doi: 10.1016/j.apenergy.2016.07.027.

Zambotti, S., Pezzutto, S. and Bisello, A. (2019) *Multiple-benefits from buildings' refurbishment:*

Evidence from smart city projects in Europe, *Smart Innovation, Systems and Technologies*. doi: 10.1007/978-3-319-92099-3_19.

Research Paper

Presenting the Prospects for Ropeway Implementation as a Public Transport Mode, the Case of Moscow

Andrew BORISOW, National Research University Higher School of Economics – Institute for Transport Economics and Transport Policy Studies, Centre for Transport Modelling, Russia aaborisov@hse.ru | itetps.hse.ru; Russian Federation

Abstract

Modern technological advances in transport engineering and transport construction expand tools available to a transport planner: previously considered purely niche, "exotic" transit modes begin claiming to be full-fledged urban public transport varieties. One of those are aerial ropeways. The paper analyses international experience of this technology as a mass transit component used in urban environments. We suggest factors can influence decision making in favour of aerial cableways as a form of public transport. Within the proposed methodology, we identify pairs of adjacent districts where cableways could be sufficient as an element of an intermodal transit system.

Keywords

Public transport systems, cable-propelled transit, aerial cableways, connectivity

1. Introduction

1.1. Preface

The issue of how modern cities are organized and developed is one of the most pressing nowadays. Indeed, the share of urban population in the world has been already above 54% (55.3%), whereas by 2050 the percentage tend to be around 66%. Currently about 74% of Russian population lives in cities, and by 2050 this figure should exceed 80% (UN, 2018). At the same time, Moscow population in 2018 was estimated in about 12.5 million inhabitants (Rosstat, 2018). The importance of competent transport planning in such a city as Moscow is without any doubt. In fact, the capital of Russia carries the legacy of the USSR era, exposed in its' morphology and road network configuration: the mono-functionality of peripheral areas with a predominance of residential uses, while the proportion of the built-up area of the city allocated for streets and roads on the outskirts does not reach 10% (Blinkin, 2018).

While it is clear that a permanent increase in the share of streets and roads in such circumstances would not be economically justified, Moscow tend to solve the accessibility challenge in various ways: one of them is the development of public transport system, its attractiveness. In terms of utility, the attractiveness of public transport for an individual could be considered as a function of time spent on the journey. Although this is far from the

only variable describing attractiveness, it is however the most suitable for the planner in terms of an unambiguous assessment. Thus, the maximum level of utility would be achieved by minimizing the duration of time travelled. Obviously one's attitude to public transport as an alternative to a personal vehicle is rather impossible to interpret. However, it can be argued that the more choices and the higher the average speed of public transit are provided to the population, the greater is the probability of its attractiveness among citizens.

Fundamentally, planner's decision of a public transport mode on the section from point A to point B is based on various parameters, one of the keys when making such decisions is transport demand - in other words, the number of passengers moving daily from one location to another. Generally, classic urban transport modes (bus, tram, subway, etc.) are used for such objectives, depending on their carrying capacity. However, for urban planners there are much more restrictions like commissioning costs, operating expenses, existing settlement, and others. Hence, in some cases, standard urban transport planning tools cannot efficiently solve immediate problems. Solutions, previously considered narrowly applicable, may prove to be complementary to a modern city development agenda, complementing public transport network and assisting to solve a specific series of urgent issues.

In this paper, Moscow is considered as an example of a dynamically developing city with high intraday passenger traffic and typical post-Soviet cities' issues (see above). In the context of its' specifics, namely the low connectivity level, implementation of aerial cableways as an element of Moscow's public transport system is proposed, foremost, to increase the accessibility of neighbourhoods.

1.2. Goals and Objectives

In recent years, cable transport systems (cable-propelled transit) have been significantly improved in terms of technological applicability for urban transport and can currently fill a niche in the urban transport system, where traditional methods might be relatively less efficient. Moscow suffers from the problem of low connectivity - especially when it comes to peripheral areas of the city. The issue is due to the poor development of the road network, in particular, lack of overpasses through railways and bridge crossings over water barriers, as well as the presence of blocked areas (usually industrial zones) between neighbouring areas. Low connectivity, in turn, generates an extremely high rerun rate, amounting to 1.7 in Moscow versus 1.2-1.4 for cities with a developed street network. It is clear that this circumstance negatively affects the existing public transport, total time spent on journeys and the quality of life in general (Ingrid E. Schneider, 2013).

The object of the research is aerial cableway passenger systems, while the subject is the possibility of expanding the typological spectrum of urban passenger transport due to the implementation of the aerial ropeways as a type of public transport on the example of Moscow.

Basic hypothesis suggests the need to establish direct transport links between isolated areas of the city of Moscow, while the solution could be met by incorporating modern aerial ropeways into urban transport systems. Thus, the purpose is to propose an evaluation methodology corresponding to connectivity estimates of Moscow districts. The results of the analysis show for which areas of the city implementation of aerial cableways as an element of the public transport system is appropriate and valid.

2. Ropeways in urban transportation practice

2.1. Technological features

The paper deals exclusively with aerial cableways. Such decision follows from the specifics of this type of transport, namely: capital and operating expenditures, low terrain requirements for development and construction. While describing the cableways, terminology adopted in the community of urban planners - The Gondola Project – is used. Thus, it is considered hereinafter to be called CPT or Cable-Propelled Transit.

Modern practice of CPT successful use worldwide in urban environments is due to a significant improvement in technical characteristics of these systems. First, manufacturers have significantly improved the CPT speed performance compared with the predecessor used in cities. To date, this type of transport is able to reach speeds above 40 km / h (Doppelmayr / Garaventa_1), while the average speed of standard monocable systems exceeds 20 km / h (Marocchi, 2015). Thus, according to this indicator, CPT can compete with some traditional types of urban public transport (Griškevičienė, et al., 2006), (Madejski, 2005). Secondly, modern CPT types have sufficiently high carrying capacities, comparable to bus routes. At the same time, infrastructure construction and rolling stock purchases, as well as operating costs, are also comparable to corresponding capacity systems.

Indeed, aerial cableways can effectively complement urban mass transit, especially within the existing development. However, it is important to note that when considering the issue of CPT implementation in the city, it is necessary to understand that this system is not an alternative to existing types of urban public transport, but serves as a local addition to existing system in current planning conditions.

Further, we consider the existing types and technical features of aerial ropeways, as well as quantitative estimates of its application - in terms of costs, safety, transport indicators, tariffs and indirect effects.

2.2. CPT types

Features of the traction device, passenger capacity, speed, and resistance to climate conditions – all this features distinguish cableways applicable in urban environments. In total, there are five main types of top-supported cableway systems: (1) MDG, (2) BDG, (3) TDS/3S, (4) Funitel, (5) Aerial tram, (6) Pulsed gondola. Indeed, each of them are well described, although either in most publications, we observed discrepancies in technical data, or absence of their full description was found. This paper illustrates an attempt to unify that data and depict it (Table 1) on the grounds of several cases.

1) MDG or mono-cable detachable gondolas

Cableways with detachable gondolas are the most common type of CPT as part of public transport systems. Gondolas move along a single traction-carrying cable, which is turned around at the end stations and is driven by a traction wheel. At the station, cabin grip disengages suspension cable, and its further movement performs using roller guides.

2) BDG or bi-cable detachable gondolas

Same as MDG, but traction and carriage are divided between two cables.

3) TDS / 3S or tri-cable detachable gondolas

Operating with two steering and one traction cables, this kind of CPT offers significant throughput growth in terms of operating speed, resilience and passenger capacity. The rest repeats two previous types.

4) Funitel

A special characteristic is the design feature of two installed loopback cables, performing as a traction-carrying function simultaneously for opposite directions.

5) Aerial tram

A classic aerial tram consists of two independent stationary guiding cables for each carriage and one looped traction cable. The cab itself has high passenger capacity, much higher than previously described systems - from 50 to 200 people. The key feature is the maximum speed indicators among the CPTs. Aerial trams are able to reach speeds up to 43.2 km / h.

6) Pulsed gondolas

This type's peculiarity is in non-trivial installation solution: several small-sized gondolas are set in close proximity to each other, thus a group cableway can be characterized as a combination of classic MDG and aerial tram. In terms of speed, it is comparable to MDG / TDG, but inferior in carrying capacity to all of the systems above - up to 1000 pphpd (Jacobs, 2016). Hence, it is least disposed for public transport uses.

Features and cities where these systems operate are indicated in Figure 1.

City	*Opening*	*Type*	*Length, meters*	*Cabin capacity*	*Number of cabins*	*Operating speed, km/h*	*Peak headway, seconds*	*pphpd*	*Tariff, US dollars*	*Ticket menu integration*	*1 km cost, mio US dollars*
New York	1976	Aerial Tram	3100	78	2	26	7,5 min.	1 000	2,75	yes	8,6*
Portland	2006		1027	126	2	35,4	5 min.	2 028	4,7		55,5
Medelin (Line K)	2004	MDG	2072	10	93	18	12	3 000	0,75		11,58
Nizhny Novgorod	2012		3661	10	28	18	60	1 000	1,2	no	4,21
London	2012		1100	10	36	21,6	60	2 500	4,67	yes	72,57
Hong Kong	2006	BDG	5700	17	112	27	18	3 500	9,43	no	16,75
Coblenz	2010	TDG/3S	890	35	18	19,8	34	3 700	8,41		13,35

Figure 1. Author's estimates, (Alshalalfah, et al., 2012), (Dale, et al., 2013), (The Gondola Project, 2011)

*** Reconstruction carried out in 2010**

2.3. Comparative evaluation

According to the analysis of reviewed CPT systems, as well as the analysis of the calculated technical and economic indicators, it is possible to compare the CPT with the classical urban mass transport. Figure 2 presents a quantitative comparison estimates for CPT systems and prevalent public transit modes.

As a result, in relation to carrying capacity and capital expenditures, cableways are comparable (conditionally) to bus and tram. When comparing the cost per kilometre, CPT types as well as the number of cabs allowance is essential. Obviously, many factors that might affect the final project costs cannot be fully disclosed here (materials, financial plans were not disclosed). Remarkably, delta between the capital costs is significantly less alters than bus and tram analogues within the capacity range (Carlet, 2017).

Transit mode	*RoW*	*Operating speed, km/h*	*max. speed, km/h*	*Passenger capacity (3,5pax/m2)*	*Passenger capacity (5pax/m2)*	*1 km cost, US dollars**	*pphpd*	*max. pphpd*	*Number of cars*	*max. Number of cars*
Tramline	C	23,1	до 30	197	430	3 - 10	7880	20 000	3	5
BRT	B	26	до 40	100	250	1 - 10	4000	12 000	1	2
LRT	B	38,5	до 70	200	750	5 - 50	8000	36 000	5	7
Subway	A	48	до 80	1200	2632	40 - 130	48000	70 000	4	8
Urban rail	A	53,6	до 90	2043	4700	40 - 150	81720	90 000	6	10
CPT	A	21,6	up to 48**	up to 8-10	up to 230**	5 - 8	1800	4 000	1	1

Figure 2. Author's estimates, (Alshalalfah, et al., 2012), (Jacobs, 2016), (Marocchi, 2015)

*** Includes all capital costs: rolling stock and other infrastructure facilities**

**** Peak operational speed values at the spans, as well as the maximum passenger capacity are calculated for aerial tram, while the maximum passenger capacity for TDS/3S reaches 6000 pphpd**

By type of application, the vast majority of CPTs operating in urban environments are the MDG family, which is associated with considerably lower costs and to relatively high capacities. Most of these systems are installed as an alternative to complex transport infrastructure (tunnels, bridges, etc.) due to the terrain-challenged relief and / or within existing development and environmental management. Aerial trams are established to connect areas with a stable predefined transport demand. All that systems have never been tested at their peak capacities (6 000 pphpd or even more) and considering a CPT as an alternative to metro or LRV is not entirely correct, at least for transport safety reasons. Hence, we do not consider CPTs as trunk lines, presuming on the contrary to be an addition to feeder transport and solving local problems.

In accordance with the above-mentioned features the paper proposes a methodology for assessing the city of Moscow to CPT implementation.

3. The Research

3.1. Context

Moscow is of the greatest interest to consider any transport innovation prospects for many reasons. The total daily passenger traffic by all mass transit types is about 18 million passengers. The cumulative annual budget expenditures is about 250 billion roubles (approximately $4 billion). Both numbers are among the highest compared to other global cities (Moscow DoT, 2017). At the same time, a number of local transport problems generated by low connection density and road network connectivity are still unsolved.

Below, we identify poor connected districts and offer a solution using CPT. Additionally, indeed over the past year two cableways appeared in Moscow, none of them integrated in mass transit system.

3.2. Approach

The paper proposes an approach that identifies areas suffering from poor connectivity and continuous blocked borders. For this it is necessary to set a few exogenous parameters. In accordance with the above-mentioned features the paper proposes a methodology for assessing the city of Moscow to possible CPT implementation. All administrative districts within the Moscow Ring Road are chosen, since the main objective is to improve the existing

transport network intensively. The idea is to identify neighbouring districts with at least one common border, the direct transport links between which are absent and the border itself represents a continuous barrier – area where transport infrastructure construction is obstructed or impossible. These "barrier areas" include natural reserves, urban forests, parks, water bodies, cemeteries, industrial zones, port zones, defence facilities, incinerators, railway transport infrastructure.

Than all these objects are displayed and clipped by districts' boundaries, represented as a buffer zone around linear objects districts and 400 meters in diameter (Figure 3). The parameter is defined as the maximum public transport access level to commercial and residential specified by Moscow Government (Regional Ordinances, 2015). The results show continuously blocked boundaries, apart from areas within the T1-T4 urbanization zones in accordance with current classification (means, predominantly unsettled areas). Continuity is measured as orthogonal display of selected areas in the form of a continuous curve.

The next step is to overlay the road network metro and tram lines (Figure 4). Now we introduce a pairwise connectivity assumption: two randomly selected neighbouring areas with at least one blocked border considered to be unsatisfactory connected under the following conditions:

- the topological distance along the road network between these areas is zero;

- there is no metro line, the stations of which are in the body of each considered district in pair;

- there is no tram service between the districts.

The concept of area body is introduced exogenously and defined as a part of an administrative district, except for territories within 100-meters buffer zones around district borders. The buffer is taken in accordance to Regional Ordinances, meant the interchange length between public RoW C and RoW B transit stops (bus, tram) and RoW A (subway, urban rail). A set of satisfying districts are shown in Figure 5.

3.3. Final assessment

Implying intensive development, we are based on (1) filling existing gaps and (2) connecting blocked areas with public transport network. The decision makes it possible to expand the transit choice for selected districts having trunk links with Moscow urban core, but without local inter-district correspondence capabilities. This leads to over mileage and travel time loses.

We impose a condition: each district pairs must have at least one metro station within its' body, not belonging to the same line.

Thus, we form a set of neighbouring areas with a common continuous barrier passing along the adjacent border and the absence of straight-line inter-district transport links. These pairs could relate to CPT use, which in turn could be integrated into public transport network. Since our main purpose is not to trace exact routes, we define the potential length of these systems as the minimum air distance between metro stations of each chosen pair. At the same time, we introduce the "Realistic condition" – a distance limit should be no more than 4 000 meters (from Figure 1, "length"). The new sample is presented in Figure 6.

Figure 3. Author's approach

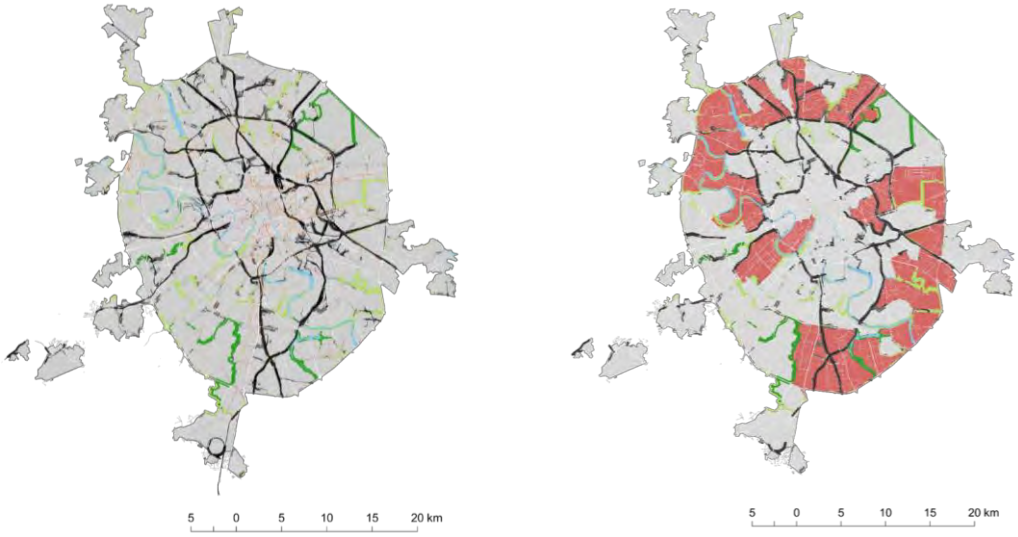


Figure 4, 5. Initial set selection. Author's model

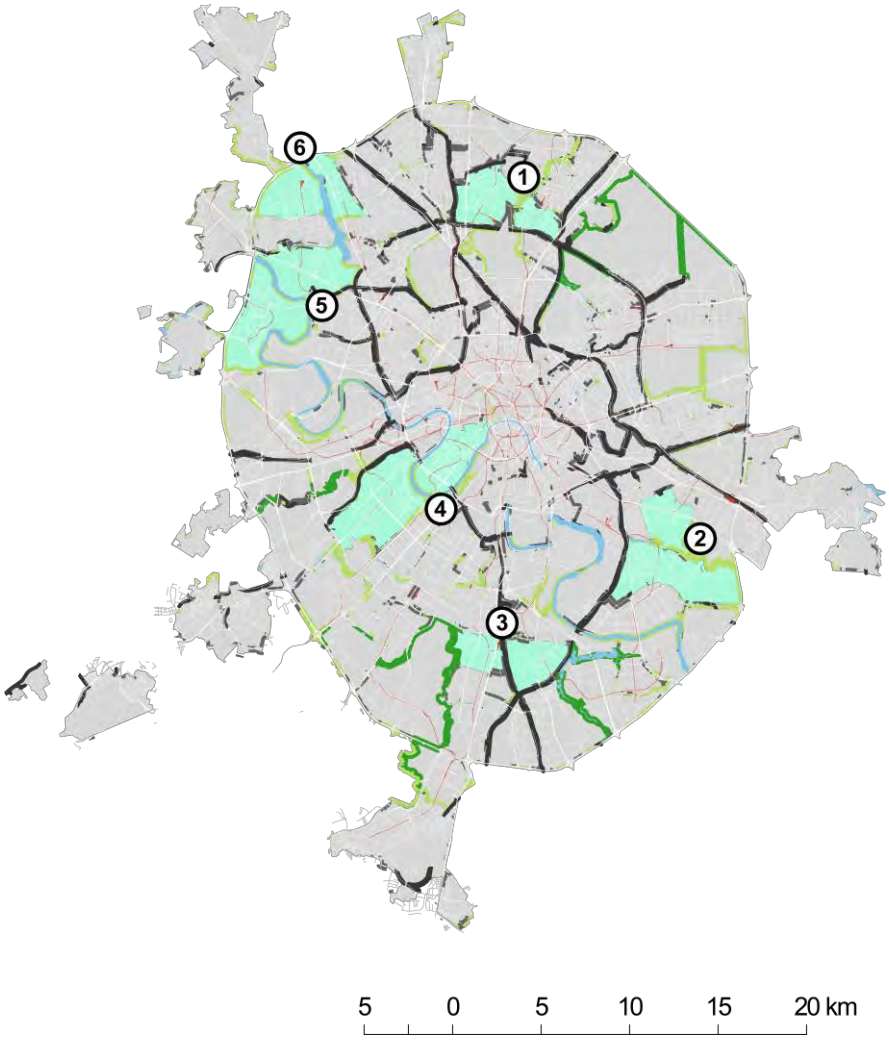


Figure 6. Final sample. Author's model

The selected six pairs are also presented in Figures 7, 8 and a comparative analysis results with satisfactorily connected pairs of areas in terms of overmileage. In addition, ODs for the six pairs were analysed. It was considered cumulative, from the nearest terminal station, using Moscow Metro O-D Matrix (granted on request).

As it is shown, the least transport demand is imposed on the last pair (Figure 9). It is an unexpected result, since these districts are considered for the cable car construction (Interfax, 2018); moreover, the source predict passenger traffic of about 19 thousand passengers per day.

For that reason, a link analysis using traffic macro model was additionally carried out. But this also did not produce results like indicated figures. Appendix illustrate the total demand for inter-district correspondences (about 200 cars per hour).

Probably the calculation should be carried out using the multimodal (rather than traffic) simulation. However, such calculations are beyond the scope of this study.

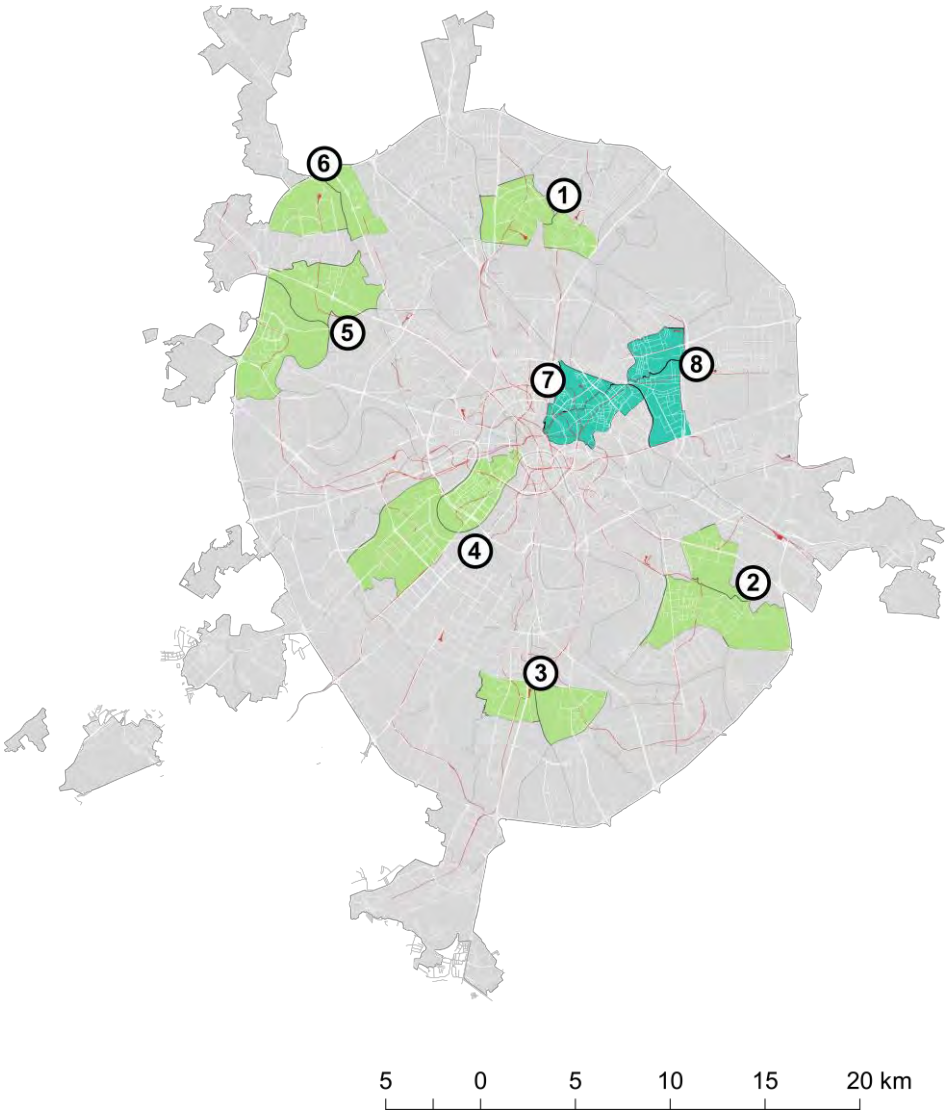


Figure 7. Six considered + two compared (7 and 8) districts. Author's calculations

		Pairs	*Aerial distance between metro stations, km*	*Time travelled by public transport, min*	*Time travelled by individual vechicle*
Unsatisfactory connected	1	Otradnoe - Sviblovo	3,1	29	12
	2	Kuzminki - Lyublino	3,32	32	16
	3	Tsaritsyno - Chertanovo Severnoe	3,32	28	17
	4	Ramenki - Khamovniki	3,51	33	22
	5	Strogino - Pokrovskoe-Streshnevo	3,3	33	20
	6	Severnoe Tushino - Levoberezhniy	2,59	47	20
		average	3,19	**34**	**18**
Well-connected	7	Preobbrazhenskaya ploshad - Semenovskaya	1,49	14	6
	8	Basmanny - Krasnoselsky	1,13	10	9
		average	1,31	**12**	**8**

Figure 8. Comparative analysis. Author's calculations

Districts (Direct route)	*Metro stations*	*pphpd, cumulative*	*Districts (Reverse route)*	*pphpd, cumulative*
Otradnoe - Sviblovo	Otradnoe - Sviblovo	14	Sviblovo - Otradnoe	37
Kuzminki - Lyublino	Kuzminki - Lyublino	93	Lyublino - Kuzminki	123
Tsaritsyno - Chertanovo Severnoe	Kantemirovskaya - Yuzhnaya	205	Chertanovo Severnoe - Tsaritsyno	174
Ramenki - Khamovniki	Lomonosovskiy prospekt - Sportivnaya	N/A	Khamovniki - Ramenki	N/A
Strogino - Pokrovskoe-Streshnevo	Strogino - Tushinskaya	65	Pokrovskoe-Streshnevo - Strogino	66
Severnoe Tushino - Levoberezhniy	Planernaya - Rechnoy Vokzal	18	Severnoe Tushino - Levoberezhniy	19

Figure 9. Passengers travelled (morning peak). Author's estimates, Moscow Metro OD-matrix

4. Discussion

The main feature of CPTs is a possibility of supplementing feeder systems, so public transport system multimodality could be enhanced.

We identified the basic principles that should be followed when deciding CPT use in the city. Proposed approach for Moscow evaluates the basis on which the straight-line connections creation between neighbouring but isolated districts is set. We determine such areas of the city. As a result, four pairs of districts are proposed (Figure 9).

According to the author's opinion, an important implementation component is the presence of positive visual qualities of the potential route. Proceeding from this subjective hypothesis, we found it possible to reduce the number of pairs to four, while excluding the Otradnoe-Sviblovo and Tsaritsyno-Chertanovo Severnoe. Thus, the decision could not only solve local transport problems, but also contribute to new attraction.

However, we are not claiming the unambiguity of our conclusions. On the contrary, one or another decision on transport infrastructure development may be based not so much on objective factors, such as passengers travelled or relative costs, depending more on political preferences. We tried to offer a very obvious and transparent connectivity assessment,

bearing in mind CPT technical features and hence provided an opportunity to view the map of the city with a sober and unbiased look.

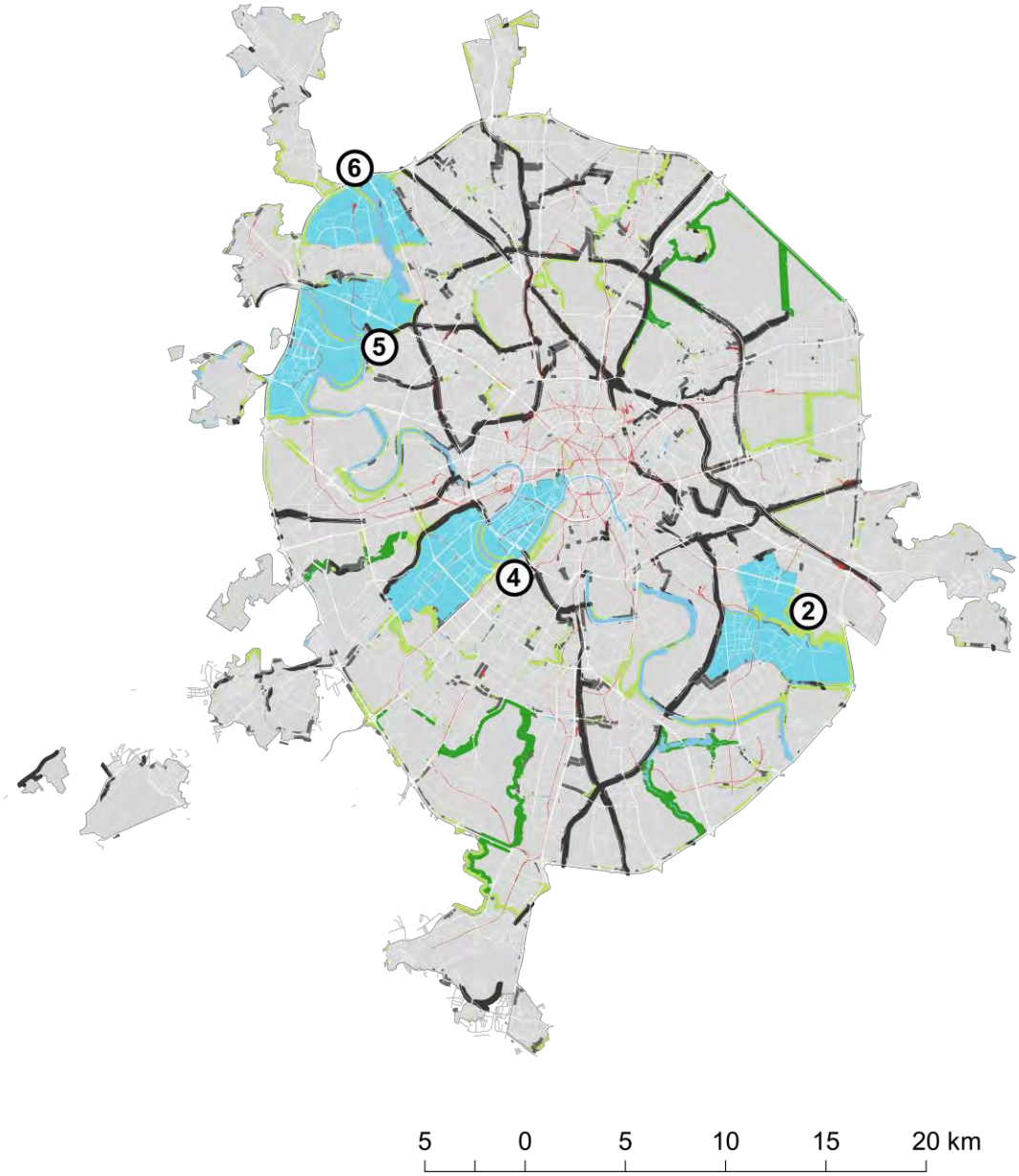


Figure 8. Final set. Author's calculations

We assume that the final sample we carried out is not sufficient, and there may be much more tracing variations connecting other areas. But we have responded the issue we posed at the beginning. Indeed, arguing in terms of throughput and spatial connectivity, we have shown the areas with the greatest potential for CPT. These pairs of districts are preferred to be connected better but on the other hand not by implementing above-ground solutions while underground facilities burden the city budget and as a result taxpayers.

5. References

Alshalalfah B. et al. (2012) // Aerial Ropeway Transportation Systems in the Urban Environment: State of the Art [Journal] - © American Society of Civil Engineers: Journal of Transportation Engineering, Issue Number 3. Volume: 138

Blinkin Michael (2018) // E.G. Yasin Research Seminar “Urban mobility and spatial structure of the city: background, reality, forecasts”. - Institute for Transport Economics and Transport Policy Studies, HSE

Carlet F. (2016) // "An Overview of Aerial Ropeway Transit and Its Potential in Urban Environments," in SBE16 Towards Post-Carbon Cities, 18-19 February 2016, TORINO, pp. 228-295

Dale S. et al. (2013) // The Essential Guide to Cable Cars, Urban Gondolas & Cable Propelled Transit [Book]. - CUP, The Gondola Project Guide

Doppelmayr/Garaventa_1 (2018) // Reversible Aerial Tramway Brochure - https://www.doppelmayr.com/en/products/reversible-aerial-tramway/brochure/browsethe-brochure-67/

Ingrid E. Schneider (2013) // Quality of Life: Assessment for Transportation Performance Measures [report] - Minnesota Department of Transportation

Griškevičienė Daiva and Griškevičius Algirdas (2006) // The 6th International Conference “Reliability and Statistics In Transportation And Communication - 2006” [conference] // Sustainability of Vilnius Public Transport System by the Integration of All Modes of Passenger Conveyance. - 2006. - T. Session 3

Government of Moscow (2015) // "On approval of regional standards for urban planning in Moscow» October 1, 2015 N 945-PP

Jacobs MPO Final Report (2016) // Aerial Cable Transit Feasibility Study. - Miami

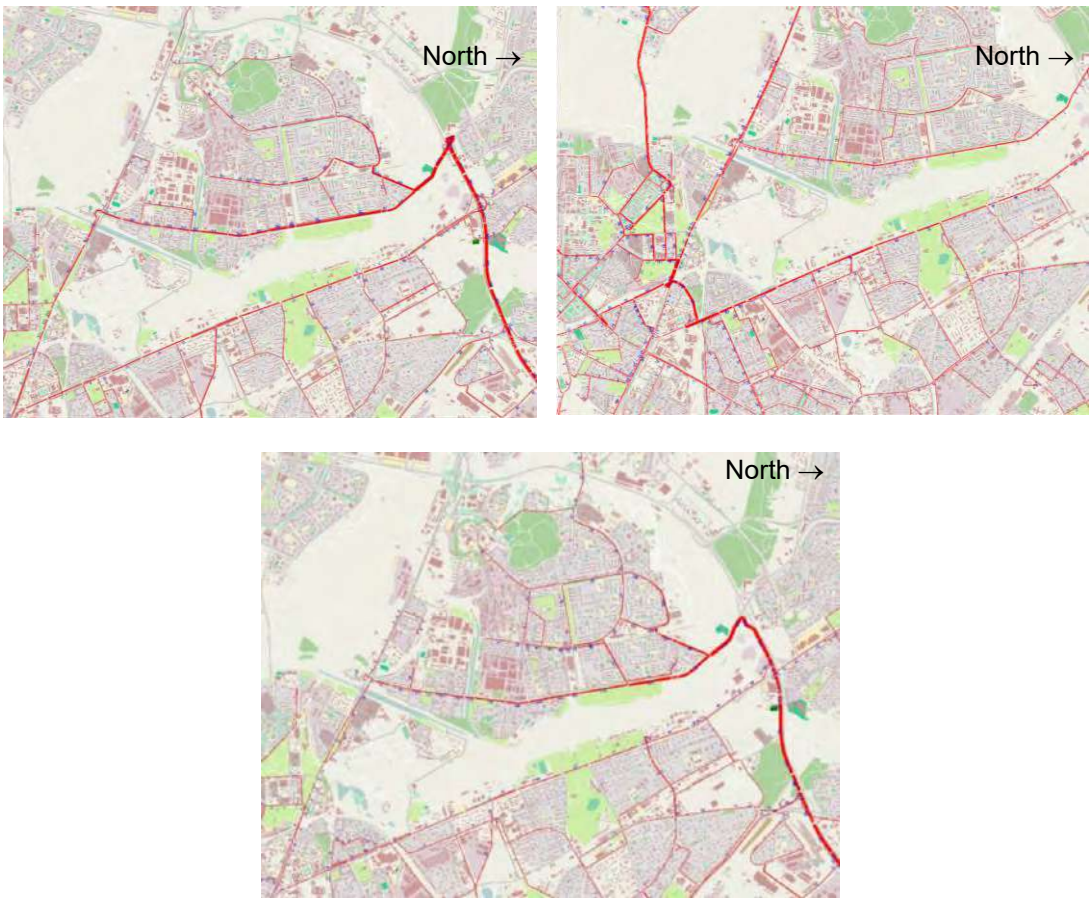
Madejski J. (2005) // Light rail, tram track and turnout geometry [article] // WIT Transactions on The Built Environment. - © WIT Press, Vol 77.

Marocchi Andrea (2015) // Cableways for Urban Transportation: History, State of the Art and Future Developments [report] - O.I.T.A.F.

Rosstat (2018) // Resident population on 1st of January 2018 and the average for 2017 [Online]. - Rosstat, 2018 - http://www.gks.ru/free_doc/new_site/population/demo/Popul2018.xls

UN Revision of World Urbanization Prospects (2018) // United Nations. - The Population Division of the Department of Economic and Social Affairs, - https://data.worldbank.org/indicator/sp.urb.totl.in.zs

6. Appendix



Link-analysis for Severnoe Tushino - Levoberezhniy

Case Study Paper

Re-Thinking the city:

Basaksehir Living Lab (Case of Istanbul)

Ozge CELIK, Istanbul Technical University; Turkey
Ozhan ERTEKIN, Istanbul Technical University; Turkey

Abstract

Smart Cities depend on strategies and solutions enabled by ICTs involving directly citizens, local governments and communities. Aim of the paper is to understand the challenges and potentials of new technologies and its applications in an urban setting while surveying urban innovation units and living labs. The paper uses the concept of smart cities as a mean and manner of urban future. Moreover, it examines the change in the concept and to find out cooperation between local governments and living labs in two different extents. One is to determine the effect of new technologies on city planning and its users and other is to find out social movements that might bring them together. In addition, this paper analyses a set of five key principles that define the concept of living labs. Using these five principles, organizers and volunteers in Basaksehir Living Lab in Istanbul (Turkey) were interviewed and most relevant projects and implementations were evaluated to indicate how well planning practice advances smart planning and projects that contribute to the local development.

Keywords
living labs; local development; participation; smart cities; technological innovation; Turkey.

1. Introduction

> "Cities are complex systems whose infrastructural, economic and social components are strongly interrelated and therefore difficult to understand in isolation."
>
> (Jacobs, 1961).

Before discussing technological effects on cities, one question should be answered: what does the 'city' mean? As yet, there is no global agreement on what a city is. It has been defined in different ways throughout history from country to country as the fact that the city is in a constant change by its nature and gains different meanings according to the socio-economic conditions. In this sense, it is not possible to find a single city definition and criteria to express this definition in the literature for all countries. In many countries, a city is termed by quantitative measures as Turkey. A city is not only a physical imprint on a map but organic entity with its own identity. Moreover, it responds to its inhabitants' demands and needs. As the global population continues to grow, cities are progressively being challenged by incessant and emerging phenomena. So that a city should be driven by responding to its inhabitants' changing needs and ambitions as well as values estimated in the global agendas (UN-HABITAT, 2016). UN-HABITAT describes cities as hubs of economic growth, innovation, culture and creativity. In addition, cities have the potential to provide an environment that embraces innovation. Many of the challenges our societies face

today are increasing in urban areas; this is one of the reasons why innovation is becoming more of an issue in cities.

In recent years, smart cities become global trend concerning various disciplines, from economics to urban designer and from technological development to globalization (Caragliu et al., 2015). The concept is not only related to technological applications in cities but also regulates many sectors. Smartness concept also includes a variation that involves digital or intelligent concepts or is discussed together. Smart city terminology focus on the significance of new ICT regarding modern infrastructures in cities in the 90s. The focus of the term smart city, which was first used in the 90s, was on the importance of modern infrastructures and ICT in cities (Albino et al., 2015). The idea of being a smart city has been criticized by arguing that technically oriented and smart city approach, which emphasizes the role of social capital in urban development, should be strong governance oriented. It is considered as an approach (Caragliu et al., 2015). The discourse on smart city promises an innovative era of urban planning through ICT implementation, based on urban technologies that will make cities cleaner, more beautiful, safer and more efficient (Hajer and Dassen, 2014). Therefore, the concept of smart city is not a static term and the concept has been developing since its first use. Although technology is the key to being a smart city due to the use of ICT to transform life and work within the city, a well-functioning infrastructure is required to be a smart city, but this is not enough (Nam and Pardo, 2011). IT infrastructure and practices are a prerequisite, but the tool as ICT and its practices exists to facilitate the participation of all actors in the development of smart cities (Lindskog, 2004). There is no smart city unless there is genuine participation and willingness to cooperate and cooperate between the private sector, citizens and public institutions (Lindskog, 2004).

According to Hajer and Dassen (2014), planning will become a continuous experiment and cities will serve as living laboratories. As a result, the main objective of the paper is to evolve a clear understanding of Living Lab concept in Turkey. So that, Basaksehir Living Lab will be examined to understand its concept, mechanism, decision making process and implementations, also, to determine the success of Living Lab initiative. The paper responds to the following research question: What are the appropriate technologies to serve urban planning problems and users' needs in the Living Lab and How these new technologies affect them?

2. Living Lab Concept

> "Urban living labs constitute a form of experimental governance, whereby urban stakeholders develop and test new technologies, products, services and ways of living to produce innovative solutions to the challenges of climate change, resilience and urban sustainability."
> (Bulkeley and Castan Broto, 2013)

According to Hillgren (2013), there is no uniform definition of living labs. Bulkeley and Castan Broto define living labs as a form of experimental governance by which new technologies, products, services and way of living are

developed by urban stakeholders to produce innovative solutions to urban problems (Bulkeley and Castan Broto, 2013). For technology-driven and digital/smart cities concepts, living labs have different objectives and ways of working. However, living labs are initiated by various actors and form different types of partnerships which has defined as sectors (public, private etc.) where universities play a key role (ENoLL, 2015). On the other hand, for some academicians and organizations, living labs are more in the light of pilot and demonstration projects (Kommonen and Botero, 2013).

At the beginning of 2000, Living Lab began to emerge as the focus of testing new technologies in newly built homes. Since then, the growing concept has now taken its place with the establishment of real-world context. The Living Lab concept can be used as a human-centred research and development approach where ICT innovations are co-created, tested and evaluated in open, collaborative and real-world environments. Living Labs could be considered as an environment for actors and industry to help them generate and improve their products and services or commercialise their technology. Besides, it could be considered as an approach for intentional collaborative experimentation of researchers, citizens, companies and local governments (Schliwa, 2013). The Joint Programming Initiative (JPI) Urban Europe introduced the term "urban living lab" and defines it as "a forum for innovation, applied to the development of new products, systems, services, and processes, employing working methods to integrate people into the entire development process as users and co-creators, to explore, examine, experiment, test and evaluate new ideas, scenarios, processes, systems, concepts and creative solutions in complex and real contexts" (JPI Urban Europe, 2013).

Living lab methodologies are based on education, investigation, testing and applying projects which are related to sustainable challenges and occasions that cities are facing in Europe (ENoLL, 2015). There is no clear understanding of the ultimate role of Living Labs could play in urban governance. From the point of view, many projects related to Living Labs are emerging phenomenon on participation, collaboration, experimentation, learning and governance in cities. Nonetheless, cities, competing to reduce carbon emissions and to be sustainable, try to position themselves as innovation leaders. However, living labs provide a mean of applying for high-profile statements of intent and means to fund sustainable urban development and encourage cities to adopt innovative solutions.

During the design of the concept, living labs were defined as an environment, a methodology and a system. While technological platforms and user based approaches can be countable for environmental perspective, data transfer and user participation are under consideration of methodological perspective. In addition, the Living Lab approach not only focuses on the inclusion of users in development processes, but also attempt to cooperating with other stakeholders from public–private–people partnerships. What distinguishes the living lab approach from other laboratories is the inclusion of users in the process as an actor that shape the innovation in their real-life environments. But, other labs or innovation networks experts are shaping the process while users are act as sources (Almirall, 2009). Ensuring equitable urban development; empowering civil

society, expanding democratic participation and reinforcing collaboration; promoting innovations that facilitate learning and the sharing of knowledge principles are given by New Urban Agenda in response to develop and test different forms of urban governance (UN-HABITAT, 2016). In a way, living labs could encourage cities to adopt new challenges.

2.1. Basaksehir Living Lab: "Technology for life"

Basaksehir Living Lab, was founded in 2015, is in European side of Istanbul also it is located Basaksehir district. The lab is identified with first Turkish living lab, which has performed 370 organizations, approved by ENoLL (European Network of Living Labs). The first purpose of the lab is to create an environment in which information technology and technology-related products design and services can be tested by real users in a real-life environment (BLL, 2018). Basaksehir Living Lab is focused on helping society to see the real accretion value of new products and services while serving an experiment, research and innovation environment (ibid.). Moreover, besides their focus on producing new products and services, the smart city projects and ICT based projects are adopted their agenda (ibid).

The lab also serves as an ecosystem for entrepreneurs whose projects, about information technology and design, approved by the committee (BLL, 2018). It also provides an environment for entrepreneurs working on similar topics. In addition, entrepreneurs are given free support to submit their projects to the market in the lab while young generations are supported to raise their awareness on ICT and design issues (ibid.). Likewise, Basaksehir Living Lab ecosystem serves same benefits and privileges to their partner institutions and organizations. Following indicators are proposed by Basaksehir Living Lab:

> (1) Entrepreneurs can benefit from the incubation centre and all facilities in the building such as Elektrolab, 3D Printer Laboratory, meeting rooms and video call rooms.
> (2) Entrepreneurs can benefit from consultancy and mentoring support in Basaksehir Living Lab during the project process.
> (3) Entrepreneurs can participate in Entrepreneurship Trainings given by professional entrepreneurship experts at Basaksehir Living Lab.
> (4) All can promote their products and services by taking part in the Basaksehir Living Lab stand.
> (5) Entrepreneurs can get all design support from IDF (Istanbul Design Factory) which is the solution partner of Basaksehir Living Lab.
> (6) Entrepreneurs can present their products and services in the User Experience Centre and Product Display Area and create an environment for the end users' experience.
> (7) In the Entrepreneurship Days, Entrepreneurs can expand their relationship network and cooperate with all institutions and organizations in the ecosystem.
> (8) Entrepreneurs can create test environments for their products and/or services that they developed and Entrepreneurs have an opportunity to test with real users in real life environment.

(9) Entrepreneurs have a place on their news on the international platform through Basaksehir Living Lab e-newsletter and ENoLL newsletter that publishes every month (BLL, 2018).

Basaksehir Living Lab cooperates with Basaksehir Municipality in all its projects and organizations by giving importance to strategic partnership. In addition, IDF and Zemin Istanbul institutions are involved in projects and organizations as partners. In addition to these partnerships, the lab cooperates with four other private organizations as a living lab strategic partners. (see figure 1) Other than strategic partners, each project and each event, organized by BLL, have specific partnerships in related topic.

Figure 1 Basaksehir Living Lab Strategic Partnerships

2.2. Background Mapping and Organization

Lab management consists of coordinator and vice coordinators who are whether business engineers or industrial engineers (Celik, 2018). Management perception of lab is to create a working space and/or environment for its users. The lab is defined by coordinator as an environment to develop informatics oriented projects and to improve users' ability (Celik, 2018).

The laboratory acts as an organ of Basaksehir Municipality. All projects and activities to be carried out during the year are prewritten report and presented to Basaksehir Municipality in advance (Celik, 2018). The organization of the lab is determined by technical specification by Basaksehir Municipality every year. For example; 35 hours of informatics training, 72 hours of mobile game training and 25 hours of entrepreneurial training will be provided for current year (ibid.). In addition, Basaksehir Municipality uses the lab as activity-based environment. Environmental support is provided to use in special events or organizations for Basaksehir Municipality as a collaboration (ibid.).

Private sector partnerships are provided through collaboration in organizations, projects or various events, as well as environment and room support. However,

actors or partnerships involved in the process are a project-based selected, determined by technical specification while choosing experts is left open ended (Celik, 2018). On the other hand, experts and designers are chosen from the existing ecosystem according to the event context and time. In addition, selection of the participants is also based on the concept and time of each event (ibid.). The job and participation descriptions and responsibilities of the users or actors in the process vary according to the project and/or activity.

Meanwhile, the process is completed by first identifying the event, then confirming and announcing the users of the event (Celik, 2018). Based on the event, special users are chosen such as entrepreneurs, municipal employees, university or/and high school students (ibid.). Some programs include special partnerships for children training. In addition, special training programs are provided for housewives or children with disabilities (ibid.). It is clear to understand from all these information is that educational approach is more crucial for Basaksehir Living Lab. While educational project approaches are the main principles in the living lab organizations, urban based implementations get higher points due to their importance level to solve urban problems. Even though there are some smart cities projects created in Basaksehir Living Lab, the impact area of projects is limited. In real-world context, implementation process should be more taken into consideration.

3. Basaksehir Living Lab Success Criteria

3.1. Methodology and Data Collection

To investigate the "smart plan" applications in urban planning and to determine development of technologies in urban planning, their inclusion in the planning will be revealed through documentary analysis of the projects and one-to-one interviews. The aim is to measure and evaluate the success of Living Lab initiative. Reflecting urban contexts suitability in a living lab environment and how it adapts to living labs' features. For this purpose;

(1) To identify the living lab practices / projects and events and design methods
(2) To identify design concept, project process and implementation process of the living lab
(3) To reveal the living lab' objectives and relations in the urban context
(4) To determine the network relations, partnerships and participation process are examined and analysed.

In addition, interviews were held with organizers, laboratory staff and board members. Interviews were based on a semi-structured questionnaire with questions related to organizations of the living lab, decision making process, actualization and were conducted in Turkish and English languages. All interviews were recorded and transcribed in order to allow further analysis.

Focusing on the Basaksehir Living Lab approach related to the components and principles of the living lab will be explored, and data will be collected to ensure a common knowledge base of available applications. Since living labs is a new field of research, the amount of supporting theories for understanding the concept is limited. The absence of systematic analysis and reflection on existing methods and tools and their relevance to the context of the living lab will also be determined to identify Basaksehir Living Lab success criteria.

3.2. Data Analysis

To analyse interviews, implementation process is highlighting an important statement that out of 15 projects and 370 events related to education, product and software design (see figure 2) only 3 projects were implemented in urban environment. One of them is a smart infrastructure system located in Basaksehir district. Others, also located in Basaksehir district, are about renewable energy and architecture related. According to interviewers, this situation is more about Turkish planning system. It shows what are the driving elements of living lab in the planning ecosystem.

Figure 2 Interview questions pool

Basaksehir Living Lab has 7 strategic partners which are public (2) and private (6) institutions (see figure 1). This partnership encompasses different elements that shape the dynamics of new methods for urban planning and development such as user-driven methods, user-centred methods (Celik, 2018). But interviews show that living lab projects or events only seen as a platform to educate, or an environment where you can test your product and try new technologies (ibid.). However, it is assumed that collaboration of different actors and stakeholders should enhance smartness of a city as well as combinations of different elements should. How can city be smart without changing traditional government structure to adapt city functions to the new paradigm? The question releases problems regarded Turkish empirical domain. In order to solve problems, enforce rules or

allocate resources, the process should be more open, transparent and democratic at the same time. “Openness” is one of the main living lab principles that should be taken into consideration both partnership level and intellectual property rights (see figure 7). Also, cooperation between different stakeholders actively involved in a decision-making process should be affect to form public policy if necessary (Celik, 2018).

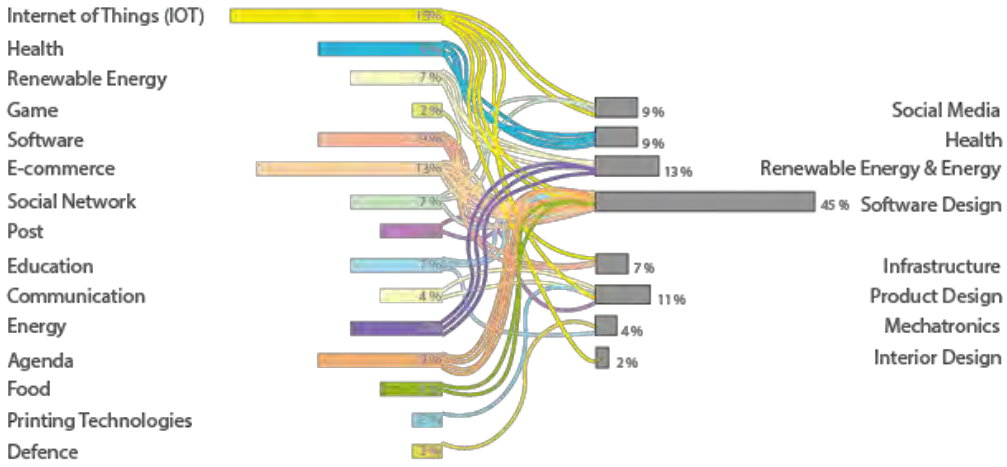


Figure 3 BLL projects and events content

The participation process is evolving under the control and the support of the private sector other than strategic partners. This may in fact reveal the strength of cooperation and the need for diversification in projects. However, it also provides the basis for a variety of actors (see figure 4). As seen in figure 3, the projects produced between 2015 and 2019 in the lab are more focused on software design. Only total of 29 percentage of projects include smart city applications such as health, infrastructure and energy. From this point of view, situation pushes to think that the priority field studies of the lab are overriding spatial planning. Whether ICT become more countable than spatial/environmental reflections of the projects or ICT serves the new environment for the reflection of the projects. It may lead us to statement that virtual environments, applications and developments can be considered spatially. As a matter of fact, become more transparent and open, besides all the collaboration between BLL and Municipality of Basaksehir living lab process should be more communion about project details and results, is a necessity. Long term commitments and large scale communities should be considered apart from number of events and projects.

Variety and number of users diverge according to the projects (see figure 4 and 5). For each activity or project, an average of 25 users are selected by announcement method. In some cases, the first responders are preferred, while in some cases, choices are made in line with the intended purpose of the projects and the professions or age/tender of citizens. Within the scope of the activities and collaborations determined by the Lab, the users are designated to specific groups. All this reveal “empowerment of users” according to the Enoll principles. In the

case of Basaksehir, the users are passive and take plays the tester or informant role in the decision-making process of the projects.

Figure 4 Organisational partnership and user participation network

Yet, according to Enoll principles, "continuity" can be put forward with the project lifespan. In the case of Basaksehir, this period is generally kept short. Although each event is renewed according to user demand, no continuity is observed in the projects. The actor diversity varies according to the project and differs to the subjects. Some projects or activities include a wide variety of actors within the scope of the established cooperation, while others (usually for educational purposes) include a limited number of actors. The role of the designer in this process was defined as the trainer. Although the designer helps the users in the process, its contribution is limited (see figure 7).

In addition to all these, Basaksehir living lab has a high impact on “realism” and “real world content” due to the technological opportunities offered by the lab building and environment. The projects developed within the Lab come into the real-world context with time and space constraints. Although the spatial impact on Istanbul is not yet in effect, its impact on the Basaksehir Neighbourhood borders

is indisputable. In addition, it has national and regional "influences" through the entrepreneurs who trained or supported by the lab (see figure 7). A potential risk at the living lab is that the lab come from a technology-push rather than a demand-pull. In fact, giving support to the needs rather than the necessities takes steps towards the solution of city problems and directs the users and entrepreneurs to the right market.

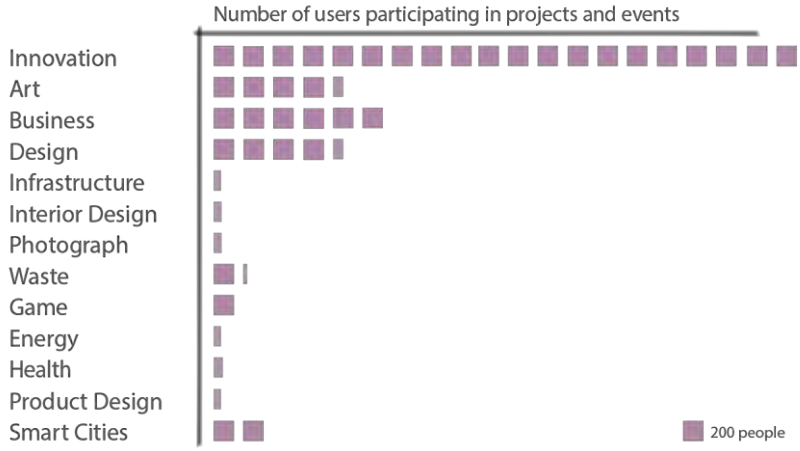


Figure 5 Project based participation of users

As a result of given parameters (see figure 7), Basaksehir Living Lab should manage a more open process and provide a transparent environment for the users and public. Lab methods applied in future projects can be developed and users take part as experiments as well as being used as a contributor. This also applies to designers.

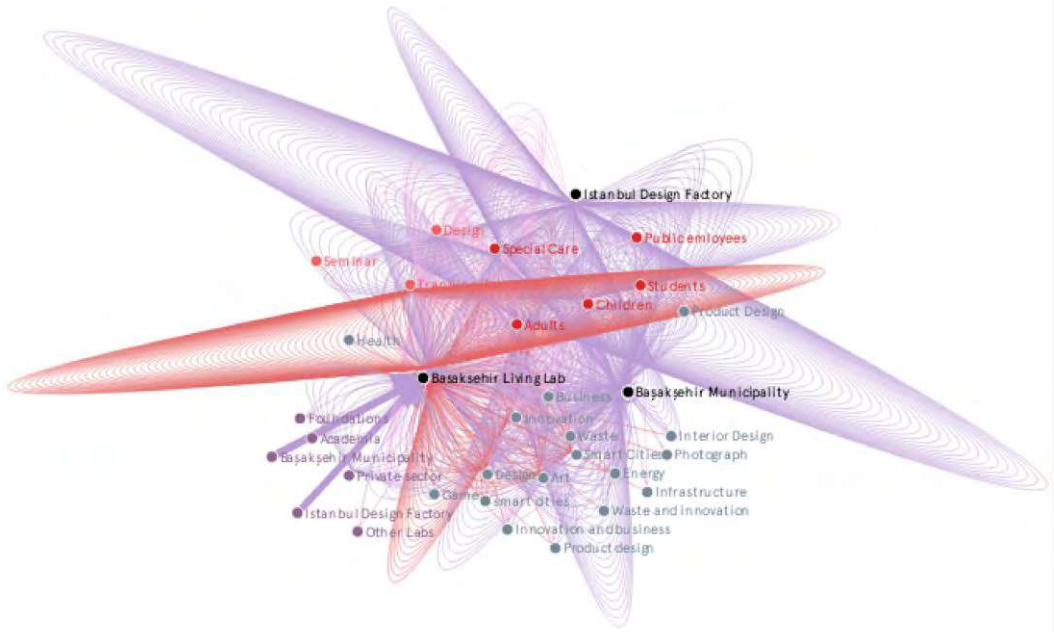


Figure 6 Network Analysis in BLL projects

	Criteria	Basaksehir Living Lab	Level
Openness	Level of openness - partnership	Semi-exclusive partnership	2
	Level of openness - intellectual property rights	little results and information generated in the living lab are shared (only brief updates or summaries)	2
	Domain	Mostly digital domains, rarely diagnostic and actual domain	1
Empowerment of users	Users role	Mostly informant, rarely contributor (creating with user)	1
	Scale	Small (<100 users)	2
	Selection of Users	Mostly without any criteria, rarely with professions	2-3
Continuity	Lifespan	Short term Project (<6 months)	1
	Ecosystem approach	Value creation and sharing to some of the stakeholders in the living lab ecosystem (missing links in the value chain, no equal contribution of all stakeholders)	3-4
	Actor Diversity	Mostly small scale (1-2 actor), rarely medium and large scale	2
	Designer Role	Mostly interpreter, rarely context designer and contributor (creating with users)	1
Realism	Technical Infrastructure	Infrastructure with extensive monitoring and in-depth technical testing	4
	Real-world context	real-world context with some time or space limitations	3
Influence	Context Research	The usage context is substantially considered using advanced techniques (surveys, diaries)	3
	Design Method	Educational	1
	Impact Area	Regional or National	4
	Community	Neither passive nor active community (equally shares)	3
Spontaneity	Co-creation	User feedback is captured (iterative), which may lead to some modifications/ alterations of the innovation	3
	Evaluation	Limited evaluation by users (post survey)	2

Figure 7 BLL success criteria

Although figure 7 is determined as the success criteria, the result shows the parameters that should be developed, not the failure of the lab.

4. Discussion and Conclusion

In some research areas, a multi-stakeholder partnership is a necessity for living labs. Living labs are a form of experimental governance; urban stakeholders

develop and test new technologies, products, services and lifestyles to produce innovative solutions to the challenges of urban context. It is a way of developing solutions which cities have faced or facing. Different forms of smart city approaches are being developed and tested in living labs. As differs in Turkey, there are not many projects include smart city approaches regarding to spatial planning. Somehow, spatial projects have been replaced by virtual ones. In the research, we aimed to determine new technologies affect urban planning. Analysis show that technological transformation process is currently in digital environment rather redound on spatial environment in Turkey. In other words, it is social enforcements that can trigger development of such transformations. While living labs provide opportunities to adapt to technology, the fact that they have not become widespread or not yet known, show limitations in terms of cooperation and application.

Current technologies, information technologies, ICT, smart city applications show that a new era has started in urban space and a new structure has been formed, because of limitless information flow and sharing. Although the digital area overcomes the urban area, it is seen that the studies made promise to be considered within the scope of urban governance. The participation process has also taken on a new structure with all these changes. Instead of public participation in the planning process or implementation process, it is more important for the next steps to be involved in the education process and design process offered by living labs. Basaksehir Living Lab studies show that it is all about the process of education in the beginning, following designing with users and after designing by users. There are all steps to take into considerations. Social learning and education point towards clever solutions by creative people. However, living lab approach can help governments under pressure to adapt smart city approach to improve the city visibility and the citizens' life quality. Although, smart city ranking reveals the winner and the loser, entering the global competition may pose risks. Smart solutions, smart planning should not be about the competition. According to Nam and Pardo (2011), smarter government should do more than simply regulate the outputs of societal and economic systems where it interconnects with businesses, citizens, communities in real time to inspire growth and innovation. For that, living lab success not only measured by living labs principles and theoretical indicators but development process and future tendencies lead to success.

5. Acknowledgement

This paper is produced from the Ph.D. thesis of O. Celik which was developed under the "New Planning Experience on open space design" Istanbul Technical University BAP Project, ID 1475. Authors would like to thank Basaksehir Living Lab Management and team whose identity kept confidential.

6. References

Albino, Vito; Berardi, Umberto; Dangelico, Rosa Maria (2015) "Smart cities: definitions, dimensions, performance, and initiatives", Journal of Urban Technology, Vol. 22, No.3, (January).

Angelidou, Margarita (2014) "Smart city policies: a spatial approach", cities, Vol.41, No.1 (July).

Basaksehir Living Lab (2015) "About Basaksehir Living Lab" (online) Available at: http://basaksehir-livinglab.com/BLL/anasayfa (Accessed 21 October 2018).

Caragliu, Andrea; Bo, Chiara Del; Nijkamp, Peter (2011) "Smart Cities in Europe", Journal of Urban Technology, vol. 18, No. 2, (August).

Celik, Ozge (2018) Interviews, about Basaksehir Living Lab.

Hajer, Maarten; Dassen, Ton (2014) Smart About Cities: visualising the challenge for 21st century urbanism, Rotterdam: naio10 publishers.

Lindskog, Helena (2004) "Smart communites initiatives", ISOne World Conference, The Information Institute.

Nam, Taewoo; Pardo, Theresa (2011) "Conceptualizing smart city with dimension of technology, people, and institutions", Proceedings of the 12th Annual International Conference on Digital Government Research, (June).

UN-HABITAT, (2016). Urban planning and design lab tools for integrated and participatory urban planning.

UN-HABITAT, (2016). World Cities Report: Urbanization and development-emerging futures.

Case Study Paper

The strategy and analysis of optimizing lugu lake tourism Image

based on online travel data

Le Dong, Shanghai Tongji urban planning and design institute; China
Chen Xu, Shanghai Tongji urban planning and design institute; China
Baolu Chen, Shanghai Tongji urban planning and design institute; China

Abstract

Tourism image is of great significant to construction of scenic areas and enhancement of scenic competitiveness. However, many scenic areas are facing problems such as ignoring their own cultural values, homogenization and self-positioning. It is meaningful to define what the tourism image actually is. For the past few years, the number of internet users are increasing dramatically, whose comments boost the progress of intelligent tourism. The utilization of these online information now becomes an important way for tourists to generate how the destinations look like. In the age of big data, analysis of online comments is helpful to explore cultural features, shape the scenic areas' image and improve tourists' satisfaction.

This essay takes Lugu lake scenic area as an example, consist of three parts. The first part focus on comments extraction about tourism resources, infrastructures and service. After that, the second part mainly deals with the analysis of tourists' behaviors and perception. Lastly, the third part proposes the optimization strategy in scenic marketing and precision services, scenic image creation, facilities improvement, linkage development with surrounding attractions and other perspectives.

Online travelling comments are encouraged to spread among tourists, as a result, either good or bad reviews will lead to exponentially influence and exposure. Tourism image optimization based on internet reviews is the embodiment of public participation in the new era, which is helpful to realize the application value of big data in the field of urban planning, shape scenic image and enhance its competitiveness.

Keywords

Online comments data, Lugu lake scenic area, Tourism image

1. Research review

Scenic tourist image is the overall perception and a series of impressions, views and emotional expressions of the scenic spot, which is formed by normal and potential tourists dealing with information from various channels. Good scenic image can not only improve the

tourist revisit rate, enhance the satisfaction and loyalty of tourists, but also affect the travel willingness of potential tourists. It is also considered as an important basis for scenic planning, activity creation and visitor management.

There are several ways to analyze traditional tourism image, such as face-to-face interviews, questionnaire surveys, secondary data released by government or tourism organizations, observation, and mobile tracking devices，most of these data collection methods are generally costly and time-consuming, and have limitations in getting samples and information. In comparison, Online travelling data, which is published by tourists on social media spontaneously and records the actual behaviors of tourists naturally, provides a more effective way to analyze tourists' travelling activities and preferences. Online travelling data is sizeable and cost-effective. In addition, it contains various information such as text description, geographical location, travel time, pictures and so on, which can reflects the toursits' needs in real.

Based on the perspective of scenic spots, online travel analysis can be used to design scenic spot accurately and enhance the tourism image. It also provides the possibility for incorporating the public's will into the spatial planning, and promotes the transformation of urban research and urban planning in terms of technical means and value orientation. Therefore, this article takes Lugu lake scenic area as an example, trying to explore the public demand and proposes the optimization strategy of tourism image by analyzing the online travel data, which may provide reference for other related planning.

2. Research Background

2.1. Overview of Lugu lake Scenic Area

Lugu lake is located at the junction of Yunnan and Sichuan Province，where the beautiful plateau lake（Figure 2-1） blends with the mysterious Mosuo matriarchal culture（Figure 2-2）, making it an important attractions. As a national scenic spot and provincial nature reserve, lake lugu has high ecological and cultural value. From 2015 to 2017, the number of visitors to Lugu lake Scenic Area was showing a rapid upward trend, which was about 0.38 million, 0.42 million, and 1.07 million, respectively. The prospect of Lugu lake Scenic Area is optimistic. In recent years, with the rapid growth of tourism and the amount of tourists, as an emerging scenic spot, Lugu lake is suffering pollution and destruction. Furthermore, Its tourism infrastructure fails to satisfy the tourists demand, which leds the abundant resources lake to a AAAA-level rating merely, This is why it needs to be optimized.


Figure 2-1:Beautiful scenery of lugu lake


Figure 2-2: Mosuo architecture and decoration

2.2. Travels data discussion

The online travel notes contain various data types such as text, photos, videos. Many travel notes also include the user's geographic information, travelling time, and travelling ways. Those datas, which contain tourists' travelling behaviors and resources, form tourist's digital footprints. Integrated travel data can be used to explore the space path and travel methods of tourists. In addition, we can keep abreast of tourists' preference for scenic resources and tourism products, as well as the satisfaction degree of the scenic management and service quality.

The travel data has been a hot topic since this year, with the characteristics of high accuracy, wide coverage, timely update, large amounts of information and various types. The research in the planning field mainly includes the following three aspects: The first category is about the image research of tourism destinations. This kind of research builds out tourist image by grasping the key words of online travel records and analyzing the tourists' perceptions and emotions. The second category considers more about tourists' behaviors, including motivation, activity routes, visiting places, and Interested contents. By the study of tourist behaviors, it can analyze the attraction of tourism destinations, the passenger flow of different travel routes, and then adjusts the planning. The third category is the study of tourism satisfaction, determining the factors that affect the satisfaction of tourists, and the satisfaction of different tourists on the same destination. However, there is less analysis at the scale of the scenic spot and few optimization strategies. For this purpose, Taking Lugu lake scenic spot as an example, this article studies the image based on online comments and proposes strategy for optimizing tourism image.

3. Case study

3.1. Data acquisition and organization

3.1.1Data Sources

Network travel data is an important source of big data, As a large online travel agency in China, Ctrip.com has the most recorded online comments and the most active users for Lugu lake scenic spots. Therefore, this paper searches for tourist reviews with Lugu lake based on Ctrip online travel data. Write code in Python to crawl the contents of the travel page. In addition to the travel text material, structured tag data such as travel time, cost, dwell time, associated destination, and author's permanent city are also captured.

3.1.2Data sorting and cleaning

Considering the timeliness, this paper selects a 36-month tourist review from March 17, 2017 to March 17, 2019. The initial data is 6,697, and 4,276 valid data are obtained through screening. The data screening principle is to eliminate meaningless content such as a large number of missing basic information, too short or pure symbols, repeated publication by the same visitor, too extreme or exaggerated, obvious commercial propaganda.

3.1.3 Text segmentation

This paper uses the content mining software ROSTCM6.0, which integrated with automatic word segmentation, word frequency analysis, co-occurrence matrix analysis, social network analysis, sentiment analysis, to sort travel comment data. The principle of this method is mechanical word segmentation, that is, applying Chinese dictionary to match Lugu lake scenic area comments. If a string is found in the dictionary, Then the match is successfully recorded.

3.1.4 Semantic Analysis

Semantic analysis mainly includes semantic network structure and sentiment analysis. The principle of the semantic network structure is to analyze words‘ relevance and show it with topology diagram. According to the high-frequency vocabulary generated by the text segmentation, the article counts the co-occurrence frequency of these words, obtains word co-occurrence matrix and uses Gephi to visualize it. Emotional analysis mainly explores the emotional tendency of travel texts. The mood index of each review is generated by ROSTCM6.0 software. The larger the value, the more positive tourists are.

3.2. Tourist characteristics analysis

3.2.1 Tourist source

In order to get the proportion of tourists‘ sources , this paper counts the permanent city of tourists who comment on Ctrip about Lugu lake scenic spots. The data indicates that the tourists source can be divided into 4 levels according to the commentators number, such as Table 3-1. The first level is from the first-tier cities like Beijing, Shanghai and Guangzhou, which occupies the largest number of tourists source, followed by Southwest regions such as Lijiang, Chengdu, cities of higher economic development, and other cities. The result shows that the tourist source of lugu lake scenic spot is closely related to spatial distance, economic level and traffic. The closer space distance, higher level of economic development, and more convenient traffic, lead to more tourists.

Number	City	Proportion	Number	City	Proportion
1	Shanghai	12%	13	Xi'an	2%
2	Beijing	10%	14	Changsha	2%
3	Guangzhou	7%	15	Xiamen	2%
4	Lijiang	4%	16	Tianjing	2%
5	Chengdu	3%	17	Suzhou	2%
6	Shenzhen	3%	18	Gulin	1%
7	Nanjing	2%	19	Qingdao	1%
8	Chongqin	2%	20	Zhenzhou	1%
9	Kunming	2%	21	Ningbo	1%
10	Wuhan	2%	22	Dongguan	1%
11	Hangzhou	2%	23	Dalian	1%
12	Foshan	2%	24	Zhuhai	1%

Table 3-1 The proportion of tourists sources

3.2.2 Tourist behavior patterns

The analysis of tourists' behaviors such as travel time, travel mode, average cost and stay time are shown in table3-2 to table 3-5. The highest travel rate is in spring and autumn, about 31.13% and 33.77%. By contrast, the summer travel rate is the lowest, only 13.90%, which indicates that the activity level of Lugu lake scenic area is greatly affected by seasons.

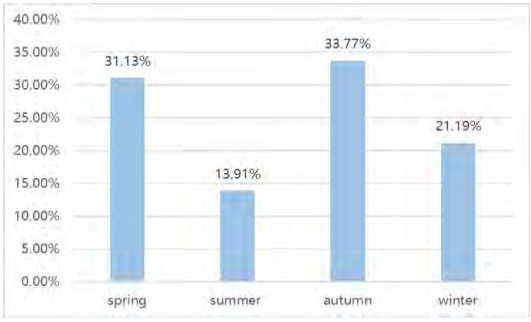


Table 3-2: Travel time distribution of tourists

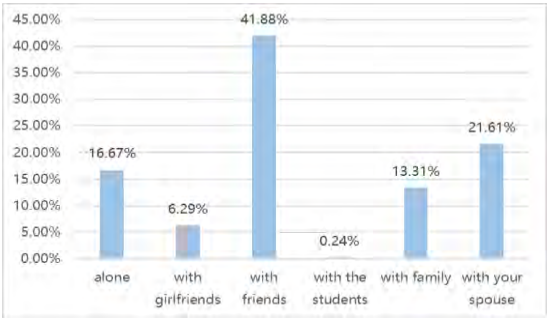


Table 3-3: Tourist play mode

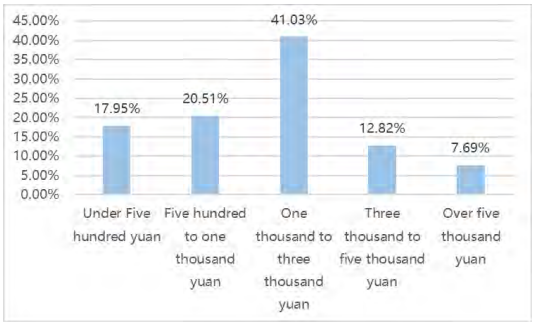


Table 3-4: Per capita expenditure of tourists

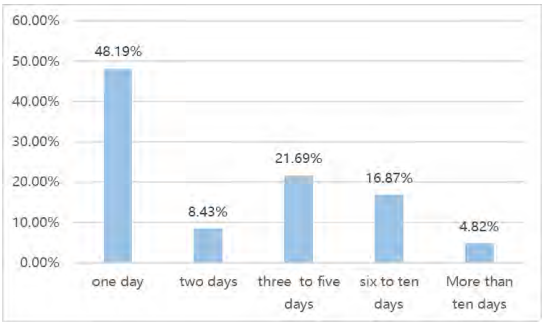


Table 3-5: Tourist time

The main way for tourists to play is travelling with friends, accounting for 41.88% of total number. Couples, solo and family travel account for 21.61%,16.67% and 13.31% respectively. Tourists comment on Valentine' beach, Lovers' tree, Heart-shaped island and Marriage-bridge frequently, such as "it is said that by the side of Lugu lake, all the trees grow out in pairs, like intimate partners", which can be used to explore romantic attractions. The average spending of tourists in lugu lake science spots mainly concentrate at 150~400 dollars. The travel time pf Lugu lake is insufficient, mainly for 1~7 days. How to attract tourists' attention from different travel modes, creat rich brand activities, broaden the tour route and increase dwell time, should be an important planning consideration.

3.3. Keywords analysis

The high-frequency vocabularies on Ctrip.com are shown in Table 3-6, and semantic network graph is shown in figure 3-1. This paper divides high-frequency words into three dimensions: tourism resources, tourism infrastructures and supporting services, environmental atmosphere.

First dimension deals with tourist resources. The keywords of Lugu lake tourism resources include"fresh water", "sunrise", "Mosou walking-marriages", "bonfire", "The goddness mountain". It shows that tourists' perception in Lugu lake is consistent with natural resources, which is consistent with the field survey. As for Mosuo matrilineal culture, it is only mentioned by two keywords: walking-marriages and bonfire. The cultural experience floats on the surface.

Second dimension focus on tourism infrastructures and supporting services include "drivers","tickets","hotel","journey","wharf","carsickness","traffic price". Tourists pay more attention to the traffic and have more negative perception.

In terms of environmental atmosphere, words such as "mystery", "like", "feeling" and "quietness" come out in front. This shows that beautiful landscape and Mosou culture are not only important atmospheres to attract tourists, but also environment feelings which we need to closely surround and cannot break.

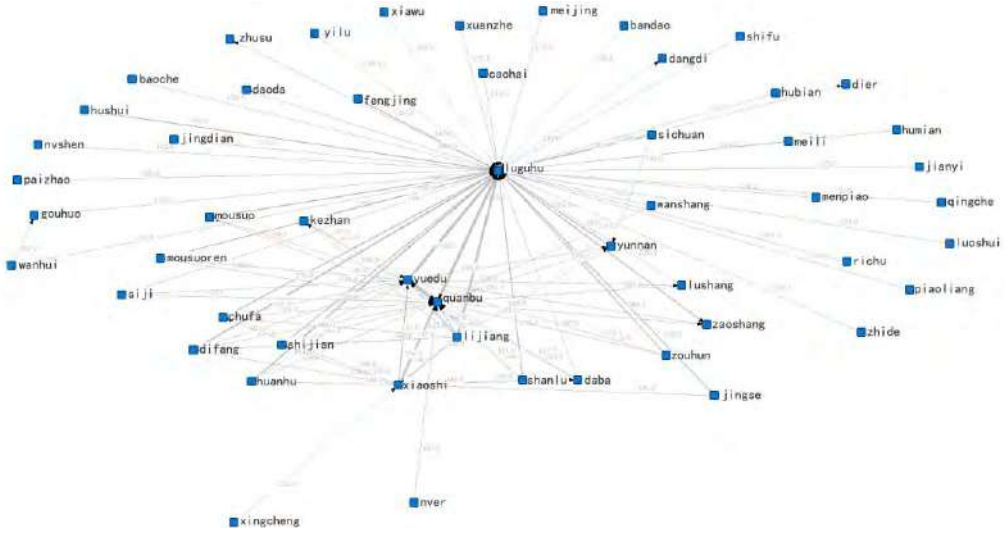


Figure 3-1：Semantic network analysis diagram of some high frequency feature words

rank	key words	frequency	rank	key words	frequency
1	Lugu Lake	3675	26	bonfire	164
2	sunrise	706	27	lake surface	161
3	league	546	28	quietness	151
4	The goddness mountain	538	29	observation deck	149
5	around the lake	497	30	Accommodation	149
6	scene	473	31	range of driving	148
7	inn	466	32	tickets	147
8	fresh water	446	33	lover	145
9	lake water	389	34	so beautiful	142
10	Luoshui	321	35	carsickness	141
11	scenery	311	36	very good	140
12	peninsula	245	37	have gone	137
13	ghat	237	38	weather	135
14	feel	237	39	goddess	132
15	driver	226	40	jolt	131
16	kingdoms of females	226	41	wharf	130
17	beauty	214	42	photograph	130
18	Mosou walking-marriages	213	43	hotel	123
19	lakeside	194	44	Mountain Kinabalu	121
20	traffic price	193	45	the most beautiful	118
21	compare	192	46	journey	118
22	fine view	189	47	Recommend	116
23	particularly	178	48	mystery	114
24	limpid	174	49	plateau	111
25	evening	169	50	hotel	107

Table 3-6：Text ranking top 50 high frequency keywords

3.4. Tourist satisfaction

This article conducts on emotional analysis of review data, among which 1,760 are positive , 1,074 are neutral and 220 are negative, as shown in table 3-7. On the whole, tourists' emotional tendency is optimistic, however, the negative emotion in tourists' evaluation still needs to be paid full attention. According to the content analysis, it can be seen that the

dissatisfied aspects of tourists focus on traffic, high ticket prices, garbage, catering, over-commercial experience, less cultural experience and so on.

The analysis of negative emotion is consistent with actual situation. In terms of traffic, it takes 4~6 hours from Lijiang to Lugu lake with rough mountain roads, dominated by private cars and bus. Ninglang airport is less efficient. The transportation mode in Lugu lake scenic spots is mainly by self-driving, carpooling, bike-riding and walking. Insufficient public transport and inadequate basic service facilities are major factors which limit the development of lugu lake. In order to create travelling stunts and make more profits. Mosuo matriarchal culture is over-publicized, and losing its mystique. In addition, the original Mosuo buildings have been replaces by various hotels and shopping malls. Mosuo family structure and rural landscape gradually collapse, the disappearance of cultural authenticity and over-commercial atmosphere affect the tourism image.

type of emotion	number	percentage	remark
positive emotion	1760 items	57.63%	Among them, the sectional statistics of positive emotions are as follows： common（0—10marks）： 236 items 7.72% medium（10—20 marks）： 433 items 14.19% higher（beyond20 marks）： 1091 items 35.72%
Neutral emotion	1074 items	35.17%	
Negative emotion	220 items	7.20%	Among them, the sectional statistics of negative emotions are as follows： common（-10—0 marks）： 149 items 4.89% medium（-20—-10 marks）： 71 items 2.31% higher（under -20 marks）： 0 0.00%

Table 3-7：Statistical analysis of tourists' emotions

3.5. Associated destination

With the improvement of transportation and the rapid development of tourism, the links between different tourist attractions are getting closer and closer, and the tourist route presents networked characteristics. The article sorts out the structured related destination in the network comment of lugu lake scenic area, obtains a list of surrounding tourist attractions cored with lugu lake, and analyzes the correlation strength.

Through the semantic network diagram, it can be seen that the external attractions of lugu lake scenic area are mainly Lijiang, Shuhe, Lashihai, Dali, Yulong snow mountain, Tiger leaping gorge, Shangri-La, Erhai, Mufu. At the same time, "Lijiang--Yulong snow mountain--lugu lake--Lashihai" and "Lijiang--lugu lake--Erhai--Shangri-La" form two important relationship chains in the entire network.

In lugu lake scenic area, the core tourist route forms competitive advantage around the two important distribution centers namely Luoshui and lugu lake Observation Deck, as well as four tourist attractions such as Liwubi Island, Gem Goddess mountain, Lovers Beach and Caohai. The network status of other tourist attractions is relatively poor, the competitiveness is weak, and tourists are rarely attracted.

rank	keyword	word frequency	rank	keyword	word frequency
1	Old Town of Lijiang	4149	11	observation deck	730
2	Lijiang	2880	12	Liwubi Island	625
3	Shuhe ancient town	1408	13	Square Street	550
4	Tiger Leaping Gorge	1266	14	Shangri-La	501
5	Lashi Lake	961	15	Erhai	478
6	Caohai	950	16	Mufu	386
7	Dali	861	17	The CangShan Mountain	266
8	Gem goddess mountain	821	18	Lovers Beach	247
9	Yulong snow mountain,	815	19	Blue Moon	232
10	Kunming	785	20	White river	169

Table 3-8： Correlation analysis of scenic spots

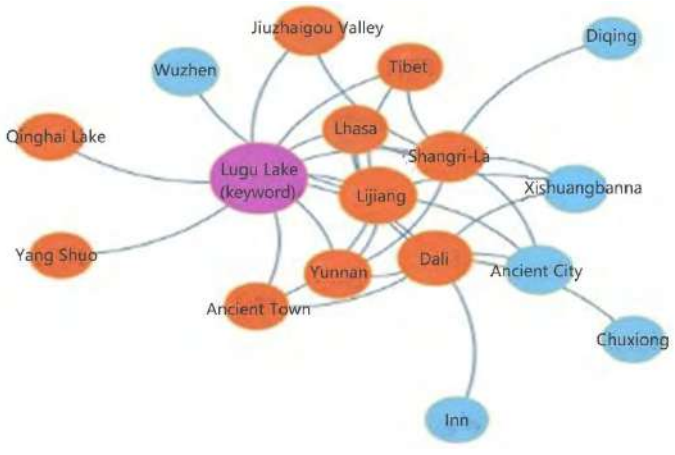


Figure 3-2： Correlation analysis of scenic spots

4. Suggestions on Tourism Image Optimization

4.1. Scenic marketing and precision services

This paper puts forward the precise service strategy and carries out targeted promotion according to different tourist source. First of all, for the first-tier urban agglomerations, the publicity strategy advocates the concept of relaxing life. Secondly, as for the surrounding southwestern areas such as Lijiang and Chengdu, The publicity strategy emphasizes the unique environmental atmosphere of lugu lake, which combines nature and culture characteristics, and distinguishes it from the surrounding attraction such as Erhai lake and Fuxian lake. Moreover, For the new first-tier and second-tier cities with great development potential, although they are not the main force of lugu lake tourism market at present, their consumption capacity cannot be underestimated. Scenic spots should increase publicity, build high-profile attractions and activities, and expand the popularity of Lugu lake.

The Lugu lake scenic area should promote tourism self-service and intensify supervision and management. Independent travel such as self-driving trip, couple trip, family trip has a growing proportion in Lugu lake scenic spot. Therefore, managers should build a circular bus system, self-guided tour system, self-help explanation system, and provide diversified, personalized and independent scenic products and services .Lugu lake is a place to promote relaxation, where tourists are immersed in nature for a long time. However, it can be seen that tourists stay in Lugu lake for a short time generally from the statistics of tourists' comments. It is the key issue in promoting the development of scenic spots to keep tourists, enrich scenic spots activities and Increase the surrounding tourist attractions.

4.2. Destination image creation

The planning and design of Lugu lake Scenic Area revolve around the combination of nature and humanities closely in recent years, which matches the tourists' feelings of tourist image. However, it can be seen from tourists comments that the understanding of Mosuo culture is superficial, and the cognition of “matriarchal Culture” and “walking-marriage” is exparte. The mysterious Mosuo culture has become the gimmicks of tourism development. The protection and inheritance of Mosuo culture should be highly valued. Managers may prevent the existing Mosuo residents and Mosuo culture from being excessively interfered by the tourism development, preserve the authenticity, meanwhile, Mosuo culture can be displayed in public spaces to increase visitors' understanding. Infrastructure should respond to the environment atmosphere, which can guide visitors to experience the beautiful scenery.

4.3. Improvement of scenic facilities and service levels

The article summarizes the sources of negative emotions of tourists further. Firstly, the infrastructures such as transportation facilities and service facilities are insufficient. Secondly, the cultural inheritance and expression are insufficient. Thirdly, the scenic spot is too commercial and lack of tourist experience activities. Therefore, we propose suggestions for improving tourist satisfaction.

As for transportation, The distance around lugu lake is 76 kilometers. Public transportation such as sightseeing vehicles are required. The traffic organization plans to set up bus stops between scenic spots, build sightseeing sidewalks and bicycle trails around the lake, so that visitors can experience the beauty of Lugu lake at close range.

Improve supporting facilities and carry out scientific management. The scenic area should increase the restroom and improve the guiding facilities such as traffic signs. The high price of accommodation, meals and tickets is also an important issue for tourists to have negative emotions. Managers should strengthen the supervision and management. It is also necessary to provide tourists with good experience and lower price.

Pay more attention to the protection and inheritance of Mosuo culture and add experiential activities. In addition to the bonfire evenings, more cultural and folk activities should be shown, The design of the scenic spot should extend the activity brands such as Hualou Love Song, highlight the cultural atmosphere and weaken the commercial atmosphere.

4.4. Linkage development with surrounding attractions

The multi-destination selection of tourists prompt the possibility of regional cooperation development between Lugu lake, Lijiang, Dali and Kunming. At the same time, the Lugu lake scenic area should highlight its own characteristics in the development of entire areas, especially compared with the similar scenic area such as Lashi lake, Erhai and Fuxian Lake. What are the characteristics of Lugu lake? From the comments of tourists such as "the landscape is more natural", "Mosuo culture", "there are many small fresh places in Erhai, the scenery of lugu lake is particularly beautiful, very romantic", "the traffic of Erhai lake is more convenient," "Lugu is farther away from urban life", we can see that the landscape environment away from nature, landscape proportion, Mosuo culture and beautiful scenery are prominent features of Lugu lake from the perspective of tourists. Therefore, in the coordinated development of the scenic spot, Lugu lake should ensure its natural and cultural integration, adhere to the naturalized landscape features, preserve the mysterious Mosuo culture, and avoid excessive artificial design traces.

In Lugu lake scenic area, it is recommended that the scenic spots should be jointly developed, around more mature attractions such as Lugu lake observation seck, Liwuibi Island, Gem Goddess Hill, Strengthen scenic spots with excellent development potential but insufficient network competitiveness, such as Liger island, Mosuo House, ZamiLama Temple, Rani Island. In the linkage development of scenic spots, couples' tour lines, friends' tour lines and cultural landscape tour lines are set up to provide richer choices, increase the long-term travel.

5. Conclusion and discussion

Tourism image is an important factor influencing tourists' intentions and decision-making. It is also a key aspect of tourism destination marketing and improving the core competitiveness of the destination. This paper attempts to explore the tourists' real experience and feelings on Lugu lake Scenic Area by taking online travels as an analysis object, proposes optimization strategies from the aspects of scenic image creation, promotion of tourism infrastructure and supporting services, and linkage development with surrounding scenic spots. But the research still has some shortcomings. For example, the inadequate sample size may lead biased results. The review tourists are mostly aged from 20 to 40, and some older people who cannot use the review software are not included. In addition, social network data is still based on historical information feedback with certain delays. If the timely feedback can be established dynamically in the future, it will be beneficial for scenic management to provide precise services. However, as a new way to

analyze the tourism image of scenic spots, the analysis process and results of Lugu lake Scenic Area have certain values in innovations and references, which may provide new ideas for the optimization of scenic tourism image. In the post study, in order to obtain more general conclusions and verification, the research will focus more on the cross-validation of travel big data and traditional statistics.

6. References

[1] Jiang Xin(1994), Wu Dan-zi(1988), Wang xiang-rong(1963), "Investigation about after-use evaluation og garden exhibition based on online comments data", Landscape architecture, May,2018.

[2] Shao Jun(1974), Chang Xuesong(1989), Zhao Yamin(1977), "Research on Tourist Travel Patterns in Mountain Huashan Scenic Spot Based on the Big Data from Travel Blogs",Chinese Landscape architecture, March, 2018.

[3] O'Neill E, Kostakos V, Kindberg T, et al. Instrumenting the City: Developing Methods for Observing and Understanding the DigitalCityscape[M]// International Conference on Ubiquitous Computing . Springer Berlin Heidelberg,2006: 315-332.

[4] Wong E, Law R, Li G. Reviewing Geotagging Research in Tourism[M]// Information and Communication Technologies in Tourism 2017 .Springer International Publishing, 2017: 43-57

[5]Girardin F, Calabrese F, Fiore F D, et al. Digital Footprinting: " Uncovering Tourists with User- Generated Content". IEEE Pervasive Computing ,2008, 7(4): 36-43.

Research Paper

Smart signals in heterogeneous traffic conditions

Mayank DUBEY, Assistant Professor, Xavier Centre for Urban Management and Governance, Bhubaneswar; India

Abstract

Major urban corridors in Indian cities are carrying significantly high traffic leading to near saturated conditions for extended peak hours. As mixed landuse and major trip attracting/generating establishments are generally observed to be located along such corridors for better accessibility, significant side friction is also observed along these corridors. Among various measures to improve the throughput along such corridors, signalized intersections seem to be the most preferred intervention for intersection control. Although frequent occurrence of such traffic signals and non-coordinated signal phases have in turn made the whole situation more complex. To overcome this challenge, variations of smart signals are being proposed by technology and traffic enterprises globally. Generally, smart interventions in operation of signalised intersections require communication among vehicles and control system through various sensors and applications of Intelligent transport services (ITS). Smart signal operations require the sensors grouted in pavement or attached with camera to share the relevant data in real time basis with central command and control centre. With adaptive signal operations, it is attempted to schedule signal phases in such a way that green phase of every cycle generally experiences near saturated flow conditions. The smart cities mission (SCM) of India, covering around 100 cities also focuses upon improving the urban mobility through various measures including smart signals. Some of the popular proposals relating to smart operation of signalised intersection across shortlisted smart cities include adaptive and coordinated traffic signals. It is understood that traffic signal optimization is not a one-time action but rather a continuous process, as data archiving, data crunching, research and adaptations are indispensable for its success. As the geometry, location and setting of each intersection in every network is bound to be unique, the optimization process needs to consider the same. The literature and case study of Indian city Bhubaneswar (ranked first in nationwide smart city challenge) revealed that challenges specific to Indian driving conditions are major cause of worry for yielding stated benefits of smart signals. Factors like varying hierarchy and functions along major arterial corridors, fluctuating carriageway width and quality, considerable side friction within right of way, heterogeneity in vehicular mix, significant variation in peak hour directional flows leading to tidal flow, surrounding network characteristics and efficacy of optimisation techniques are responsible for limited rewards out of the whole process. The study reflects upon these challenges and concludes with recommendations to improve the performance of signalized intersections along corridors with heterogeneous traffic conditions.

Keywords

Signal phase, arterial corridors, intelligent transport system, side friction

1. Introduction

1.1. Congestion on urban roads

High vehicular density and relatively low operating speeds along arterial corridors of major cities in India represent the highly saturated traffic flow conditions (*Shriniwas*). Volume by Capacity ratio (V/C), the commonly used yardstick to assess the vehicular saturation on roads, consistently records values above unity referring to highly saturated road conditions. The journey speed in many cities are observed to be in the range of 7 – 20 kmph, representing severe jamming like conditions (*Alam et. Al.*). Table 1 summarizes general travel characteristics along arterial corridors for 5 different cities of India.

Table 1 - Vehicular traffic congestion along arterial corridor of various cities

Sr.	City	Corridor	Stretch	C/way width in m	Peak hour volume in PCU*	V/C#	Peak hour speed in kmph
1	Bhubaneswar	Janpath - 4.9 km	Vani Vihar to Sishu Bhaban	12 m (3-lane)	2230	2230/3857 = **0.58**	19.2
2	Agra^	M G Road - 5.8 km	Bhagwan Talkies to Pratappura	6 m (2 lane)	2564	2564/2142 = **1.2**	11. 8
3	Jaipur	Tonk Road - 5 km	GTC Mall to Bajaj Nagar	10 m (3 lane)	3112	3112/3857 = **0.8**	13.3
4	Indore	M G Road - 4.1 km	Rajwada to patrakar Chk	varying (3 lane)	3664	3664/3857 = **0.95**	12.4
5	Patna	Bailey & Suri road - 7.10 km	BPSC to Shanichara mod	Varying (2 lane)	2644	2644/2142 = 1**.23**	6.9

Source – Primary data other than for Agra^ MG Road Improvement Study, SPA Delhi 2014
*Vehicle to PCU conversions based on IRC 106:1990
Volume by Capacity (V/C) calculations based on Design service volume from IRC 106:1990

It can be observed from Table 1 that across cities, not only the journey speeds are reduced, but most of the traffic flow operations along arterial corridors is saturated and forced. The volume by capacity ratio (V/C) is only indicative of the level of saturation although actual traffic flow depends upon other subjective parameters also. Along all the case study corridors mentioned above, ribbon development, on street parking, frequent punctures and side access, heterogeneous mix of vehicles and mixed landuse adjoining the arterial corridor are some of the factors which are responsible for reduced throughput and enhanced vehicular congestion. Lack of awareness, education and driving discipline can also be attributed to inefficient utilization of these roads (*Chandra. et. al*.). Apart from all the reasons listed above, frequent intersections along the arterial corridor and their inefficient operation also contributes to the congestion.

1.2. Intersections along urban roads

Intersections are the potential nodes in the road network which help in manoeuvring crossing vehicular desires. As various conflict points are scattered across the intersection (depending upon the geometry and desires), time and/or space appropriation is done to ensure safe and efficient mobility. Although intersections are very much required to provide various options and permutations for individual's route choice, frequent occurrence of

intersections along arterial corridor results in significant delay and congestion. It is generally understood from codes of practices (*IRC 106:1990 and NUTP*) that mobility and accessibility for any corridor vary inversely with each other resulting in limited access per unit length for higher hierarchy corridors. But because of ribbon development, bazaar system and mostly unregulated development along the corridors, it has been observed that the functional hierarchy of arterial corridors have been diluted (*Curtis et. al.).* Table 2 illustrates the occurrence of punctures and side friction along selected arterial corridors of few Indian cities.

Table 2 - High accessibility and correspondingly low mobility along arterial corridors of selected Indian cities

Sr.	City	Corridor	Number and type of intersection(s)					Other side friction elements
			Minor access	Signalised/ Roundabouts	Partial grade separated and or signalised	Interchange	Total	
1	Bhubaneswar	Janpath - 4.9 km	24	11	2	0	37	on street Parking
2	Agra	M G Road - 5.8 km	35	17	1	0	53	Vending, parking
3	Jaipur	Tonk Road - 5 km	14	15	1	0	30	Mix landuse
4	Indore	M G Road - 4.1 km	27	14	0	0	41	Varying ROW and mixed landuse
5	Patna	Bailey and Suri road - 7.1 km	21	22	1	0	44	Varying ROW and mixed landuse

Source - Primary data other than for Agra^ MG Road Improvement Study, SPA Delhi 2014

Based upon information presented in Table 1 and Table 2, it can be inferred that because of various reasons, including frequent intersections, the arterial corridors get reduced to the functional hierarchy of any other corridor of the settlement. It can also be noted from Table 2 that among all major intersection types, signalised intersections are most popular along the mentioned corridors across all cities studied. Signalised intersections are popular with civic administration because of simple operations and control and they offer predictability for the road users. In the complete life cycle of signalised intersections, it can be also argued that Signalisation is cost effective as compared to other traffic intersection control mechanism (*Prashanth et. al*.).

On the other hand, it has also been observed that the so-called benefits of signalised intersections are not very elastic and there is a limitation w.r.t. total traffic handling capacity of signalised intersections. Capacity of signalised intersection is a function of cycle time, traffic composition, turning movement, capacity of slip lanes and pocket lanes, etc. (Radhakrishnan et. al.). Because of localized traffic flow and desire, it has been observed that certain intersections along arterial corridors are not only sight of extreme congestion but also act as bottleneck for whole neighbourhood road network. Reduced Level of Service (LOS) at only one or few signalised intersections in a road network is at times responsible for

total jamming of road system in an area. This is one of the primary reasons for the recent push for smart and digital operation of signalised intersections.

1.3. Smart and digital interventions in traffic signal operations

The recent popularity of smart and digital interventions in operation of signalised intersections has demonstrated certain new and exciting techniques for monitoring and improving the traffic operations. Majority of smart interventions in operation of signalised intersections work upon the communication among vehicles and control system through various sensors and applications of artificial intelligence. Smart signal operations require the sensors grouted in pavement or attached with camera to share the relevant data in real time basis with central command and control centre. The decision to alter cycle time or any other intervention depends upon the marginal utility and 'advantage' of such action. The 'advantage' mentioned here can be in terms of flow rate, travel time, reduced emissions, priority to public vehicles etc. which has been further detailed in next section. The smart cities mission (*SCM*) of India, covering around 100 cities also focuses upon improving the urban mobility (*Aijaz et. al.*). Some of the popular proposals relating to smart operation of signalised intersection across shortlisted smart cities are – Adaptive and coordinated traffic signals, traffic command and control centre, priority to public and service vehicles, productive use of solar and mechanical energy, etc.

2. Traffic signal optimisation

2.1. Concept of traffic signal optimization

Signalisation of road intersections is primarily done to maximize traffic flow rate and road safety along with reducing the delay. The whole concept of adaptive signals and signal coordination is based upon dynamic data capture, synthesis, archiving and analysis using various available digital and conventional techniques (*Misbahuddin et. al.*). The generalised schematic principle of operations for smart signals at traffic intersections is presented in figure 1 with its various disaggregate components.

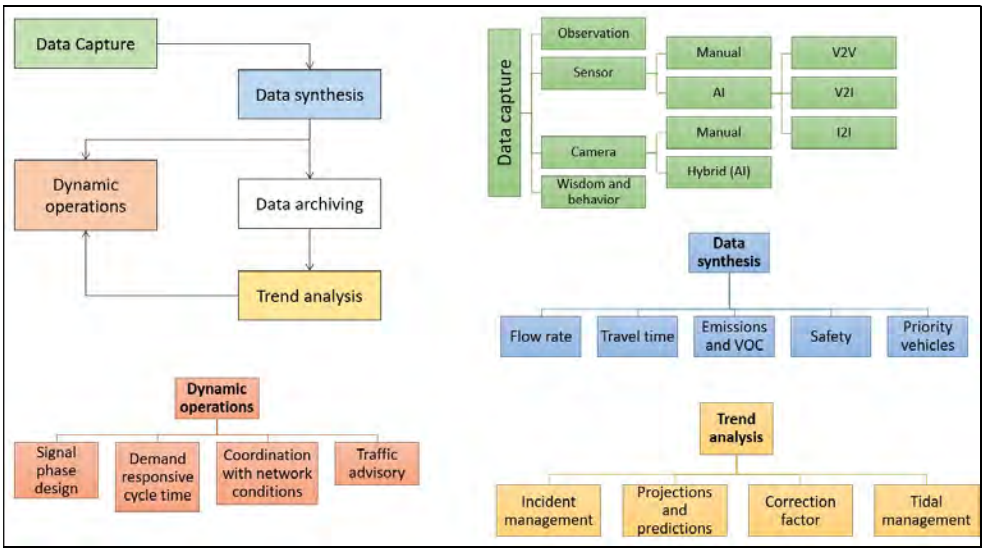


Figure 1 - Generalised schematic operation process at smart signals

Data pertaining to various traffic characteristics like speed-flow variables, vehicular composition, directional turning volume at intersections, lane utilisation, etc. is captured at all critical cross-sections (intersections and varying Right of way cross-sections) using sensors and camera. Traditional understanding and field observations compliment the data so collected. Some of the worthy and upcoming mechanisms of 'smart' data collection using Artificial intelligence (AI) techniques are V2V (vehicle to vehicle), V2I (vehicle to infrastructure) and I2I (infrastructure to infrastructure) which are capable of handling large sets multi-variate data (Bento et. al.). The data so collected in real time is then synthesised and archived at the central command and control centre for city wide operations. Synthesised data is also considered for real time signal phase design and triggers decision to ensure efficient signal operations along the network. Based upon periodic data collection along the complete network, trend analysis is carried out w.r.t traffic projections, incident management, peak hour management, seasonal correction factors, tidal flow corrections, etc. which helps in retiming of signalised intersection operations. Based upon isolated adaptive traffic signal operations, the other signalised intersections of neighbourhood and corresponding corridors are knit together under the framework of coordinated traffic signal operations. As the name suggests, the biggest advantage of adaptive signals is its stimulus to dynamic traffic conditions. The adaptive signalised intersection in coordinated conditions is therefore expected to cater the local and neighbourhood traffic flow by updating cycle time and signal phase. Since each intersection would have various permutations of cycle time and phases, coordination of signalised intersections in a network is an extremely complex process. It shall be noted that the rational of signal coordination and adaption remains same – increased efficiency and safety along with reduced net delay. Some other smart techniques used at signalised intersections to improve the overall mobility includes sensors and transponders for 'priority vehicles', dynamic pedestrian and vehicular phasing using sensors and pelican switches. In this research, the traffic signal optimization using digital interventions refers to combination of one or more above mentioned techniques

2.2. Evaluation of traffic signal optimization techniques

With adaptive signal operations, it is attempted to schedule signal phases in such a way that green phase of every cycle generally experiences near saturated flow conditions. One of the most direct outcome of efficient signalised intersection optimization is improved traffic flow rate. There are many secondary benefits of improved throughput through signalised intersections like –

- reduced net delay for traffic operations in terms of vehicle-hours
- reduced net emissions and air pollution due to vehicular operations
- reduced noise pollution
- reduced fuel consumption and vehicle operating cost

It can be also argued that improved performance of signalised intersection would lead to safer vehicular operations throughout the network. Some of the long term behavioural and intangible benefits out of optimized signal operations are –

- better enforcement of law and order along the network of smart signals
- reduced road rage and improved on road mutual empathy

Another anticipated benefit of improved throughput through signalised intersection is reduced diversion of arterial and sub-arterial corridor traffic to the neighbourhood network in the want of congestion free corridors. Some scholars argue that manual marshalling of

intersections is one of the most efficient and optimized ways of operating intersections as the stimulus and adaptations are prompt in this case. But it seems that manual marshalling is generally based upon local traffic experience and general wisdom which might not be able to process and coordinate with traffic characteristics in neighbouring network and intersections. In the light of above discussions, it seems that if implemented in true sense, signal optimization can lead to multifold benefits for our resources.

Although traffic signal optimization is still in its nascent days in a developing economy like India, the available limited experience and research highlights certain challenges w.r.t. the concept and process of optimization. As it has been already discussed in the previous section that traffic signal optimization is not a one-time action but rather a continuous process, the corresponding data archiving, data crunching, research and adaptations are indispensable for its success. This would necessitate robust infrastructure and skill capacities for the local traffic management agency. As the geometry, location and setting of each intersection in every network is bound to be unique, the optimization process needs to consider the same.

The dynamism in signal phasing and cycle timings might also lead to unpredictability and ambiguity among the road users. It would require reasonable awareness and time for the road users to assimilate and follow the signal optimization process. The bigger challenge here would be change and upgradation of the network geometry to put in place the required V2V and V2I communication systems. Also, it would be difficult for the signal optimization process to actualize its stated benefits unless driving and road user behaviour is in synchronization with the traffic optimization process at signalised intersections.

Another inevitable challenge leading out of improved signalised intersection operation would be augmented and induced traffic demand on the network. If at all, the level of service improves at signalised intersections along arterial roads and connected corridors, the private vehicle user might get tempted to be on road, who otherwise use public/shred transport. This would eventually increase the vehicles on road and the benefits of traffic signal optimization w.r.t. reduced delay may not be materialized. The above-mentioned phenomena, generally termed as 'vicious transport supply and demand cycle' is not unique to this intervention but it would be important to consider that the induced demand would pose challenges to the already complex signal optimization process.

3. Challenges in traffic signal optimization

As discussed in the previous section, traffic signal optimization requires each network and intersection to be attended individually because of its unique setting and role. It seems that traffic signal optimization cannot be attempted successfully using template-based upscaling approach because of the same reason. Further, most of the field knowledge relating to 'smart signals' and signalised intersection optimization is based on experiences of developed economy. The parameters and characteristics of traffic and corresponding signal optimization are bound to be different on Indian urban corridors. The following section discusses various challenges in Indian conditions relating to traffic signal optimization.

3.1. Mix of hierarchy and functions

Pertaining to ribbon development and bazaar culture, higher hierarchy corridors in Indian urban area are generally sight of commercial and mix landuse activities. This is mostly in

contradiction to the primary function and utility of arterial corridors as mentioned in various codes of practices like IRC 106, UTTIPEC and IUT guidelines, etc. Because of this ambiguity in hierarchy and functions of such corridors, the road network and eventually signalised intersections don't end up using their full potential.

3.2. Non – uniform road network

Like non-uniformity in priority and hierarchy, non-uniform carriageway, ROW and street infrastructure is also responsible for inefficient traffic operations at intersections and corridor. This not only reduces the overall LOS along the road network but also triggers unauthorized use and encroachments along the unused stretches of ROW. The traffic signal optimization would require certain infrastructure and information technology systems to be installed along the ROW for data capture and in absence of suitable ROW, the process may get compromised. Similarly, intersections would also require suitable ROW to accommodate design and IT features.

3.3. Side friction

Various activities and features like on street parking, hawking and vending activities, kerb side bus stops, encroachments, frequent punctures for access streets, etc. are termed as side friction because of impedance offered by them to traffic flow operations. It has been observed that side friction is responsible for reduced traffic flow variables (speed, density and flow) and causes turbulence in the traffic stream. The phenomenon gets escalated and disrupts the traffic flow through intersections when significant side friction is observed near the intersections. It can be observed from Table 2 that along major arterial and sub-arterial corridors of many cities, the average intersection spacing is around 350 m and 200 m for major and minor intersections, respectively. These frequent conflict and decision areas reduce the overall LOS of traffic operations through the road network. At intersections, varying desires and movements of every vehicle requires it to merge and diverge more frequently and therefore, even minor side friction may impact the traffic operations severely.

3.4. Heterogeneity in vehicular mix

Urban roads are observed to have varying mix of vehicles operating along them with extreme heterogeneity in it. Table 3 represents the share of standard car and other modes during peak hour in a traffic mix along major corridors of few selected cities.

Table 3 – Mode share during peak hour traffic along major corridors of selected cities

Sr	City	Corridor	Peak hour volume in vehicles (PCU*)	% share of vehicles (PCU*) in stream		
				Standard car	Other motorised	NMT#
1	Bhubaneswar	Janpath - 4.9 km	2772 (2230)	21% (26%)	64% (64%)	15% (10%)
2	Agra	M G Road - 5.8 km	3612 (2564)	11% (15%)	67% (66%)	22% (19%)
3	Jaipur	Tonk Road - 5 km	3937 (3112)	23% (29%)	68% (64%)	09% (06%)
4	Indore	M G Road - 4.1 km	5091 (3664)	21% (29%)	76% (68%)	03% (02%)
5	Patna	Bailey & Suri road - 7.1 km	4760 (2644)	10% (14%)	78% (78%)	12% (08%)

Source – Primary data other than for Agra^ MG Road Improvement Study, SPA Delhi 2014
*Vehicle to PCU conversions based on IRC 106:1990
NMT – Non – motorized transport

It is observed from Table 3 that urban roads cater to a variety of vehicles who share the same carriageway for travelling. Across all corridors, combined share of standard car and non-motorized modes vary from 22% to 36 % whereas the classification of other motorized modes haves highest share. Modes like powered two-wheelers, auto rickshaw, tempo, bus and other freight vehicles comprise of this classification. Certain stretches along these corridors don't have a usable sidewalk and cycle track which forces pedestrians and cyclists, respectively to use the vehicular carriageway.

Since a mix of vehicles operate in such traffic streams, the clearances, headways, acceleration-deacceleration, turning radius, vision cone, etc. of individual vehicle type is different and therefore the streams become turbulent in nature towards saturation flow rates. Correspondingly, the maximum utilization of signal phases and cycles is generally not observed because of vehicle heterogeneity in the stream. The situation gets degraded further because of missing driving discipline and lane-based driving. It has also been observed that certain vehicle types are unique to Indian conditions and it requires certain changes in sensors and approach to include their characteristics in data collection and archiving.

3.5. Tidal flow

The distribution of landuse and aggregation of major attracting landuse in a settlement triggers time based skewed and unidirectional traffic flow rate along corridors which is generally referred as 'tidal flow'. The unique characteristic of such a phenomenon is extreme variation in saturation rate between the two directions of traffic flow along the corridor. The behaviour is specifically visible along divided carriageways as on undivided carriageway, the vehicles spill over to other side of carriageway diluting the concept of directional traffic congestion. One of the major challenges posed by tidal flow phenomenon is inefficient signal phases and cycle time unless dynamically tweaked using available knowledge. At times, certain algorithm might give us a signal time and phasing resulting into minimum delay per unit vehicle, but it may not be practically implementable because of driving behaviour. The concept has been illustrated using field data in subsequent sections. As tidal flow might be a recurring but not a periodic phenomenon, state of art signal optimization would require adaptations accordingly.

3.6. Network characteristics

Another challenge in traffic signal optimization arises from the fact that intersection efficiency is also a function of road network including the characteristics of preceding and succeeding intersections. Any sudden incident anywhere in the network demands quick calibration of signal phasing and cycle times across the network. There would be limited gain out of a highly calibrated and optimized signalised intersection if it is located among and around inefficient intersections and networks. Since each of the intersections in a network is characterized by its own unique geometry, flow rate and desire, the optimization attributes are bound to be different among intersections. As heterogeneous mix of vehicles use this network, the vehicle density and other traffic flow parameters are bound to be different across lanes and segments between two subsequent intersections. This signifies that efficiency optimization of standalone signalised intersection and coordination of signalised intersections in a network would not have exactly overlapping goals. Therefore, to improve the overall mobility experience and reduce the travel delay along any network, suitable

appropriation might be needed at certain intersections. This would necessitate actions leading to purposeful deterioration of the LOS for specific standalone intersections to achieve better mobility experience along the corridor.

3.7. Efficacy of optimization techniques

The fundamental aim of signalised intersection optimization process is to achieve improved flowrate, speed, safety accompanied with reduced net delay to road users. Reduction in net delay along intersection and network can also be used as a yardstick to measure efficacy of optimization techniques. Average net delay per unit length with reference to free mean speed operations can be used to measure the impact of traffic signal optimization along the corridors. Similarly, average delay per vehicle (LOS criteria) can be used to measure the impact of traffic signal optimization at intersection, given that the traffic flow rates, and other conditions are not significantly altered. Both scales mentioned here seems to be not fully exclusive with each other and therefore their mutual relationship shall be studied. Unless not proved otherwise, it cannot be negated that reduction of delay at intersection because of traffic signal optimization will not lead to congestion along the surrounding corridor.

4. Case study

4.1. Bhubaneswar

Bhubaneswar is the administrative headquarter of Odisha state and is located around 70 km away from the Bay of Bengal in Khorda district. Famous for its beautiful temples and rich history, the core of present-day Bhubaneswar was designed by Otto Königsberger around 1948. Bhubaneswar is also one of the leading smart cities under Smart Cities Mission of India with various unique and state of art interventions for better quality of life for its users. One of the major components of smart cities mission is 'area-based development' (ABD) for which, Bhubaneswar town centre district (BTCD) along Janpath is being developed using retrofit and redevelopment approaches (Praharaj et. al.). As far as pan city development (PCD) proposals are concerned, one of the core and ambitious initiative is intelligent traffic management using smart signalised intersections. The central part of Bhubaneswar city is broadly aligned on grid-iron pattern with 4 major corridors running parallel to each other in north-south direction, connecting the Kharagpur-Chennai (NH16) National highway and is also relatively parallel to railway line. The 4.9 km long 'Janpath' stretch from 'Vani Vihar' intersection to 'Shishu Bhawan' intersection is host to most of the ABD as well as PCD interventions. Figure 2 represents the alignment of Janpath stretch in Bhubaneswar city.

Around 9 signalised intersections along Janpath are being upgraded with sensors and systems to reap the dividends of intelligent traffic management. As the surrounding landuse is primarily commercial and institutional along with some residential segments, on street parking and vending activities are frequently observed along the network. Although the on-ground carriage way width varies from 6 lanes to 8 lanes divided (18 to 25 m), but pertaining to certain physical bottlenecks like on street parking, and low turning radius at punctures, effective carriageway gets reduced to 12 to 18 m at certain sections. The landuse along the Janpath stretch is also dominated by commercial landuse on one side of the corridor although residential and institutional landuse line the other side of the corridor. Figure 3 presents the carriage way variations and broad landuse along the Janpath stretch.

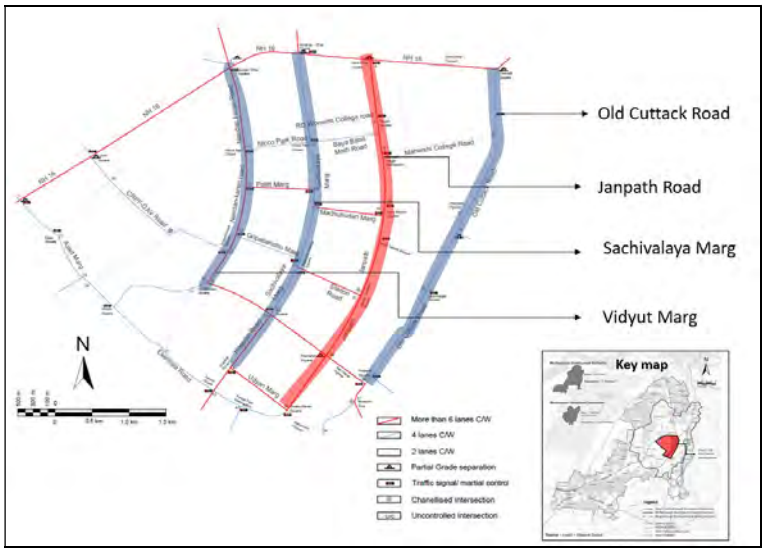


Figure 2 - Area based development in Bhubaneswar city as part of Smart Cities Mission

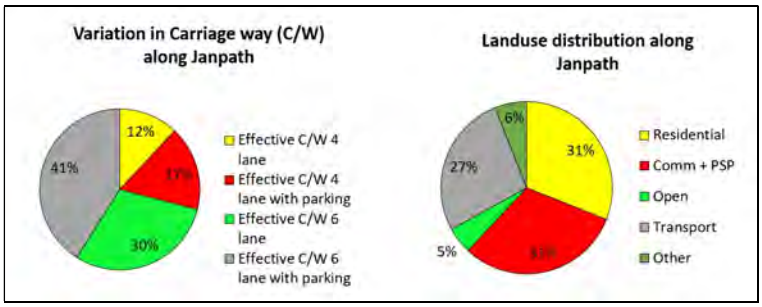
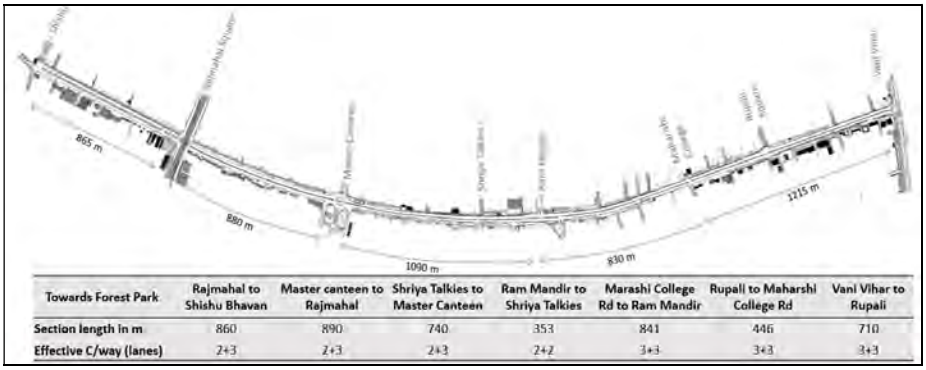


Figure 3 - Carriage way width and broad landuse classifications along Janpath

Source – Primary survey

As mentioned in Table 2, the 4.9 km long Janpath corridor hosts around 37 minor and major intersections/punctures which significantly alters the functional utility of the corridor as primary arterial corridor. Figure 4 illustrates the major segments and intersections along the Janpath corridor.



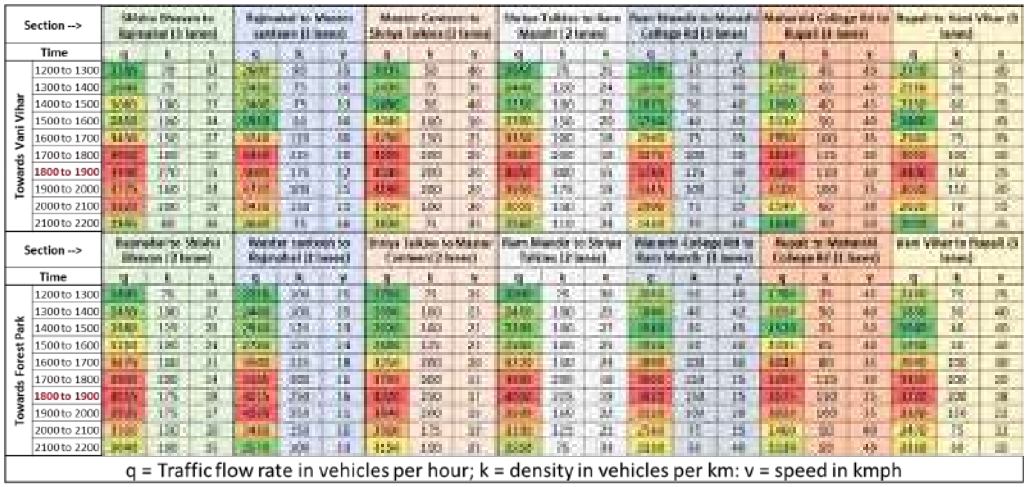
Towards Forest Park	Rajmahal to Shishu Bhavan	Master canteen to Rajmahal	Shriya Talkies to Master Canteen	Ram Mandir to Shriya Talkies	Marashi College Rd to Ram Mandir	Rupali to Maharshi College Rd	Vani Vihar to Rupali
Section length in m	860	890	740	353	841	446	710
Effective C/way (lanes)	2+3	2+3	2+3	2+2	3+3	3+3	3+3

Figure 4 Major segments and intersections along Janpath Corridor

4.2. Traffic flow along Janpath

The primary data collected along the Janpath corridor included traffic flow parameters – speed, flow, density (derived using linear speed-density model); simultaneously at major intersections for 10 hours. The direction wise synthesised traffic flow data is presented in Table 4.

Table 4 - Direction wise traffic flow parameters along Janpath corridor



Source – Primary survey

The Janpath corridor is divided in 7 segments and the data is presented in hourly window for 10 hours. The traffic flow rates along the corridor in either direction is almost similar and is getting saturated between 1800 to 1900 hours. Assuming an 80% ratio between Vehicles to PCU (Refer Table 3, corresponding to high share of powered two wheelers), the PCU values per lane per direction at extreme congested links, is around 1500. This value is significantly higher and necessitates interventions to improve flow rate as corresponding speeds are observed to be around 15 kmph. The alarming situation of traffic congestion and saturation was one of the driving reasons for investing into Adaptive traffic control system (ATCS) and right of way (ROW) redesign as part of smart cities mission.

4.3. Suitability for optimization

Although Janpath corridor is of the hierarchy of arterial corridor for the town of Bhubaneswar, commercial establishments and high demand of on street parking along the corridor dilutes that hierarchy. As mentioned in Table 2, approximately 37 major and minor intersections are lined along the corridor making the corridor unsuitable for through desire. The average puncture spacing along the corridor is less than 150 m, which makes it very difficult to implement any traffic management technique with efficacy. Based upon the traffic flow parameters observed in table 4, and assuming jamming density of 400 vehicles per lane (based upon average vehicle length = 2.5 m), the queue length generated by traffic signal operations along Janpath corridor is presented in Table 5.

Table 5 - queue length estimation using shockwave at intersections

Traffic condition	Flow (q) in V/dir/hour	Density (k) in V/dir/km	Speed (v) in kmph	Shockwave speed (ω)	60 sec queue length	90 sec queue length

Near capacity	4180	190	22	19.9 kmph or 5.5 m/s	(5.5*60)/3 lanes = 110 m	(5.5*90)/3 lanes = 165 m
Jamming	0	400	0			

Source – Deduced by author

As the average cycle time and corresponding waiting time at major intersections during peak hour is well beyond 90 seconds, a queue length of around 200 m is generally observed per phase along Janpath. This leads to the two way problem, one – the preceding junction to a signalised intersection is always prone to congestion locking because of backward propagating traffic congestion, two – the vehicles stop in the queue without leaving sufficiant headway leading to significant loss in head start during green phase.

Another challenge for optimised signal operation is full utilisation of green phase of the cycle time, which significantly depends upon the trend of straight and turning vehicles. A high share of turning movement at successive intersections corresponds to high share of local traffic interfering with through traffic. Table 6 presents the ratio between turning and straight moving vehicles.

Table 6 - Turning volume to straight moving vehicle ratio along Janpath during peak hour

Serial	Intersection (chainage value in m)	Ratio of turning vehicles/ straight moving vehicles
1	Rupali (710)	1.1
2	Maharshi College (1156)	0.8
3	Satya Nagar (1894)	1.0
4	Ram Mandir (1997)	1.8
5	Shriya Talkies (2350)	0.8
6	Master Canteen (3090)	2.1
7	Rajmahal (3980)	1.7

Source – Primary survey

The ratio between turning vehicles to straight moving vehicles along the seven intermediate intersections of Janpath corridor also suggests that the share local traffic is significantly higher along the corridor as compared to regional demand. As per the estimate from corridor wide origin – destination study (travel desire pattern), around 10% of the vehicles travel more than 4.0 km along the corridor (total length of corridor (4.9 km). This frequent mixing of local and linear traffic causes significant impedance and reduces the overall level of service along the corridor.

Traffic signal optimisation can yield its stated benefits if only there is uniformity and predictability in the support indicators of the traffic and corridor. The significant fluctuation in carriageway width, vehicle heterogeneity, local versus regional demand and frequent punctures are significant challenges for implementation of adaptive traffic control systems.

4.4. Optimisation challenges

Driving discipline, non-uniform road geometry, high rate of side friction and significantly higher flow rates are major challenges in using the smart signals. Even with excluding all other challenges, signalised intersections might not be as successful on such congested corridors because of the practical capacity of signalised intersections. Few intersections along Janpath are already experiencing more than 12000 vehicles of hourly inbound volume which necessitates grade separation and interchanges. The corridor either requires demand

management (and reduction) to successfully reap the dividends of intersection signalisation or would require capacity augmentation in terms of wider/ multi tier corridors. In this regard, the suggestive approaches based upon field learnings and feedback from operating agencies is presented in subsequent section.

5. Solutions for improved efficiency at traffic signals

5.1. Immediate/ short term

- The right of way and carriage way shall be uniformly distributed to avaoid geometric bottlenecks. Extra slip lanes shall be provided to facilitate outgoing traffic so as to reduce the saturation levels and frequent side-punctures shall be restricted. If at all necessary then service roads can be used to dilute the impact of side punctures, parking and estaqblishments on primary arterial corridor.
- The hybrid and auxiliary lane marking (at least at the intersection influence zone) in heterogeneous traffic condition can help in optimising the stream movements. As vehicles tend to stop with negligible gaps between vehicles, this leads to significant accelerating and head start loss. Lane wise box marking or 3D holographic projections along each lane can be used to artificially infuse minimum gaps among vehicles in queue which can help in improving the flow rate at intersections. Although this would lead to increased queue length but would improve the flow rate because of simultaneous acceleration and movement of all vehicles in a lane. Figure 5 illustrates the lane wise box marking and corresponding gain in throughput.

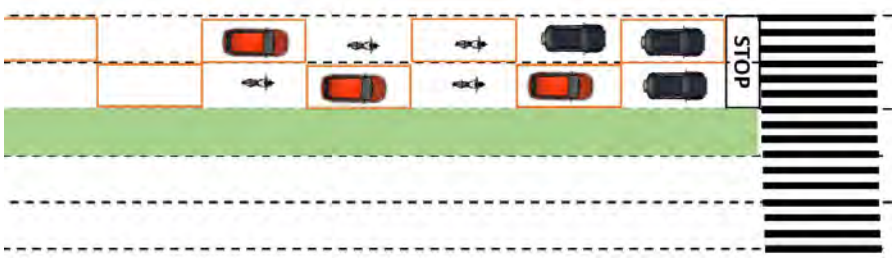


Figure 5 - Lane based box marking illustration

5.2. Long term

- Travel demand management and preferential treatment to non-private modes as part of policy intervention shall be carried out phase wise to optimise the corridor. Essentially this is demand management through optimising mode mix. Other techniques of travel demand management include restriction to specific modes (like heavy vehicles/slow vehicles/long vehicles, extra) for specific duration of the day to stagger the demand. Alternative corridors can also be developed to divert the traffic from existing corridors. Also, the conflicting traffic shall be segregated as they not only reduce the throughput but also cause unsafe operations. Here, conflicting traffic refers to one or more combination of following characteristics -
    - Slow-fast (motorised – non motorised)
    - Local-regional
    - Passenger-freight

- Traditionaly driven-self driven

- Many of the on road incidents and conflicts can be avoided with standard driving conditions and discipline. Multiple mechanisms of improving on road awareness can definitely improve the capacity and level of service operations.
- Self driven and mutually communicating vehicles can also help ion improving the efficiency of operations as driving discipline and standard protocols can be expected to be better adhered. In a scenario where traditionally driven vehicles and self driven vehicles operate simultaneously in traffic streams, it would become indispensable to follow standard rules and discipline of operation.

6. Conclusion

Adaptive traffic control systems have improved the level of service and flow indicators significantly in those cases where uniformity in modes and right of way characteristics have been observed. Unlike them, the arterial corridors in many of Indian cities are host to varied kinds of heterogeneity. Leave apart smart signals, theses corridors are theoretically not even suitable for manually operated/marshalled signals because heavy flow rate and high side friction. To reap the true dividends of smart signals along such corridor, multiple simultaneous attempts are required to not only justify the investment but also to ensure that social, economical and environmental indicators are not getting deteriorated. In absence of such mechanisms, no significant gain can be evaluated out of smart signals.

7. References

Shriniwas S. Arkatkar (2018) "Traffic operations and capacity analysis in India", Transportation Letters, 10:2,65-67

Alam, M.A. and Ahmed, F., (2013) "Urban transport systems and congestion: a case study of indian cities", Transport and Communications Bulletin for Asia and the Pacific, 82, pp.33-43.

IRC, I.R.C., 1990. 106. (1990) "Guidelines for Capacity of Urban Roads in Plain Areas", Indian Roads Congress, New-Delhi (pp. 1-10).

Chandra, S. and Kumar, U., (2003) "Effect of lane width on capacity under mixed traffic conditions in India", Journal of transportation engineering, 129(2), pp.155-160.

Vaidya, C., (2009) "Urban Issues, Reforms, and Way Forward in India", Department of Economic Affairs, Ministry of Finance.

Government of Inidia, (2006) "National Urban Transport Policy, 2006".

Curtis, C. and Tiwari, R., (2008) "Transitioning urban arterial roads to activity corridors", Urban Design International, 13(2), pp.105-120

Prashanth, L.A. and Bhatnagar, S., (2011, October), "Reinforcement learning with average cost for adaptive control of traffic lights at intersections", 14th International IEEE Conference on Intelligent Transportation Systems (ITSC) (pp. 1640-1645). IEEE.

Radhakrishnan, P. and Mathew, T.V., (2011) "Passenger car units and saturation flow models for highly heterogeneous traffic at urban signalised intersections" Transportmetrica, 7(2), pp.141-162.

Aijaz, R. and Hoelscher, K., (2015) "India's Smart Cities Mission: An Assessment", ORF Issue Brief, 124, pp.1-12.

Misbahuddin, S., Zubairi, J.A., Saggaf, A., Basuni, J., Sulaiman, A. and Al-Sofi, A., (2015, December), "IoT based dynamic road traffic management for smart cities", 12th International Conference on High-capacity Optical Networks and Enabling/Emerging Technologies (HONET) (pp. 1-5). IEEE.

Bento, L.C., Parafita, R. and Nunes, U., (2012) "Intelligent traffic management at intersections supported by V2V and V2I communications", 2012 15th International IEEE Conference on Intelligent Transportation Systems (pp. 1495-1502). IEEE.

Praharaj, S., Han, J.H. and Hawken, S., (2018) "Urban innovation through policy integration: critical perspectives from 100 smart cities mission in India", City, culture and society, 12, pp.35-43.

Case Study / Project

The Goldilocks Zone for the public sect or innovation

-Teresina 2030 towards resilience to climate change in the developing world

Mariana FIUZA, Gabriela UCHOA, Flavia MAIA,

Abstract

The term äóìGoldilocks Zoneää refers to the habitable zone around a star where the conditions are just right- not too hot and not too cold - for liquid water to exist on the surface of a planet. It provides a way to predict the habitability of newly found planets and moons. Just like in astronomical science, there is evidence of a public sector äóìGoldilocks Zoneää , where the conditions are perfect to find thriving innovation in the public sector. Local governments that are not too big and not too small are in this zone as they have enough complexity to create a fertile ground for innovative solutions to flourish without being excessively hierarchical and bureaucratical. In the developing world, urban populations are the most affected by climate change due to an overlap of social and environmental vulnerabilities. At the same time, local governments often have the most limited resources to follow through on sustainability and resilience commitments such as those expressed in the Agenda 2030, the New Urban Agenda and the Paris Agreement. In this scenario, innovation works to support local governments to deliver new products and services aiming the creation of public value and efficiency gains. To support the public sector to fulfill global agendas, a group of civil servants in Brazil created Teresina 2030, a hub for innovation within the Planning Department of the Municipality of Teresina, that prototypes solutions to strengthen urban resilience, by combining open government and smart city strategies. Our aim is to update planning and policy tools to respond to the complex situation of Teresina in the face of climate change. This situation includes a difficult geographical situation -- near the Equatorial line, in an extreme hot weather -- and a challenging economic context -- high socioeconomic inequality combined with scarce technical and educational resources in the public sector. In this paper, we placed Teresina in the 'Goldilocks Zone' for the public sector innovation and what does it mean to be in this zone. Teresina is a medium-sized Brazilian city that is not too small: it faces all these complex challenges that may not have been addressed yet by many other cities around the world, as it goes beyond issues with basic services provision, what makes Teresina a test bed for new solutions. However, Teresina is neither too big: it can avoid excessively bureaucratic and hierarchical procedures that hinder innovation in megacities. Like Teresina, there are several cities across the globe which are able to create an innovation ecosystem despite the common challenges to cities in developing countries, especially regarding scarcity of resources.

This paper explores Teresina features that position the city in the äóìGoldilocks Zoneää for public sector innovation and allow this group of urban planners from the local government innovation hub to overcome five challenges in two years since Teresina 2030 was created. Political and technical barriers, low collaboration among municipal departments, staff limitation, digital divide and unavailability of data are addressed with low-cost tools, international partnerships, innovation in bureaucratic processes, as well as a serious commitment of the practitioners with critical scholarly debates, planning researches and academic networks.

Case Study Paper

Smart Cities and The People: Urban Planning Collectives in Indonesian Cities

Hasanuddin, Dian Zuchraeni Ekasari, Alumni of Urban and Regional Planning Gadjah Mada University

Abstract

Come to Indonesia. Change is in the air. Can you smell it? For less than the last decade, there are urban planning collectives that have been growing organically, on-line and off-line. They are young, energetic, and critical. They utilize technology as the platform and tool. They see phenomenon, analyze data, discuss, collaborate, and take actions. Whereas buzz words such as smart cities, automation and big data analysis have been crowding city managers and planning worlds, these collectives demonstrate that change can begin within the society without governmental support at all. Nevertheless these collectives are based from the intellectual elites in Javanese cities, hence the question: can we replicate and deepen such initiatives to general citizen? to other cities beyond Java Island? Can we go against Jakarta-bias? Can we create an ecosystem to be smarter together and create our shared values despite the 'smart' and automation part of the cities? With a closer look to urban planning collectives in Indonesia, together we learn and build the path to be smart together with our cities.

Keywords

Urban planning collectives, smart cities, young community, on-line platform, smarter together.

1. Introduction

Smart City is an inevitable future of our cities. This is becoming a trend not merely because the government program but most importantly because the technology development both in industrial sector and daily life of the citizen. With the national internet users proportion of 55% (Ministry of Communication and Informatics, 2018), Jakarta the capital city of Indonesia has rated 19.1 of 30 points for citizen awareness and satisfaction of smart city application in their city. This point is higher than 13 European cities, even the Asian cities such as Singapore, Bangkok, and Hong Kong. This positive adaptation points out to be correlated with having a young population that accepts a more digital way of doing things (Smart Cities: Digital Solutions for a More Livable Future, McKinsey Global Institute 2018). The 'digital way of doing things' appears in daily life with Internet of Things (IoT) for daily services such as transportation, banking, and most importantly communication. Emerging of social media platforms has changed the basic primary communication form into virtual connection, with the advantage of time and place flexibility for 'anytime anywhere' communication form.

The social media platform has also become a media for youth to express their ideas. In the realm of urban planning this has also become a phenomenon with the existence of Planning Collectives. Young, energetic, and critical, the Planning Collectives use social media as the platform to highlight, talk, and discuss urban planning issues. The online platform comes together with offline event such as discussion and exhibition. The most popular Planning Collectives were born out of academic settings. It was found by the students of Urban and Regional major in reputable universities of major cities in Indonesia. In this paper we will take a closer look to these Planning Collectives and examine how they grows organically, what they aim to achieve, and moreover how they position as a part of Smart Communities element of Smart City.

2. Urban Planning Collectives

Urban Planning Collectives refer to community who has keen interest in urban issues specifically from the perspective of spatial planning, and collect data, process into information, publish the information as discussion material, and provoke discussion. These Planning Collectives run the activity in online and offline platform to have wider coverage than the community in their physical proximities.

With the nature of urban-issues as cross-cutting issue experienced by all citizen, the publication, discussion, and the Planning Collectives itself gain attention by other urban communities. The Planning Collectives exists in 4 major Indonesian Cities, Jakarta, Bandung, Jogja, and Makassar, with variety range of activities, which will be further elaborated below.

2.1. Ketempatan, Jakarta

A former Pemuda Tata Ruang chairman and co-founder, who was also a student of Urban and Regional Planning major Universitas Gadjah Mada, established Ketempatan in 2017. As an online focused community, Ketempatan started it activities by publishing popular article on its website. The main objective is to position urban issue from citizen, by citizen, and for citizen, through providing evidenced-based information. Ketempatan targets Internet user who are mostly young or productive-age people, with the idea that everyone has the right for a high quality urban study. To accomplish its goal, Ketempatan has the strategy of re-writing dissertation, research paper, or articles with analytical and evidence-based content. They approach the writers to have their consent for the rewriting, so they can still have publications without the hesitation to take time for writing.

Ketempatan has one online platform that differs with other Planning Collective, the Podcast named Teras Kota or City Terrace. The podcast was started with the agenda to provide easy listening urban talks with various resource persons. Teras Kota quickly gain popularity, as podcast become trend in urban online life. It brings freshness in the podcast era, since the talking focus on a rare subject of urban issue and present in casual style conversation. The podcast also a strategy to bring urban issue to daily public talks, with a laid-back and easy-to-digest packaging yet still based on expertise of the resource persons.

Ketempatan has collaborated with numerous stakeholders for articles in website and podcast.

Collaborators from non-government organization, researcher, government, and urban enthusiast become contributors for various topics such as housing, infrastructure, and city management. The collaboration and further networking are managed by 3 persons, the Founder as the editor, and two other person as podcast manager and social media manager. Petarung is operated in the basis of friendship, since the founder and managers are collage or office mate. Their similar interest on urban issue, and concern for an evidence-based urban study has brought them together in the Planning Collective. They are also trying to develop networking with other urban communities through the website. Now they are preparing a new format podcast, containing interviews with foreign academia to discuss about current urban issue and theory, and then compare it to local Indonesia context.

2.2. Kolektif Agora, Bandung

Based in Bandung, West Java, Kolektiv Agora was founded in 2017 by 3 urban and regional planning students of Institut Teknologi Bandung. They aim to create discussion platform for urban issues from the daily reality and perspective of citizen, and provide alternative source of urban information for citizen.

Kolektif Agora runs the activities in online platform through blogging website 'Medium' and social media 'Instagram', and offline via regular discussion forum. The online activities occur more frequently, with regular publication of articles and infographics related to urban-issues. The articles are published through Medium, a blogging site in which Kolektif Agora has a certain page linked to each writer's own page. The publications in Instagram are made from a set of data and simple analysis that translated into a simple and attractive infographics and posters format. The publication provides not only information, but also provoke question for readers concerning certain urban issue. There are also publications in Instagram that contain links to the article in Medium. The online platform of Instagram has 3,476 followers, the highest from 4 Planning Collectives. Kolektif Agora using online platform strategically as the basis of their activities, including the distribution of knowledge and information about offline discussion.

The offline discussions are held with collaboration with various stakeholders ranging from Non-Governmental Organization, research groups, to individuals working in academia and government. The collaboration occurs with extensive topics that being picked based on the folk-work-place of aspects of urban issue, such as public space, transportation, infrastructure, urban-rural linkage, city health, inclusiveness, poverty, housing, urban politics, environment, and music. To organize the offline discussions and online activities, Kolektif Agora now has 22 activists including 3 founders. The activists were involved through open recruitment to specialized position such as writer and photographer. The recruits came are students from urban and regional major or other majors from several universities in Bandung.

2.3. Petarung Kota, Jogja

Petarung (or Fighter in English) stands for Pemuda Tata Ruang or Planning Youth, is the first planning Collectives established in Desember 2012 by 15 students of Urban and Regional Planning major Universitas Gadjah Mada Jogja. As stated in the tagline, Petarung aims to increase citizen's awareness of their neighborhood and city planning. The strategies are through

research and discussion, disseminate issue and gather opinion through media, socialize urban planning issue to citizen, build awareness via citizen empowerment program, and build partnership with multiple parties to increase citizen awareness of urban planning.

Since the beginning Petarung focuses itself on action such as campaign, discussion training, and joint study. One of the annual offline activities is training for high school student in Jogja named 'Strong' or Sekolah Tata Ruang/Urban Planning School. Petarung also take part in the celebration of World Town Planning Day, in the form of public campaign and discussion. As the first urban planning community in Jogja, Petarung has regularly being involved in numerous events from other stakeholders. They have been invited to discussion by national, provincial and city/regency government regarding city-planning policies, such as land use incentive and disincentive, urban Habitat policy formulation, and strategic environmental impact assessment. Petarung also invited various discussion held by non-government organization with topic related to urban planning, such as environment with community development. The community also involved as a facilitator in joint study or field visit with other research group and students from foreign university who visited Jogja and study about it specific local site planning in urban kampong.

The online platform becomes a media to share the information regarding offline activities, share short information concerning urban issue, and provoke further discussion. Petarung initially used social media Twitter, as a popular micro blogging site to provoke online discussion. They usually provide several short information concerning a particular urban issue, and/or post statement from other prominent person or organization. Such effort gave instant popularity for Petarung, as on that time there is still limited discussion on urban issue in social media, especially form the youth. Petarung then expand its online activities to other platform namely Facebook, Instagram, Youtube, and a dedicated website.

As a community, Petarung has been continuously active for 7 years through different activists. The activists organize Petarung in a structure of chairman, secretary, treasury, and 3 thematic divisions of public relation, media and design, and literation. There is annual open recruitment for new member based on the needs of each division. The new member and committee in Petarung always consist of students from various public and private universities in Jogja that active on voluntarily basis. To sustain their activities, Petarung collaborates with stakeholders in organizing events, and also receive donation from its alumni.

2.4. Nekropolis, Jogja

3 students of Urban and Regional Planning Universitas Gadjah Mada started Nekropolis in 2017. As their tagline 'Discussion Platform and Writing Media for Urban Issue', the founders aim to discuss urban issue encompassing urban planning theoretical approach, wider to the interlink with other disciplines. They believe Planning could only succeed when the citizen become an active part of urban planning process, not merely an object. Hence it is fundamental for city planner to have a solid link with civil society, including social major students and social movement communities.

In the other hand, Nekropolis see that the current social movement in Jogja requires a more technical approach, including the analytical and data-based basis to support their acts. This condition in the context of urban issue creates the need for collaboration between social and

technical approach, where Nekropolis exists as the bridge to produce an urban alternative narration. Nekropolis held offline discussion with social communities in Jogja such as feminist, literacy, and art community. They also collaborate with other organization in university, such as the university student union body, urban and regional major student union body, and research organization. The interlink between social and technical approach in urban issue are reflected in range of discussion topics, from transportation, housing, urbanization, to city inclusiveness and urban politics. Nekropolis delivers its discussion mainly in local Jogja context, yet also taking into highlight several popular issues from Jakarta, Surabaya, Batam and Bogor.

Although based in Jogja, founded, and run by students from the same university, Nekropolis puts more focus on online and offline urban discourse while Petarung actives in offline movement. Nekropolis uses online platform Medium and Instagram to share their writing on urban issues, and publish information of the offline activities. They also produce infographics and videos in Instagram and Youtube, containing figure and facts about various urban issues in open-ended style to provoke further thought and discussion from the viewers. In social media Instagram, Nekropolis periodically engages their followers in discussing specific urban issue such as public space, urban transportation, traditional market, and smart city.

Nekropolis currently has 10 activists consisting of alumni and students form engineering and social major in Universitas Gadjah Mada. They manage the online and offline activities of Nekropolis. Since most of them are now working in other city outside Jogja, Nekropolis tries to have a periodic working schedule and regular theme for their publication. Flexibility and sustainability also become concern for Nekropolis, as they are preparing future coping strategy for its existence within the daily formal profession of its activists.

2.5. Kotata', Makassar

5 students of Universitas Hasanuddin initiated Kotata in 2017. Different with other Urban Planning Collectives, Kotata was founded in Makassar, a metropolitan city in South Sulawesi outside of Java Island. The founders are a mix of 4 students of Urban and Regional Planning major, and 1 student from Environmental Engineering major. At first the concern to urban issue discourse connected them together. They then make a proposal of introducing children to urban issue and followed a Student Creativity Contest. The proposal got accepted and the first Kotata' program came into realization.

Kotata' focuses to offline activities. In 2018 they run a program of Introducing Urban Issue to a class of elementary school children, by talking about urban environment and learning to make a documentary video together. They then used online platform Instagram to publish the videos. After that Kotata' collaborated with environmental engineering student union and disaster mitigation community to held 2 campaign relating to city waste.

In managing it activities, Kotata' has held open recruitment for activist. Several students from engineering and social major join Kotata' and support the activities, including developing website. Beside being more active in online platform, Kotata' also plan to be consistent in introducing and promoting urban issue to elementary school children as the future agent of city development.

Table 1 General Comparison of The Urban Planning Collectives

Urban Planning Collectives	Comparison				
	Location	Founded	Focus	Online Platforms Variety	Followers of Instagram (similar platform)
Ketempatan	Jakarta	2017	Online	Website, Instagram, Podcast	845 followers
Kolektif Agora	Bandung	2017	Onlin, Offline	Medium, Twitter, Instagram	3,529 followers
Petarung	Jogja	2017	Offline	Website, Facebook, Twitter, Instagram, Youtube	2,759 followers
Nekropolis	Jogja	2012	Onlin, Offline	Medium, Twitter, Instagram, Youtube	1,790 followers
Kotata'	Makassar	2017	Offline	Website, Instagram	265 followers

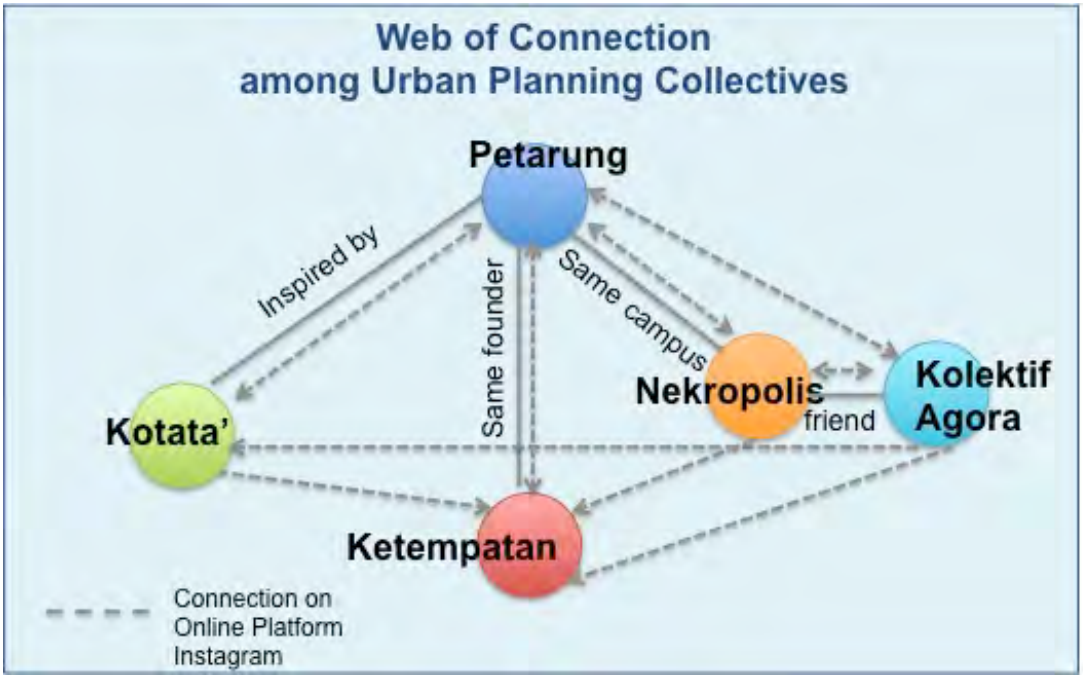


Figure 1 Web of Connection among Urban Planning Collectives

3. Urban Planning Collectives and Smart Cities

In the context of intelligence, Smart City could be defined as a territory with high capacity for learning and innovation, which is built-in the creativity of their population, institutions of knowledge creation, and digital infrastructure for communication and knowledge management (Komninos, cited in Holland 2008). From the definition we could see that there are several elements of Smart City to be appropriate for its 'smart' title. As stated by Kumar ini 2015, smart city consists of 6 major elements namely smart economy, smart environment, smart living, smart mobility, smart governance and smart people (Kumar, cited in Gupta, Mustafa and Kumar, 2017).

Urban Planning Collectives are part of Smart People in Smart City, because they are part of citizen that are using information-communication technology as a platform to contribute to the city development. Not only they are taking action in the real offline space, the Urban Planning Collectives also bring the action to virtual space in the online internet setting. They use offline and online space interchangeably, as a canal for their internet and passion to urban issue.

The effort could happen with the specific character of the Urban Planning Collectives. Looking to the study of Gupta, Mustafa, and Kumar in 2017, there are several traits of Smart People that can be found on Urban Planning Collectives activists. The personality dimensions that are appearing in Urban Planning Collectives members are extroversion, openness to experience, agreeable, and conscientiousness. These traits has supporting them in producing knowledge for general citizen regarding their common urban space. The Urban Planning Collectives has been doing their actions voluntarily, using their personal resources such as time, energy, money, gadget, and network. The reality that these Collectives actually operates based on passion for city improvement, has to be acknowledge as a social capital of smart city. Their existence has influencing other communities who collaborates with them, and furthermore general citizen to put more attention in urban issue and give more contribution to city development.

These impacts are beneficial for Smart City Development since this is the part where the people as smart city element, could learn to become smart together using intersection of technology and their own social networks. Furthermore, the learning process to be smart together with Urban Planning Collectives could provide outcome in the form of better translation of citizen needs for city development. General citizen who has acquire knowledge about urban issue, can better understand the dimension and interlink of factors and actors in city development.

This social capital of Urban Planning Collectives has the potential to be utilized in the development of city, including in the formulation of algorithm for smart city. They could participate in both sharing and gathering citizen values and aspiration for the city development. Beside the current common practice of involving academia as resource person in city policy formulation process, the involvement of Urban Planning Collectives that has been practiced in several cities, could become an attempt of wider stakeholders view and participation. The development of smart progressive city cannot simply be done with the adoption of sophisticated technology infrastructure, but more importantly it requires the input and contribution of various groups of people (Hollands, 2008)

The Urban Planning Collectives might be quite homogenous as it mainly consists of educated youth and from urban and regional planning background, yet it is their influence and collaboration to wider communities and general citizen that make them valuable for smart city.

The process of urban-related information being shared and discussed, creation of urban narrative in online platform, and assimilation between urban technical and social aspects I general citizen discourse are actually the precious parts of Urban Planning Collective existence in Smart City. With better understanding of how city can be planned, developed, and managed based on citizen needs, there will be an improving translation of citizen needs to technical urban planning language. The creation and agreement of shared values for smart city development could then be acquired more accurately to the actual needs of citizen.

4. Smart Cities in Indonesia

The Government of Indonesia has issued "100 Smart Cities Movement" in 2017, which aim to assist Indonesian cities in preparing Smart City Masterplan to optimize technology services, both for public service improvement and for potential city sectors development. This program is lead by Ministry of Communication and Information in collaboration with Ministry of Internal Affairs, Ministry of Public Works and Human Settlements, National Planning Agency, and The Office of President's Staff. Within 3 years from 2017 to 2019, there are 100 cities that are supported to be Smart Cities. The cities vary from large to medium populated city throughout Indonesia including Java, Sulawesi, Kalimantan, Nusa Tenggara and Papua Island. The cities were selected in the consideration several aspects such as city visioning, regulation, human resource and economic potency.

The "100 Smart Cities Movement" also acknowledge Smart People as one element of Smart City. This is reflected with the establishment of Smart Citizen Network, which consists of 34 youth representative from 34 provinces in Indonesia. They are expected to become agent for accelerating digital literacy and smart utilization of technology in all cities in Indonesia. This is also a program to convey the importance of citizen participation in Smart City development.

In capital city Jakarta, the Jakarta Smart City (JSC) has been launched and activated. It operates under City Government in the form of special unit with dedicated budget. JSC produces specific output related to automation of Smart City Services in the area of transportation and other public services. Nevertheless the provision of public participation channel is still limited. It is only in the form of reporting issue or bad urban services via Qlue Application, and giving input to city programming via e-musrenbangda system. The type of participation based on Arnstein Ladder of Participation (1969), then the participation type is limited to tokenism and consultation, where citizen could give inputs but not granted to be taken into consideration in city policy formulation.

In the practice of Smart City, this could be compare with Kitchen study in Dublin year 2017. He found that the citizen participation in Smart City through the provision of several applications are not yet sufficient. Furthermore he also used Arnstein Ladder of Participation and provide more insight on the kind of limited participation in Smart City era.

The emergence of Urban Planning Collectives could be seen as a window for improving citizen participation in Smart City Era, not only for improving the smart city policy, but more importantly to assure that citizen could grow smarter together with their city.

5. Reference

SIARAN PERS NO. 53/HM/KOMINFO/02/2018 Tanggal 19 Februari 2018 Tentang Jumlah Pengguna Internet 2017 Meningkat, Kominfo akan Terus Lakukan Percepatan Pembangunan *Broadband*
https://kominfo.go.id/index.php/content/detail/12640/siaran-pers-no-53hmkominfo022018-tentang-jumlah-pengguna-internet-2017-meningkat-kominfo-terus-lakukan-percepatan-pembangunan-broadband/0/siaran_pers
Accessed on June 10, 2019

Will the real smart city please stand up? Robert G. Hollands 2008

3: Smart People for Smart Cities: A Behavioral Framework for Personality and Roles: Smarter People, Governance, and Solutions
Shristi Gupta, Syed Ziaul Mustafa, and Harish Kumar, May 2017

Kitchin, Robert "Being a Citizen in the Smart City, 2017

Case Study / Project

Urban Planning in a Mediatized World

Case of Egypt

Mennatullah HENDAWY

Abstract

In this digital and information age, there is a rising assumption that planning will change dramatically. At the same time, there is a wittnenessed increase of the potential role of media in urban research and practice, and there are many demands for democratic and communicative planning practices. In Egypt, urban planning is still centralized, large scale, top-down and known by its entrepreneurial nature despite the trials to implement strategic planning for more than 25 years aiming for decentralized planning participatory processes. This led to dispatched planning processes inducing gated communities and mega-projects that are highly proclaimed and praised by all kinds of media platforms and channels reaching its pick in this information and technology revolution era: the 21st Century.

Media refers to the medium or tools of communication that are used to deliver a certain message (that are vocal, visual or textual). As a place making field, urban planning needs to respond to the changes in media and the corresponding chances and challenges among not only urban planners but also authorities, investors and community members. Two main research questions are addressed: How media 'structures' the way planning is communicated, and How the way planning is communicated via media is reflected in planning decisions. This is investigated through a qualitative research involving interviews with urban planning students . In addition to visual analysis of samples of urban projects that involved both manual and digital tools in its development.

Case Study / Project

Smart city and regenerative city

complementary or contradictory approaches.

Dorota KAMROWSKA-ZALUSKA

Abstract

Rapidly developing new disruptive technologies and digitalization is allowing for creation of smarter cities where urban dwellers are submerged in full of ubiquitous sensors and devices urban realm. Increasing connectivity is allowing for interoperability between system giving base for conducting real time data driven policy. At the same time with rise of consumption, urbanisation in its current form is threatening the very future of humanity and the natural world. There is a need for actions that can help to continuously renew and restore the ecosystems that underpin the existence of our urban systems (C. Du Plessis, 2012). Protecting nature from physical urban expansion (however important are such initiatives) is not enough, there is a need to take positive steps to create regenerative cities (Girardet H., 2015). Numerous cities are adopting various 'smart' and innovative solutions, but one can ask if all of them are strengthening sustainability and resilience of urban fabric (Kamrowska-Zaluska, D., Obracht-Prondzynska, 2018).

Above mentioned phenomena evoke questions important for the future planning and design of the cities: - Can smart solutions and infrastructure support shift toward regenerative sustainability? - On what conditions can data driven policy help shaping sustainable urban planning and management? - Can smart policies and solutions help to create regenerative urban systems of production, consumption, transportation and construction? The aim of the study is to recognize relation between smartness and regenerative sustainability in contemporary cites. Today's world need a change of approach in order to strengthen human-nature relation. There is a need to determine how new technologies affect the development of cities as well as the way it influence ecosystems and wellbeing of their inhabitances.

Proposed study is conducted in frame of COST Action RESTORE Rethinking sustainability toward a regenerative economy which aim is to advocate, mentor and influence restorative built environment. The RESTORE is investigating how a new focus of sustainable built environment can be a driving force for changing the status quo of today's practice beyond legislation and client requirements. Sustainability targets (such as SDG Goals) are forcing planners and designers to, embrace forward thinking, access and implement multidisciplinary knowledge, and multiple tools that simulate dynamic and complex future scenarios. Part of research activities is to assess how new emerging disruptive technologies influence designing new urban environments and sustainable buildings.

Research Paper

People, Places, Memories and Mobile Apps

Understanding the Potential of Augmented Reality in Public Participation and Community Development

Ming-Chun Lee, Ph.D., School of Architecture, University of North Carolina at Charlotte; USA

Abstract

Augmented Reality (AR) goes beyond the dichotomy of passive methods of engagement with the public. It offers an interactive method to expand visualization techniques in participatory planning processes. This paper discusses three mobile apps developed by a partnership. These apps support a series of community events aimed at increasing overall public participation and civic engagement with a goal of increasing awareness of community history through data visualization and story-telling.

Keywords

Augmented Reality (AR), Public Participation, Community Development, Civic Engagement, Data Visualization

1. Introduction

Samuel Mockbee once argued that the practice of community planning and design not only requires individual participation in the profession, but also requires active civic engagement (Mockbee et al., 2003). He stressed the importance of a deeper democratic purpose of inclusion in energizing one's community. Many methods for public participation have been introduced in urban planning and its allied fields such as architecture and urban design. This type of community-based practices has its root in the field of participatory design, which is a response to the demand to have voices heard and ideas taken from those who are involved in the design process. It sees community members as citizen designers who play an active role in shaping the formulation of both the design process and its ultimate results (Arnstein, 1969).

One of the issues facing this type of participatory design has to do with the challenge of making the process comprehensible, relevant, and interesting to the potential participants in order for them to willingly participate in the process (Baykurt, 2011). Augmented Reality apps on personal mobile devices, such as smart phones or tablets, may offer some clues. Immersive visualization technologies, such as Virtual Reality and Augmented Reality (AR), are powerful tools to facilitate participatory approaches in community design. As a visualization apparatus, AR goes beyond the dichotomy of passive methods of engagement and their one-way communications with the public. AR offers an interactive method to expand both non-computerized and computerized visualization techniques in community design. Moreover,

AR increases public engagement by providing comprehensible information to citizens and assisting them to express their preferences in an intuitive way.

One important aspect of AR is this fun factor in the form of mobile games (Sicart, 2016). No other AR game has drawn more players and created this world-wide phenomenon than Niantic's Pokémon-Go has in the past years. One unique fact about this Pokémon-Go fever is its ability to bring people together into public spaces. Many organizations have used Pokémon-Go in community events (Kooragayala and Srini, 2016). In collaboration with Knight Foundation and Niantic in May 2017, OpenStreets704, a non-profit organization in Charlotte, North Carolina, organized one event temporarily closing streets to automobile traffic to allow residents to use them for walking, bicycling and meeting their neighbors. Niantic arranged special in-game elements for Pokémon-Go and helped draw people to interesting places along the route of the event (Polygon, 2017). Similar events have taken places in other cities around the world (Humphreys, 2017; Knight Foundation, 2017; Niantic, 2017).

This paper discusses three projects conducted by a partnership among four organizations in Charlotte to design three AR mobile apps. These apps along with Pokémon-Go support a series of community events developed and organized by this partnership. These projects are as the following:

1. Neighborhood History Walk App utilizes AR to guide users to visit selected locations in Charlotte's streets. Users see historical photographs of street scenes through this AR app at these locations.
2. Neighborhood Pop-up Story-telling Exhibit, imagined as an urban autobiography, uses AR to peel back the layers of time to show the city in new ways through different perspectives. The collection of stories as images serves as the cornerstone of this exhibit.
3. Charlotte #HomeCLT Exhibition provides a collage of stories from local residents in five selected neighborhoods in the city. Visitors can use AR to interact with physical display panels to view data related to social, economic, environmental and safety conditions in these Charlotte neighborhoods.

The underlying principle behind these apps and community events is that innovative digital tools for information-sharing and broad-based pubic engagement can help build inclusive, healthy, and livable communities.

2. Augmented Reality in Public Participation and Civic Engagement

One of the key factors to successful community planning and design is for urban planners and designers to work together with community members and empower them to play a key role in this community building and transformation process. Together urban planners and community members work to envision the future of their communities (Fung, 2006). However, it is inevitable that people hold different views of their communities and often have different scenarios about the future. To bring together these diverse viewpoints and further come to a unified vision of the future in this community planning and design process, neutral information is needed to build a solid foundation for "informed" decision-making. To meet this need, we must employ proper tools to acquire and analyze data, help people gain

insights into the conditions of their environments, and in turn develop common understandings of issues facing their communities (Al-Kodmany, 2002; OECD, 2013).

Alongside with the rapid development in the field of Geographic Information System (GIS), immersive visualization technologies present a tremendous opportunity for data analytics and information sharing. Over the past year, much attention has been turned to AR with the belief that it offers an interactive method to expand both non-computerized and computerized visualization techniques in community planning and design (Reinwald et al., 2014). Moreover, AR increases public engagement by providing comprehensible information to lay citizens and assisting them to express their preferences in a very intuitive way.

AR is a new way of seeing. A viewer's own visual perception can be enhanced through computer-generated digital contents. This can be achieved in a variety of ways by see-through devices, head-mounted displays, or mobile devices amongst others, (Reinwald et al., 2014). The common features of all these systems are that virtual contents generated by these digital devices and the real-world physical reality are combined and overlaid. These systems operate interactively in real time and three-dimensional (3-D) information is provided (Azuma, 1997; Azuma et al., 2001).

Initial research on AR and its related technologies, such as Virtual Reality, can date back to the 1950s (Carmignani et al., 2011). However, the first definition of AR was provided in 1997 by Azuma: An AR environment has the following three characteristics: "1) combines real and virtual environments; 2) is interactive in real-time; 3) is registered in 3-D" (Azuma, 1997). While AR has been in use since the 1990s, this has mainly been in research projects, and only a few specific projects have been developed. Only in recent years have mobile AR applications enjoyed an increased presence due to the development and use of AR-enabled game engines or browsers. Because of the current distribution of suitable mobile devices equipped with high-resolution cameras, data connection and improved computing power, AR applications have become of interest to general end users.

At present, this new technology is mainly used for marketing, navigation, in the game sector, in medicine, as well as for service technicians and in tourism. The field of urban planning is increasingly interested in AR. The assumption is that the use of AR can support quality assurance in planning processes (Nash, 2010). In particular, architecture and urban and landscape planning could benefit from the use of AR applications. AR has the potential to expand the range of instruments which are offered to support public participation and community engagement. It is expected that computerized tools like AR will change but also increase the quality of public participation (Al-Komandy, 2002).

Reinwald argues that visualizations in planning, especially the digital technologies developed over recent years, can function as a mediator of empowerment in public participation (Reinwald et al., 2014). AR in urban planning and participation processes has the potential to improve civic engagement processes and make them more efficient (Nash 2010). To increase the standards and quality of public participation procedures, AR instruments should satisfy requirements such as framework conditions and virtual contents should be clearly and comprehensively communicated or equal chances for different groups to participate and influence the decision-making processes should be guaranteed (Broschart et al., 2013).

3. The Partnership

With the funding support from The Knight Foundation-Niantic Augmented Reality Fellows Program (Niantic, 2018), a partnership was formed among four organizations in Charlotte to carry out the development of three experimental AR applications, which were used in a series of community events taking place between September 2018 and February 2019 in Charlotte.

In March 2018, City Building Lab at the University of North Carolina at Charlotte created an AR exhibit in conjunction of the Urban Complexities Symbolism. This event drew more than 200 participants from the area, including planning practitioners, community activists, local developers, etc. This AR exhibit was aimed to explore the new junction between the conventional mapping methods and many new emerging digital techniques for data processing and visualization, including 3-D GIS, integration with AR, and integration with remote sensing Imagery (City Building Lab, 2019).

Figure 1 Mapping (In)equity exhibition associated with Urban Complexities Symposium on March 23, 2018

Charlotte-Mecklenburg Library, as a public institute, has long being serving the greater Charlotte Metropolitan as not only a knowledge activator but also a third place for the public to meet and learn. Many educational events are scheduled year-round, such as Learn, Connect, Play events that encourage cooperation, problem solving, letter and word recognition, and critical thinking skills. The Robinson-Spangler Carolina Room in the Main Library, which houses historical collections of photographs, publications, maps, and artifacts about Charlotte, has been an invaluable resource for Charlotte residents to learn about local history and genealogy.

OpenStreets704 of Charlotte organizes events that temporarily close streets to automobile traffic to allow residents to use them for walking, bicycling, dancing, playing, and meeting their neighbors. These events have proven to be successful at achieving goals related to recreation, public health, active transportation, and community building. In collaboration

with Knight Foundation and Niantic in May of 2017, OpenStreets704 organized one special event where Niantic arranged special in-game elements for Pokémon-Go and helped draw people to interesting places along the route of the event (Polygon, 2017).

Levine Museum of the New South has curated many exhibits with community members around Charlotte. One recent example is K(NO)W Justice K(NO)W Peace, which was co-created with the community. This exhibit includes first-person testimonials from police officers and activists, journalists, clergy leaders, the Mayor, the Chief of Police, and Charlotte residents. Students from Johnson C. Smith University provided a portion of the exhibit devoted to the victims of police-involved violence throughout the country (Exhibits, 2019).

4. The Three Projects

The Goals of these three projects that were carried out by the partnership and funded by The Knight Foundation-Niantic Augmented Reality Fellows Program are as the following:

1. To explore the potential of AR as a tool for education (data) and interaction (social gaming) in advancing community development and civic engagement.
2. To introduce AR to the general public through the use of both Pokémon-Go and the experimental AR apps developed by UNC Charlotte in different community events.
3. To establish a partnership with local organizations, including Charlotte-Mecklenburg Library, Levine Museum of the New South, and OpenStreets704 to develop and conduct community events as a platform to achieve the first two goals.

The underlying assumption behind all these apps and community events is that innovative digital tools for information-sharing and broad-based public engagement can help build inclusive, healthy, and livable communities.

The Knight Foundation-Niantic Augmented Reality Fellows Program helped initiate three pilot studies, each of which was aimed to develop one AR mobile app using Niantic's AR platform and/or open-source software assets. A series of community events were then organized by the partnership as test cases for these AR prototype mobile apps. Niantic's Pokémon-Go was also used in all these community events as an activity to inject some needed fun factor into the events. The partnership also explored the possibility to customize Pokémon-Go with additional features and/or functionality to meet the needs of these planned community events.

4.1. Project-1: Neighborhood History Walk App

The Robinson-Spangler Carolina Room in the Main Library was seeking new ways of making its vast collections of historical materials more accessible to the public. This partnership believes that the emerging immersive visualization technologies, such as AR, can help accomplish this goal. UNC Charlotte developed a Neighborhood History Walk App that utilizes AR to guide users to visit a number of identified locations in city's streets. Users were able to see historical photographs of street scenes through this AR app at these locations. Viewing angles, orientation, distances, and heights were carefully adjusted in order to precisely overlay these photographs onto the present-day street views as seen through the camera of users' mobile device. This app allowed users to compare what was in the past to

what is now at these selected locations in Charlotte. Additional historical images associated with these locations may also be displayed along with the street scenes.

This app was deployed in one of the OpenStreets704 events in September 2018 (OpenStreets704, 2018). Based on the success of the first Pokémon-Go/OpenStreets704 event in May 2017, the partnership once again incorporated Pokémon-Go in this event as an activity. While hunting for Pokémon characters, event goers were drawn to a number of "Pokéstops" and located one of the kiosks or signs with QR codes and instructions to download and use our Neighborhood History Walk App. Historical graphic contents were provided by the Robinson-Spangler Carolina Room of Charlotte-Mecklenburg Library.

Figure 2 OpenStreets704 event in City of Charlotte

4.2. Project-2: Neighborhood Pop-up Story-telling AR Exhibit

The Levine Museum of the New South is currently developing a new project, called #HomeCLT. This project is positioned to offer direct response to community needs, build bridges of communication and learning across the differences etched in the landscape of city's diverse neighborhoods, and help Charlotte find its way through the continuing civic identity crisis. It is imagined as an urban autobiography, peeling back the layers of time to show the city in new ways through a wide variety of voices and perspectives. The collection of stories, past and present, will be the cornerstone of this exhibit. The Levine Museum planned to build a proof-of-concept prototype model as a pilot version that could be installed temporarily at various locations around the city in a "pop-up" style. This prototype model was comprised of origin stories, first person narratives, artifacts, and images, as well as illustrative figures, maps, and charts revealing the development of the city over time by the numbers.

To enrich visitors' experience with this planned project, UNC Charlotte developed an AR app for two pop-up exhibits in two different selected indoor spaces at two local libraries in Charlotte. This AR app worked with the physical displays or installations to offer visitors more visual contents associated with the theme of the planned exhibits. The AR app detects the maps installed on the panels as a part of the pop-up installations. Users could see

"virtual" 3D data models shown on top of the maps. They then could tap on one of these virtual data models on the screen to call out the visual contents for that specific neighborhood. These contents can be any combination of historical photographs, video clips, and/or illustrative figures of quantitative information. The Robinson-Spangler Carolina Room provided historical materials relevant to this collaborative project. A Pokémon-Go event was organized to take place around these locations to accompany these pop-up exhibits to draw in more participants.

Figure 3 Neighborhood Pop-up Story-telling events

4.3. Project-3: #HomeCLT

#HomeCLT is an exhibit series rooted in the stories of Charlotte's neighborhoods. #HomeCLT aims to show the city in the words of its diverse residents, to reveal the unexpected, to prompt reflection and dialogue, and to inspire civic participation as Charlotte strives to build a more equitable future (HomeCLT, 2019).

The first iteration of #HomeCLT includes the stories of the Eastland Mall, Enderly Park, Hidden Valley, Dilworth and Sedgefield neighborhoods. Through an Augmented Reality app developed by UNC Charlotte, visitors can "see" the demographic changes in these neighborhoods occur over time as visuals and graphics are projected on their phones and other devices. The AR app detects the large map installed on the floor of the space as a part of the installation. Users can see "virtual" pins shown on top of the map as well as a series of 3-D models revealing some of the socio-economic conditions across Charlotte.

The exhibit includes a video recording booth where visitors can tell their own stories of the neighborhoods they have shaped and that have shaped them. It also features work by Charlotte photographer, Alvin C. Jacobs, Jr., and videographer, David Butler. The AR app also interacts with some of the display panels to allow visitors to view selected video recordings on their own mobile devices.

Figure 4 #HomeCLT exhibit at the Levine Museum of the New South

5. Discussions

This section discusses some of the lessons learned from the pilot projects with these experimental AR applications as well as the inclusion of Pokémon-Go as an activity in the community events:

Some of the most significant or impactful outcomes of these events can be summarized as the following:

For the Pokémon-Go players

- Knowing Niantic cares about them and wants to connect with them through a variety of community events.
- Getting involved in other communal and educational activities in these events.

For the other event participants

- Learning about Augmented Reality and gaining first-hand experience about its potential to promote civic engagement and public education.
- Getting involved in community affairs and learning more about their own places and people.

For the event organizers

- Getting hands-on experience about how the mobile gaming can be a fun way to engage community members.
- Getting to know about Augmented Reality and its potential as an educational and story-telling tool.

Things or factors that most contributed to the success in achieving the outcomes of these events include the following:

- Need local partners, as many as you can possibly find.
- Maintain a smooth channel for communications among local collaborators.

- Setup routine check-up meetings frequently.
- Make sure each event has a clear focus with a set of goals that are reasonably achievable.
- Pokémon-Go is fun, but so are the locally-driven activities.
- Planning and getting started with logistics ahead of time.
- Talking to the right people who can really make decisions.

In terms of event planning, preparation, logistics, and execution, some of the lessons learned from these events include the following:

- Getting people out to participate has been proven much difficult than originally expected.
- More activities that are tailored to the needs or interests of the local community are needed.
- Pokémon-Go players really expect and want something unique to the local place and people.
- Making sure it's a win-win-win situation for all partners/collaborators.
- Communications/promotion efforts require close coordination.

6. Preliminary Conclusions

Through these community events, the partnership was able to further explore the potential of AR in community planning and design with mobile gaming, image processing, 3-D data visualization, and community engagement. Specially, the AR Team at UNC Charlotte was able to develop a series of experimental AR apps to allow community members to learn more about the history of their communities. Another highlight would be the connections that UNC Charlotte was able to build with several local organizations, together working to bring Pokémon-Go to Charlotte as well as increase people's awareness of the possible applications of AR in community development and civic engagement.

Pokémon-Go creates a unique "third-place" for people to meet both physically in the real world and virtually in the digital world. This idea of social gaming is both evolutionary and revolutionary, as it can be seen as a continuation of all sorts of efforts we humans have made to connect to one another, while social gaming has generated a whole new platform for different forms of communications and human interactions to take place.

7. Future Outlook

AR is still evolving. Its potential is endless. However any possible use-case has to have a clear goal that is specific and geared towards its target users.

The issue of scale appears to still be a big challenge. Choices between scale-up with profitability and market dominance, and scale-down with public good and community-focused benefits will have to be carefully balanced to ensure its lasting success.

Allow for more user-driven voluntary contents to be built into Niantic games, such as Pokéstop selections, descriptions, more images associated with the uniqueness of these locations.

Connecting Pokémon-Go to public health measures, both physical and mental, through plug-ins, apps, smart devices, or sensors built into physical environments, such as public squares, parks, or streets.

8. References

Al-Kodmany, K. (2002). "Visualization Tools and Methods in Community Planning: From Freehand Sketches to Virtual Reality." *Journal of Planning Literature* 17, 189-211.

Arnstein, Sherry R. (1969). "A Ladder of Citizen Participation." *Journal of the American Institute of Planners*, 35, no. 4 (1969): 216. https://doi.org/10.1080/01944366908977225.

Azuma, R. (1997). "A Survey of Augmented Reality." *Presence: Teleoperators and Virtual Environments*, 6 (4), 355 - 385.

Azuma, R.; Baillot, Y.; Behringer, R.; Feiner, S.; Julier, S. & MacIntyre, B. (2001). "Recent advances in augmented reality." *IEEE Computer Graphics and Applications*, 21(6), 34 - 47.

Baykurt, Burcu. (2011). "Redefining Citizenship and Civic Engagement: Political Values Embodied in FixMyStreet.Com." In AoIR Selected Papers of Internet Research. Seattle, 2011.

Broschart, D., Zeile, P. & Streich, B. (2013). "Augmented Reality as a Communication Tool in Urban Design Processes." In M. Schrenk, V. V. Popovich, P. Zeile, & P. Elisei (Eds.), Proceedings REAL CORP 2013 (pp. 119-126). Schwechat-Rannersdorf: Selbstverlag des Vereins CORP - Competence Center of Urban and Regional Planning.

Carmignani, J. & Furht, B. (2011). "Augmented Reality: An Overview." In B. Furht (Ed.), Handbook of Augmented Reality (pp. 3-46).

City Building Lab (2019). https://www.facebook.com/CityBuildingLab-158386934209297/?ref=hl.

Exhibits (2019). "The Levine Museum presents a variety of interactive and immersive exhibits." The Levine Museum of the New South. https://www.museumofthenewsouth.org/exhibits.

Fung, A. (2006). "Varieties of participation in complex governance." *Public Administration Review*, 66,166-75.

HomeCLT (2019). "#HomeCLT: PEOPLE. PLACES. PROMISES." The Levine Museum of the New South. https://www.museumofthenewsouth.org/homeclt.

Humphreys, Lee. (2017). "Involvement Shield or Social Catalyst: Thoughts on Sociospatial Practice of Pokémon GO." Mobile Media & Communication 5, no. 1: 15–19. https://doi.org/10.1177/2050157916677864.

Knight Foundation (2017). "Augmented Reality Games Ingress And Pokémon Go Focus Of New Community Engagement Initiative Launched By Niantic And Knight Foundation." https://knightfoundation.org/press/releases/augmented-reality-games-ingress-and-pok-mon-go-focus-of-new-community-engagement-initiative-launched-by-niantic-and-knight-foundation.

Kooragayala, Shiva, and Tanaya Srini. (2016). "Pokémon GO Is Changing How Cities Use Public Space, but Could It Be More Inclusive?" Urban Wire: Neighborhoods, Cities, and Metros (Urban Institute) (blog), https://www.urban.org/ urban-wire/pokemon-go-changing-how-cities-use-public-space-could-it-be-more-inclusive.

Mockbee, S., Moos, D. & Trechsel, G. (2003). *Samuel Mockbee and the Rural Studio: Community Architecture*, 2003-11-01, Birmingham Museum of Art.

Nash, A. (2010). "Web 2.0 Applications for Collaborative Transport Planning." In M. Schrenk, V. Popovich & P. Zeile (Eds.), Proceedings REAL CORP 2010 (pp. 917-928). Schwechat-Rannersdorf: Selbstverlag des Vereins CORP - Competence Center of Urban and Regional Planning.

Niantic (2017). "Niantic forming a multi-year partnership with the John S. and James L. Knight Foundation." Niantic, Inc. https://nianticlabs.com/blog/knight050417/.

Niantic (2018). "Empowering local communities through games: Introducing the Niantic/Knight Fellows Program." Niantic, Inc. https://nianticlabs.com/blog/knightfellowsaug2018/.

OECD (2013). Government at a Glance 2013, OECD Publishing. Retrieved from http://dx.doi.org/10.1787/gov_glance-2013-en.

OpenStreets704 (2018). "Open Streets 704 teams up again with Niantic and Knight Foundation." OpenStreets704, City of Charlotte. https://openstreets704.com/open-streets-704-teams-up-again-with-niantic-and-pokemon-go/2018/.

Polygon (2017). "Pokémon Go's first community event is a hint of the game's future." https://www.polygon.com/2017/5/4/15546436/pokemon-go-community-events-2017-outdoors.

Reinwald, F., Berger, M., Stoik, C., Platzer, M., & Damyanovic, D. (2014). "Augmented Reality at the Service of Participatory Urban Planning and Community Informatics – a case study from Vienna." *The Journal of Community Informatics*, 10(3). Retrieved from http://www.ci-journal.net/index.php/ciej/article/view/1087.

Sicart, Miguel. (2016). "Play and the City." Edited by Judith Ackermann, Andreas Rauscher, and Daniel Stein. Navigationen, Playin' the city – artistic and scientific approaches to playful urban arts, 16, no. 1 (2016): 25–40.

Case Study / Project

Big Data Based Assessment on Metropolisation Processes in Poland

Hanna OBRACHT-PRONDZYNSKA

Abstract

Metropolitisation impacts regional settlement network and its spatial development. One of the vital challenges for, both researchers and regional planners is the delimitation of the metropolitan (urban) functional areas in order to define the strategic area of planning policies implementation. At the same time, there is a need to conduct more detailed analysis concerning contemporary trends determining the way how urban areas are nowadays shaped. It is noteworthy, that so far in Poland, the research aimed on urban functional areas was conducted mainly on the basis of statistical data, and have to the very limited extend been supported by the use of spatial information, while in other countries research recognising potential resulting from the collection of large data sets and from the growing amount of information is more often used. As data processing, becomes more effective and provides more precise and reliable results, there is a need to search for new methods allowing to analyse the development of functional and spatial structures of towns and their functional areas as well as to update established methods by introducing Big Data based solutions. Potential of such analyses in urban studies is still not fully recognised. Due to new determinants influencing and shaping urban and regional structures and new analytical possibilities, the aim of the research is to assess the impact of the metropolisation processes on the small towns' development in Pomeranian Voivodship. Once both the specificity of the metropolitan area of Gdansk-Gdynia-Sopot and small towns in Pomeranian region is recognised as well as the possible use of digitized spatial information for spatial study is defined, the Big Data based model has been created.

According to research aims this two-phase model allow to study the impact of the metropolisation processes on both functional and spatial development of the regional settlement network. It is based on a set of indicators characterizing trends of spatial and functional changes at the local (first phase) and regional scale (second phase). The model, built of a set of indicators, uses mostly data mining methods. By using GIS tools, it is completed with data visualisation by using cartographic and spatial statistics methods.

Finally, it is tested by:
- analysing small towns development according to both their rank in the regional settlement network and their spatial relations with the metropolitan area;
- defining factors of the metropolitan growth which influence and differentiate both spatial and functional development of small towns in the Pomeranian region; Conducted, in frame of this study, analyses allow for obtaining following results:
- introduction of typology of small towns as the base for identifying the determinants of contemporary development processes;
- introducing recommendations of both theoretical and methodological nature in relation to identified Big Data potential in urban studies;
- formulate recommendations for shaping regional policy, especially connected with Pomeranian Voivodship' small towns development.

Case Study / Project

Switching to a Sustainable Auto-rickshaw System

Namma Auto Project

Sugandha PAL, Palak THAKUR

Abstract

The Namma Project works towards reducing emissions and pollution from the auto rickshaw sector in Bengaluru and Chennai while fostering sustainable growth of the Auto-rickshaw sector. The project promotes a shift from 2 stroke technology to less polluting technologies (4 stroke /electric autorickshaws), in the two cities. The project is funded by the European Union under their Switch Asia Programme and is implemented by ACRA along with a consortium of partners including ENVIU, TERI and WHAD.

The project objective is addressed through a three-pronged strategy:
• Improving the demand for eco-friendly auto-rickshaws – Through ride booking apps, frameworkagreement with Public transport entities, behavioural change communication and focused research to measure the GHG emissions from the autos;

• Improving the supply of eco-friendly Auto-rickshaws – Through mobilising, training, capacity building and structuring of driver organizations so as to equip them as a community to make the shift, building financial instruments for green-autos, facilitating better financing options, building a positive image for drivers

• Facilitating a favourable policy environment – Work with policy makers to assess the policy and regulatory gaps, support the transport department with knowledge sharing and capacity building activities, dissemination of the research findings to stakeholders at large.

Research Paper

THE SHIFT TOWARDS SMART CITIES IN SOUTHEAST ASIAN CITIES

The Role of Urban Governance

Thibault PILSUDSKI, SEC-FCL; Singapore
Si Ying TAN, NUS-LKYSPP; Singapore
Devisari TUNAS, SEC-FCL; Singapore
Fabien CLAVIER, SEC-FCL; Singapore
Andrew STOKOLS, SEC-FCL; Singapore
Araz TAEIHAGH, NUS-LKYSPP; Singapore

Abstract

Smart cities utilise technological and digital solutions to resolve urban issues, to enhance accessibility of services, and increase the quality of life (ASEAN, 2018). In 2018, Singapore leveraged its ASEAN presidency to initiate the ASEAN Smart Cities Network to develop a collaborative forum to improve translation of smart technologies between ASEAN cities by exploring potential synergies and complementarities, developing tailored action plans and sharing best practices. However, the translation, adoption and implementation of technologies across unique geographical, developmental and governance contexts vary substantially (Taeihagh, 2017). Without sufficiently understanding these variations, the translation process will likely fail. To understand these variations and their implications for city governance, we seek to unpack the different institutional forces that shape the adoption and implementation of such technologies. The paper aims therefore to identify key aspects of urban governance that guide the adoption and implementation of smart city technologies, by questioning (1) the drivers for smart city adoption, (2) the origin of policy ideas, (3) the factors hindering or facilitating their local translation, and (4) the impact of smart city development on city-level governance. This paper is part of an ongoing research on smart cities in Indonesia.

Keywords

Smart City, Southeast Asia, Policy Capacity, Policy Mobility, Policy Entrepreneur

1. Introduction

Much literature on smart cities development typically considers it as a technical or managerial issue (Meijer & Bolívar, 2016), focusing on the potential of specific technologies to improve management or planning in cities, but rarely examining the role of governance and the social and political constructions that hinder or facilitate the adoption of new technologies in city government or planning processes. Taeihagh and Lim (2018) claim that the term 'smart city' has emerged as a new concept amidst the acceleration of competition among cities for businesses and talent, which has driven cities to place more emphasis on

the development of engineering solutions and economic feasibility for achieving desired urban development goals. Nevertheless, the conceptualisation of smart city development needs to go beyond technological solutionism, and be acknowledged as a complex social system that entails many wicked problems and competing interests (Kitchin 2016). Furthermore, Kitchin (2015) also emphasises the lack of empirical studies and contextualised comparative cases on smart cities. There is also a need to understand what the reality of deploying smart systems means for the vast majority of emerging cities in the global south, especially Asia.

This paper compares the development of smart city in two Indonesian cities; Bandung and Jakarta, which have both been at the forefront of smart city development in Indonesia since 2013-2014. It is a first step towards the creation of a framework that can be used to systematically analyse the interplay between urban governance and smart cities development in ASEAN. This will be achieved by drawing theoretical literature from public policy which include the Multiple Streams Framework (MSF) (Kingdon, 1984), instrument constituencies (Voß & Simons, 2014), policy mobility (McCann, 2011), policy capacity (Wu et al., 2015), or policy ideas (Cox & Béland 2013), to investigate the roles of political leadership, institutions, policy capacities, and policy ideas in the adoption and development of smart cities.

This paper draws upon several fieldworks in Bandung and Jakarta in 2018-2019, including semi-structured interviews conducted with key actors in the municipality departments as well as external actors involved in Bandung and Jakarta smart cities; from university, private sector and non-governmental organisations. This information was supplemented by analysis of government reports, official presentations during conferences, twitter accounts, and national newspapers (in English and Indonesian).

The fielworks were preceded by a literature review of some relevant policy concepts to analyse smart city adoption and translation, and contributed to the elaboration of the following questions that will structure this paper: (1) What are the drivers for smart city adoption and how are policies for smart city development formulated? (2) Where do the policy ideas and inspirations come from? (3) How is it translated locally and what are the factors facilitating/hindering policy adoption? (4) How does the smart city development agenda affect as well as inform city-level governance? Our findings are aimed at helping both government and non-government actors such as technology producers, city authorities, and multilateral funders to develop practice insights and policy recommendations to achieve the goals for smart city development.

2. Literature Review

The following section intends to introduce the literature on MSF, policy entrepreneur, policy mobility, instrument constituency, and policy capacity as analytical frameworks for our case studies. The MSF was developed by Kingdon (1984) to understand why some ideas are captured by policy-makers and make it to the agenda setting, while others do not. The MSF does not think that human beings are rational actors, hence policy-makers are incapable of making the best policy decisions by picking the best solutions uniquely crafted for a policy issue (Cairney, 2018). Instead, Kingdon postulates that policy problems, policy solutions, and politics, each constitute an independent process, or stream, and at the same time, they

could also form intermingling forces that influence one another in the policy process. Eventually, at a specific point in time, a policy window opens allowing the coupling of the three streams. This coupling can be realised by a policy entrepreneur, who "invest his resources, time, energy, reputation, money to promote a position in return for anticipated future gain" (Kingdon, 2011). When a window opens, policy entrepreneurs will push their policy proposals ("pet projects"), attempting to couple it with the two other streams. While the focus of Kingdon's studies was on the domestic political context of the USA, the MSF literature has since then evolved, with Bache & Reardon (2013), for instance, emphasising the importance of international networks for the development of ideas in the policy stream. Lovell (2016), who studied smart metering policy in Australia, also found that MSF would be better supplemented with theoretical insights from policy mobility as ideas move easily across national boundaries.

In the examination of smart city development, it is also important to examine how policy ideas are transported from one jurisdiction to another when cities learn from one another in their respective quest to be 'smarter'. In this respect, it is relevant to investigate how the concepts of policy mobility and policy transfer play a part to facilitate this process. Policy mobility differentiates itself from policy transfer by questioning the state-centredness of traditional policy transfer literature and its "implicit literalism" that suggests the importation of fully formed policies (Peck & Theodore, 2001). It also focuses much more on interurban "transfers" of ideas. In this context of international policy mobility where policy ideas travel between cities, policy entrepreneurs are assumed to be "searching globally for best practices to embrace, "cutting-edge" cities to emulate, and "hot" experts from whom to learn (Peck & Theodore, 2008). They tap into and utilise extralocal connections — ranging from official intergovernmental alliances to individual relationships with colleagues elsewhere — to learn about policy models and physically bring experts to the city to inform locals about cutting-edge policies."

In another addition to the MSF, Voss and Simons (2014) developed further on the network of actors behind transnational policy stream with the concept of instrument constituencies. It is defined as a transnational network of heterogeneous actors that "stay united because of their common "fidelity" not to a political agenda or defined problem but rather to their advocacy of a particular instrument(s) as a superior technique of public governance" (Béland & Howlett, 2016). In the context of smart city development in Indonesia, we apply this concept to focus largely on domestic actors who possess international experiences and are open to transboundary and cross-jurisdictional policy learning, as well as staying committed to a common goal of elevating the city's development through the deployment of various policy instruments.

Finally, we complement these concepts with policy capacity to explain the ability of city governments to receive and implement new ideas. Proposed by Wu et al. (2015), policy capacity is defined as a function of three sets of skills and competencies (political, operational, and analytical) at three levels of resources and capabilities (systemic, organisational and individual). In Wu et al.'s conceptualisation, political capacity is associated with having the political acumen to steer the overarching governmental functions towards goal attainment by asserting one's authority and by building public's trust towards the government. Operational capacity, on the other hand, pertains to the ability of government to roll-out policy effectively. Analytical capacity boils down to the bolts and nuts

of policy-making. In particular, it relates to the ability to apply technical knowledge to design and implement policies in the most efficient and cost-effective manner.

3. Comparative Analysis of the Role of Urban Governance in Smart Cities Translation in Bandung and Jakarta

Jakarta and Bandung have been widely recognised nationally and internationally as the pioneers of Smart City in Indonesia. Jakarta, the capital of Indonesia, with a population of over 10 million (2017) (BPS, 2018), and Bandung, the capital of West Java Province, with a population close to 3 million (2017) (BPS Kota Bandung, 2018), and their urban surroundings form one of the largest urban agglomerations in Southeast Asia. Faced with challenges of rapid urbanisation, population growth and increasing urban complexities, authorities in both cities have been actively exploring various technical and policy solutions to help them address the issues.

Due to the decentralisation policy that has been implemented beginning after Suharto's departure in 1999, the role of central government in directing local planning and development has been increasingly superseded by local mayors. Decentralisation has also led to divergence between certain successful "superstar" cities and regions and cities with less capacity, in Indonesia (Firman, 2014, Von Leubke, 2009) as is the case in other countries. The recent development directions in Indonesian cities and regencies, including in Jakarta and Bandung, could be attributed to the presence of strong and charismatic leadership at the local level. For example, the development of smart cities in Indonesia are largely driven by the local leadership, such as Basuki Tjahaja Purnama, the former Governor of Jakarta and Ridwan Kamil, the former Mayor of Bandung, who has since been elected as the Governor of West Java. Purnama previously had a short stint of political career as the Regent of Belitung regency (2005-2007) before pairing up with Joko Widodo in Jakarta's gubernatorial campaign. He was elected as Vice Governor, and subsequently replaced Widodo as Governor when the later was elected as President. Kamil meanwhile, came from non civil-servant background; he was a planning practitioner and academic prior to his political career.

3.1. The Drivers behind the Smart City Adoption

In both Jakarta and Bandung, the role of policy entrepreneurs has been instrumental, and this is represented by their strong local leadership that spurs the adoption of smart city development. We use the MSF to unpack the roles and influences that policy entrepreneurs, Kamil in Bandung and Purnama in Jakarta, have exerted in smart city adoption, and their framings of the problem.

Bandung

In Bandung, even though the smart city is mentioned briefly in some presentations during the preceding Dada Rosada mayorship, it was Kamil who launched the concept as one of his campaign promises in 2013 when he was running to become the mayor of Bandung (Ispranoto, 2013 September 14). Kamil decided to enter the municipal campaign quite late, only eight months before the election. Though without political experience, Kamil had been active in the policy circle since 2008 through the Bandung Creative City Forum (BCCF), a non-profit organisation, which he created with a network of like-minded individuals to promote

the concept of creative city. He worked as the first president of the forum, which gave him sufficient visibility that paved the way for his entry into politics (Mada, 2015 November 6). The mayor election opened a window of opportunity in the political stream, but also in the problem stream since the former mayor was being tried for corruption and ultimately charged with a 10-years prison sentence. Coming from the BCCF, Kamil could have framed existing city problems to couple it with his creative city solutions. But vehicular ideas like the creative city "serve to make things happen at a particular time, after which their time may be up" (McLennan, 2004). Having been advocated since the last five years, keeping the creative city concept on top of the city agenda could have led to the risk of the idea becoming quickly outdated. By framing the smart city as a solution for greater transparency, efficiency and accountability, the smart city narrative also allowed Kamil to capitalise on a contemporary policy idea that has taken root in many other countries as a means to strengthen city-level governance.

Jakarta

In Jakarta, smart city development has been credited to Purnama. He began working on the Jakarta's smart city programme during his vice governor position under Governor Widodo. Both set a new impulse in the city's management, aiming at improving public service and transparency (Wardhani, 2014), by setting up a transparent communication system to make it more accessible for the citizens to file for complaints against lapses in public services. When Widodo became president in 2012, and left Purnama with the position of governor, it opened a window of opportunity for Purnama to push the concept of smart city to be a central agenda in Jakarta to promote transparency and a greater efficiency. As the scale of complaints was too difficult to be managed by short message service (SMS), upgrading to a system that would better handle these complaints appeared to be a natural development for the government to be more responsive to the citizens' feedback. Cox & Béland suggest that skilled policy entrepreneur have "an intuitive sense for which ideas fit a newly opened policy window" (2014). In line with that, we argue that it is also a major quality of a policy entrepreneur to be sensitive enough to determine the gaps in addressing the needs of citizens, and when a policy idea that fill this gap would likely take off. In the case of Bandung and Jakarta, Kamil and Purnama have been able to sense that smart city's time has come for Indonesia, and this acumen has propelled Bandung and Jakarta to be the first-movers of smart city adoption at the national level.

3.2. Inspirations for the Smart City Visions

The smart city is an urban concept, similar to the creative city or the sustainable city. Policy mobility studies consider these concepts or ideas to be in continuous transformation and mutation (Peck, 2011) along their journey. In a policy mobility context, policy entrepreneurs, depending on their background and network, can play a key role as agent of translation for policy ideas.

Bandung

In the case of Bandung, Kamil appeared to have been the main translator of the smart city concept. Building on his overseas experiences through his studies at UC Berkeley and his urban design projects abroad as an architect (in Singapore, Thailand, Bahrain, China, Vietnam, United Arab Emirates), Kamil was able to draw on his own experiences to push for

the development of a smart city in Bandung. Among various illuminating examples, Singapore stands out as a model, with Kamil mentioning in a 2017 interview with GovInsider that "Bandung is designed to be as competitive as Singapore, as modern as Singapore," but will retain its "strong traditions as Bali. A combination of Bali and Singapore – that will be my Bandung vision" (Chambers, 2017 April 11). This particular mention for Singapore nevertheless never materialised in a close cooperation for the development of Bandung Smart City. A more tangible source of inspiration for Bandung was Rio de Janeiro's Operations Centre developed by IBM in 2010 (Paschoal & Wegrich, 2017), as this directly influenced Kamil's decision to initiate the Bandung Command Center. While IBM was involved through a "rush engagement" rather than a solid partnership (Labtek Indie, personal communication, April 2nd, 2019), there was never any form of cooperation between Rio and Bandung. Kamil was in this case the main agent of translation; tapping into a globally referenced case and adapting it to the local situation.

Figure 1: Launched in 2010 with the help of IBM, the Rio Operation Centre became a typical case study for Smart City. Retrieved from: http://icities4greengrowth.in/casestudy/rio-de-janeiros-operations-centre-rio-de-janeiro-brazil

Jakarta

In Jakarta, Purnama did not benefit from an international career to provide him a wide range of urban experiences. He had apparently adopted a more 'agnostic' vision of the smart city, and appeared to be receptive towards new ideas as long as they make sense. However, when discussed inspiration models for Jakarta, Singapore, as for Bandung, once again appeared at the forefront and became a model that Jakarta was seriously contemplating to emulate. As Purnama said in an interview; "Let's be honest, if we want to take the example of another city, we can imitate Singapore. We cannot imitate European cities; it's different. Europe has existed for hundreds of years. Their development was conducted in the 1800s" (Wardhani et al., 2015 November 19th). But he also looked at other developed Asian cities like Tokyo and Seoul (Chambers & Basu, 2016). If like in Bandung, the prominence of the Singapore model did not exert a strong influence in the smart city adoption process in Jakarta, it does shed some light on what McCann calls "city upon hills" (McCann, 2013; Cohen, 2015), which refers to a small cluster of cities of which stories are always presented, policies compared, or situation benchmarked. In the context of the new ASEAN Smart City

Network, it will be interesting to see if Bandung or Jakarta would eventually achieve such statuses and manage to become prominent examples for other followers in the smart city movement.

3.3. The Local Translation of the Smart City

While no transnational instrument constituency appeared to be strongly influencing the creation of the smart city in Bandung and Jakarta, both cities initiated the creation of a local instrument constituency around the smart city concept, and this has directly influenced policy capacity at different levels.

Bandung

A first step in the creation of a smart city constituency in Bandung was through a workshop conducted in September 2013, which paved the way to the subsequent creation of the Smart City Council over the following months. The Smart City Council gathered lecturers from ITB, municipal departments, officers from Telkom Indonesia, and technology entrepreneurs (Labtek Indie, personal communication, April 2nd, 2019). Even though these actors possessed diverse backgrounds, i.e. business, academia or political party, they become members of an instrument constituency through their common practices, interests and visions that centred around the development of smart city in Bandung (Voss & Simons 2014). The involvement of multiple stakeholders with various backgrounds, training and experiences contributes significantly to the *operational* capacity of the city. Besides, the Bandung Command Center, which was inaugurated in early 2015, also represents an effort to increase the *operational* and *analytical* capacity at the organisational level by encouraging agencies to coordinate better as well as to produce, share and disseminate more evidence-based policies. It was also a strategy, recognised as a "quick win" by local actors to increase visibility and trust from citizens (Bappelitbang Kota Bandung, personal communication, April 1st, 2019), which directly strengthen the *political* capacity of the government in Bandung. In a 2015 interview, Kamil also pointed out at external socio-demographic factors that also played a role in facilitating the smart city initiative; such as the more than 50 higher education institutions, and the fact that 60% of the population is under 40-years old, underpinning the potential of Bandung as an "educational, technological and creative hub" (Oxford Business Group, 2015).

Jakarta

In Jakarta, Purnama set from the beginning a very strong management style that make it clear to the citizens that his administration will not tolerate any forms of corruption and indolence (Chambers & Basu, 2016 April 27th). And he indeed fired about half of the officials in his first two months. But he also increased wages to attract the brightest talents and set a specific Smart City Team, which increased both *operational* and *analytical* capacities of his administration. Purnama also introduced an application; CROP, to monitor the performance of his officials in responding to citizen complaints. While this was met with opposition within the bureaucracy and the Jakarta Council, it sent clear signals to private companies that business is now easier because of increased transparency and efficiency (Jakarta Smart City, personal communication, May 5th, 2019). The city also purposely encouraged startups to join the smart city initiative, which led to the growing importance of Qlue, an application first designed to answer public complaints more efficiently. Through the Jakarta Disaster

Mitigation Agency (BPBD), the city collaborated with the University of Wollongong, Australia, and Twitter, to create an application mapping the floods, increasing the city's disaster responsiveness. These various collaborations with non-governmental actors contributed to a greater *operational* capacity, which also led to the creation of an instrument constituency on the smart city in Jakarta. Similar to Bandung Command Centre, the Jakarta Smart City Lounge was launched in 2015, symbolising the structural promises of a more evidence-based, transparent and less-siloed government.

Policy capacity at different levels		**Examples in Bandung and Jakarta**
Analytical capacity	**Individual**	Training of existing staff and use of external consultants in **Bandung** and hiring of highly-skilled employees in **Jakarta**
	Organisational	Sharing and use of systematically created data encouraged
	Systemic	High number of universities in both cities, and additionally in **Jakarta** high number of international businesses
Operational capacity	**Individual**	New managerial style, increased transparency and accountability
	Organisational	Coordination amongst agencies encouraged
	Systemic	Collaboration with associative networks (ex: BCCF) and universities (ex: ITB) in **Bandung**, collaboration with startups (ex: Qlue), multinationals (ex: Google-Waze), universities (ex: Wollongong) in **Jakarta**
Political capacity	**Individual**	**Kamil** and **Purnama** as policy entrepreneur
	Organisational	Newly established dialogue with citizens, mostly through social media
	Systemic	Increased trust in public institutions through transparency and accountability

Table 1: The policy capacity in Jakarta and Bandung in smart city development

3.4. The Impacts of Smart City on Urban Governance

If Kamil and Purnama have been instrumental in the development of smart city in their respective city, they are no longer in command; Kamil left his position of mayor to become governor of West Java in 2018, while Purnama was defeated in the 2016 election. This invites a first reflection on the sustainability of the changes they made in urban governance.

Bandung

It remains difficult to judge if the policy window that Kamil opened for a smart city in Bandung remains viable or not. In his study on the former mayor of London Ken Livingstone and his road congestion pricing policy, Dudley (2013) was able to map the opening of the window and its closing once the project was implemented. For Bandung Smart City, it seems that the window is still open. Kamil's smart city programmes was formalised in Bandung Long Term Development Plan 2014-2018. Some of the action plans are still being implemented to date. A web portal has been launched at the end of 2018 to summarise all the smart city actions happening in Bandung, as well as a City Dashboard to communicate on simple statistics about the different city neighbourhoods. Furthermore, Kamil is now extending this policy window at the regional level as he acceded to the post of governor for the West Java Province in 2018, aiming to transform the region into a Smart Province. But the current mayor of Bandung, Oded Muhammad Danial, who took office in 2018, appears to be less active prioritising smart city development. This was indicated in the limited mention of Smart city in the final draft of Bandung Long Term Development Plan 2018-2023 launched under his leadership. While the preceding document set out the Smart City programme in great detail, the current document, albeit stating a specific goal to improve Bandung's Smart City Maturity ranking (by adopting a set of indicators developed by the local university), did not set out any detailed action plans on how to achieve it, apart from mentioning the need to integrate all existing digital platforms (Bandung RPJMD Final Draft 2018-2023). Similarly, the Smart City Council that was active at the early stage of the smart city, did not turn into a long-term exchange forum by meaningfully engaging various stakeholders who are committed towards smart city development. While some key stakeholders are still working on the smart city domain (i.e. university, associations, government), there is a lack of common vision that could constructively advance the current state of smart city development. However, some of Kamil's legacy that was launched under the guise of smart city has appeared to be enduring. Notably, public agencies continue to report and update their activities on Twitter regularly (Bappelitbang Kota Bandung, personal communication, April 1st, 2019), a newly established dialogue with citizens through social media has been rolled-out, and increased coordination among various agencies to address collective problems has been observed.

Jakarta

In Jakarta, more clearly than in Bandung, the enthusiasm for smart city at the highest leadership level has cooled down since the change in leadership with Anies Baswedan replacing Purnama in 2017. While the city administration still includes a special Smart City task force under the City's Information and Communication Department (the team comprises external and highly skilled non-tenured civil servant.) that is active and fully functioning, the new mayor is reported to be less inclined to promote Jakarta as a smart city, which is often seen as a legacy of his predecessor. Under his leadership, Jakarta joined the 100 Resilient City, which could put the smart city concept secondary to the concept of resilient city. His effort to rebrand Jakarta to cast away the shadow of his predecessors led to some unintended consequences that could potentially undermine the analytical capacity of his administration. For instance, Setiaji, the head of Jakarta Smart City, has decided to leave the city's administration to join Kamil in West Java. However, Sandiaga Uno, who was the vice governor of Baswedan before running for the presidential election, has recognised the

important steps taken by Purnama earlier in promoting public service efficiency and improving citizens' trust towards the government (Chambers, 2017 May 11th). The new governor is also continuing to push agencies to work together, while the deputy governor of Jakarta for planning, Oswar Muadzin Mungkasa has insisted on the active engagement with the citizens from the bottom-up (Centre for Liveable Cities, 2019). But the rigid rules within the existing bureaucracy remain as a barrier for the development of the city's capacity. For instance, it remains difficult to recruit programmers or data analysts because they often do not meet the rigid criteria to have prior similar job experiences (Jakarta Smart City, personal communication, May 5th, 2019). Even though Jakarta and Bandung are two of the most bustling administrative and commercial hubs in Indonesia and have so far taken the lead in smart city development, to date, a national-level initiative that regulates the legal and governance issues that could arise from smart city development is still lacking. Despite the launch of the urban digitisation programme such as "100 Smart Cities" in 2017, there remains ample room for smart city regulatory frameworks to be firmed out to improve the governance of smart cities in Indonesia.

4. Discussion - Conclusion

This paper is a first step to analyse smart city in ASEAN in regards to urban governance. We have identified five policy concepts that appear to be relevant; the MSF, policy entrepreneur, policy mobility, instrument constituency and policy capacity. These could be complemented by a network analysis to identify peripheral actors and policy brokers (Howlett et al., 2017) and to examine their roles as well as their relation to policy entrepreneurs. This initial framework will also be tested on a third city; Makassar which is also a city within the ASEAN Smart City Network but possessing very different contexts from Jakarta and Bandung. For instance, the city does not benefit from the same pool of talents as compared to Jakarta and Bandung, which might hinder its analytical capacity. It seems however, that the former mayor of Makassar; Mohammad Ramdhan Pomanto, did play a policy entrepreneur role, like in Jakarta and Bandung. Kamil and Purnama, through their new management style; a shift from a hierarchical and bureaucratic to a more accessible and engaged leadership (Zaenudin & Suwatno, 2017), have indeed contributed to the heightening of public's trust towards the government strengthening political capacity at systemic level.

The analysis of smart city in two indonesian cities through the lens of urban governance and public policy study, allows a preliminary conclusion on the functional and structural promises of smart city and more precisely smart planning. From a functional point of view, the smart city development in both Jakarta and Bandung has enhanced administrative management abilities and responsiveness towards city problems such as floods, or slight optimisation of traffic issues. However, it did not materialise in an enhanced ability to conduct long term planning. What it did more successfully is, from a structural point of view, to reshape the city-level governance. Indeed, in both cases, the smart city concept was a window of opportunity to introduce new management styles and promoting transparency; through regular reporting of agencies on social media for instance, accountability; through official performance monitoring app like CROP in Jakarta, or increased cooperation between agencies in sharing data, but also involving external partners; citizens, startup like Qlue or universities like ITB in Bandung, and Wollongong for Jakarta.

In both cities, the smart city development does not move as fast as it used to be, and this is partly driven by change of leadership, with the new mayor of Bandung and governor of Jakarta less enthusiastic in advancing a policy idea that appears to be more representative of their predecessors (BCCF, personal communication, April 3rd, 2019; Jakarta Smart City, personal communication, May 5th, 2019). In addition, there is also a sentiment within current administration that most of the major steps have been taken, and that the rest has more to do with long term implementation and consolidations of the various initiatives (Jakarta Smart City, personal communication, May 5th, 2019). The recent national initiative of "100 Smart Cities" or the ASEAN Smart City Network that are bringing new momentum for smart city development, could nevertheless give a strong incentive to Jakarta and Bandung to put efforts to maintain their prestigious status as well as to act as examples for lower-sized cities. Some like the CEO of Qlue, Rama Raditya, actually consider that the smart city potential has been largely untapped. For him, Jakarta is still far from being smart, since "ideally, a smart city must be built from scratch with cutting-edge technological infrastructure, from undergrounds pipes that are equipped with IoT to street lights that have been installed with live sensor technology" (Putera, 2019 April 9th).

Perhaps this is an opportunity to pause and think about the future; does a smart city needs to be more equipped with cutting-edge technology like Raditya has suggested? Or could a smart city espouse a more low-tech approach (Urbanités, 2018), whereby the aim of smart city development is less on techno-solutionism but more on using innovative tools to increase government's responsiveness and efficiency in solving policy problems by actively engaging the citizens and other important stakeholders in the society.

5. References

ASEAN (2018). Concept Note, ASEAN Smart City Network.

Bache, I., & Reardon, L. (2013). An Idea Whose Time has Come? Explaining the Rise of Well-Being in British Politics. *Political Studies*, 61(4), 898–914. DOI:10.1111/1467-9248.12001

Béland, D., & Howlett, M. (2016). How Solutions Chase Problems: Instrument Constituencies in the Policy Process. *Governance*, 29(3), 393–409. DOI:10.1111/gove.12179

BPS (2018) Statistik Indonesia 2018, Badan Pusat Statistik, Jakarta.

BPS Kota Bandung (2018) Kota Bandung Dalam Angka 2018, Badan Pusat Statistik, Bandung.

Cairney, P. (2018). Three habits of successful policy entrepreneurs. *Policy & Politics*, 46(2), 199–215. DOI:10.1332/030557318X15230056771696

Chambers, J. (2017). 'The Interview: Ridwan Kamil, Mayor of Bandung'. *GovInsider*, 11th April [online]. Available at: https://govinsider.asia/digital-gov/the-interview-ridwan-kamil-mayor-of-bandung/ (Accessed: 24 june 2019)

Chambers, J. (2017). 'In the hot seat: Sandiaga Uno, Jakarta's Deputy Governor-elect', *GovInsider,* 11th May [online]. Available at: https://govinsider.asia/smart-gov/in-the-hot-seat-sandiaga-uno-jakartas-deputy-governor-elect/ (Accessed: 24 june 2019)

Chambers, J., & Basu, M., (2016) 'Exclusive Interview: Governor of Jakarta', *GovInsider,* 27th April [online]. Available at: https://govinsider.asia/innovation/exclusive-interview-governor-of-jakarta/ (Accessed: 24 june 2019)

Centre for Liveable Cities. (2019). 'CLC-Lecture - Juggling Jakarta: Urban Challenges and Solutions'. Available at: https://www.youtube.com/watch?v=DjKXZskzbGU&feature=youtu.be (Accessed: 24 june 2019)

Cohen, D. (2015). Grounding mobile policies: Ad hoc networks and the creative city in Bandung, Indonesia. *Singapore Journal of Tropical Geography*, *36*(1), 23–37. https://doi.org/10.1111/sjtg.12090

Cox, R. H., & Béland, D. (2013). Valence, Policy Ideas, and the Rise of Sustainability: Valence and Sustainability. *Governance*, 26(2), 307–328.

Dudley, G. (2013). Why do ideas succeed and fail over time? The role of narratives in policy windows and the case of the London congestion charge. *Journal of European Public Policy*, 20(8), 1139–1156. DOI:10.1080/13501763.2013.771090

Firman, T. (2014). Inter-local-government partnership for urban management in decentralizing Indonesia: from below or above? Kartamantul (Greater Yogyakarta) and Jabodetabek (Greater Jakarta) compared. *Space and Polity*, 18:3, 215-232. DOI: 10.1080/13562576.2014.959252

Howlett, M., Mukherjee, I., & Koppenjan, J. (2017). Policy learning and policy networks in theory and practice: The role of policy brokers in the Indonesian biodiesel policy network. *Policy and Society*, *36*(2), 233–250. https://doi.org/10.1080/14494035.2017.1321230

Ispranoto, T. (2013). 'Di tangan Kang Emil, Bandung jadi smart city', *Sindonews*, 14th September [online]. Available at: https://daerah.sindonews.com/read/783004/21/di-tangan-kang-emil-bandung-jadi-smart-city-1379133217 (Accessed: 24 june 2019)

Kingdon, J. (1984; 1995). *Agendas, Alternatives and Public Policies* 1st and 2nd eds. New York: Harper Collins.

Kingdon, J. W. (2011). *Agendas, Alternatives, and Public Policy*. New York Longman.

Kitchin, R. (2015). "Making sense of smart cities: addressing present shortcomings". *Cambridge Journal of Regions, Economy and Society*, 8(1-1), 131–136 DOI:10.2139/ssrn.2641802

Kitchin, R. (2016). The ethics of smart cities and urban science. *Philosophical Transactions. Series A, Mathematical, Physical, and Engineering Sciences*, 374(2083). DOI:10.1098/rsta.2016.0115

Kota Bandung (2018) Rancangan Akhir - Rancangan Pembangunan Jangka Menengah Daerah (RPJMD) Kota Bandung 2018-2023, Kota Bandung.

Lovell, H. (2016). The Role of International Policy Transfer Within the Multiple Streams Approach: The Case of Smart Electricity Metering in Australia. *Public Administration*, *94*(3), 754–768. https://doi.org/10.1111/padm.12259

Mada, R.W. (2015). 'Memahami Ridwan Kamil : Ide, Gagasan dan Tanggapannya Terhadap Kritik', *Bixbux*, 6th November [online]. Available at: https://bixbux.com/memahami-ridwan-kamil-ide-gagasan-dan-tanggapannya-terhadap-kritik/ (Accessed: 24 june 2019)

McLennan, G. (2004). Travelling with vehicular ideas: The case of the third Way. *Economy and Society*, 33(4), 484–499. DOI:10.1080/0308514042000285251

Meijer, A., & Rodríguez Bolívar, M. P. (2015). Governing the smart city: a review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82. DOI:10.1177/0020852314564308

McCann, E. (2011). Urban Policy Mobilities and Global Circuits of Knowledge: Toward a Research Agenda. *Annals of the Association of American Geographers*, 101(1), 107–130. DOI:10.1080/00045608.2010.520219

McCann, E. (2013). Policy Boosterism, Policy Mobilities, and the Extrospective City. *Urban Geography*, *34*(1), 5–29. https://doi.org/10.1080/02723638.2013.778627

Oxford Business Group. (2015). 'Ridwan Kamil, Mayor of Bandung: Interview'. Available at: https://oxfordbusinessgroup.com/interview/obg-talks-ridwan-kamil-mayor-bandung (Accessed: 24 june 2019)

Paschoal, B., & Wegrich, K. (2017). Urban governance innovations in Rio de Janeiro: The political management of digital innovations. *Journal of Urban Affairs*, 1–18. DOI:10.1080/07352166.2017.1310561

Peck, J. (2011). Geographies of policy: From transfer-diffusion to mobility-mutation. *Progress in Human Geography*, *35*(6), 773–797. https://doi.org/10.5749/minnesota/9780816677306.001.0001

Peck, J. Theodore, N. (2001) Exporting work-fare/importing welfare-to-work: exploring the politics of Third Way policy transfer. *Political Geography*, 20, 427–460

Peck, J. Theodore, N. (2008). Embedding policy mobilities. Working paper, Department of Geography, University of British Columbia, Vancouver, Canada.

Putera, P.A.W. (2019). 'Interview with Qlue CEO, part II: Smart cities in Indonesia and beyond', *Compasslist*, 11th April [online]. Available at: https://compasslist.com/insights/Interview-with-Qlue-CEO%2C-part-II%3A-Smart-cities-in-Indonesia-and-beyond (Accessed: 24 june 2019)

Taeihagh, A. (2017). Crowdsourcing, Sharing Economies and Development. *Journal of Developing Societies*, *33*(2), 191–222. https://doi.org/10.1177/0169796X17710072

Taeihagh, A., & Lim, H. S. M. (2018). Governing autonomous vehicles: emerging responses for safety, liability, privacy, cybersecurity, and industry risks. *Transport Reviews*, 1–26. DOI:10.1080/01441647.2018.1494640

Urbanites (2018). 'Appel #12 / La ville (s)low tech'. 25th October. Available at : http://www.revue-urbanites.fr/appel-12/ (Accessed: 24 june 2019)

Von Luebke, C. (2009). The political economy of local governance: findings from an Indonesian field study. *Bulletin of Indonesian Economic Studies*, 45(2), 201-230.

Voß, J.-P., & Simons, A. (2014). Instrument constituencies and the supply side of policy innovation: the social life of emissions trading. *Environmental Politics*, 23(5), 735–754. DOI:10.1080/09644016.2014.923625

Wardhani, A.D. (2014). 'Jakarta Launches Smart City Program', *The Jakarta Post*, 16th December [online]. Available at: https://www.thejakartapost.com/news/2014/12/16/jakarta-launches-smart-city-program.html (Accessed: 24 june 2019)

Wardhani, A.D., Sofian, E.M., & Elyda, C., (2015). 'Discourse: My way of bureaucratic reform is like playing soccer: Ahok', *The Jakarta Post*, 19th November [online]. Available at: https://www.thejakartapost.com/news/2015/11/19/discourse-my-way-bureaucratic-reform-playing-soccer-ahok.html (Accessed: 24 june 2019)

Wu, X., Ramesh, M., & Howlett, M. (2015). Policy capacity: A conceptual framework for understanding policy competences and capabilities. *Policy and Society*, *34*(3–4), 165–171. https://doi.org/10.1016/j.polsoc.2015.09.001

Zaenudin, H.N. & Suwatno, S. (2017). Ridwan Kamil's Digital Public Sphere and Public Policy. *IOP Conf. Series: Earth and Environmental Science,* 145 (2018) 012007

Research Paper

Future Urban Mobility Development Framework to Maximise Benefits of Plug-in Electric Vehicle Penetration in ASEAN Countries

Alloysius Joko PURWANTO, Economic Research Institute for ASEAN and East Asia

Dian LUTFIANA, Economic Research Institute for ASEAN and East Asia

Abstract

Several Association of Southeast Asian Nations (ASEAN) members have recently developed strategies for low carbon-emission mobility to decrease oil import dependency. The strategies emphasise, amongst others, the importance of removing obstacles to electrification of transport and promoting market development of road plug-in electric vehicles (PEVs). Concerns about the impacts of PEV penetration include how to ensure that (i) electricity used to feed the vehicles will be produced mostly from renewable energy sources to lower carbon emissions, and (ii) additional electricity demand will not put additional stress on urban electricity grid systems.

We deduce two recommendations. First, because they use fossil-fuel energy-intensive electric power, ASEAN countries need to increase urban density and compactness and stop urban sprawl, which will minimise energy use in transport, including PEVs. Generalised PEV travel cost will continue to decrease as new technology is increasingly adopted and the use of PEVs becomes more widespread. Only when a country develops renewable energy to generate electricity, such as through home-based solar photovoltaic systems, can it relax its policies on urban sprawl. Second, ASEAN countries need to avoid putting stress on the electric power grid and to maximise the use of renewables to generate power. Integrating these objectives will help determine the location of charging facilities and the measures to support mobility.

Keywords

Electric vehicles, urban mobility, renewable energy, smart city, ASEAN

1. Introduction

Understanding key mobility trends is crucial to implement the sustainable development agenda. To meet the needs of growing urban populations, many countries face challenges related to housing, transportation, energy systems, and other infrastructure. More than 50% of the world's population lives in urban areas; that share is expected to increase to 68% by

2050. About 90% of this increase will take place in Asia and Africa (UN Data, 2018). Between now and 2030, the number of city dwellers in East Asia Summit countries is projected to rise from roughly 500 million to 900 million. Asia is already home to 54% of the world's urban population. The arc of urban development leans towards continuous growth, resulting in the rise of 43 megacities (with populations over 10 million) by 2030 (UN Data, 2018). At this rate, urbanisation will significantly increase demand for energy to support greater economic activity, expanding urban infrastructure, and the rising need for municipal services. As of 2018, urban areas accounted for 65% of global energy demand and 70% of energy-related CO_2 emissions (Bačeković and Østergaard, 2018).

Electric vehicles (EVs) can help mitigate climate change if they are powered by renewable energy (Chan and Wong, 2004). As part of their commitment to limit temperature rise below 2°C under the Paris Agreement 2015, several Association of Southeast Asian Nations (ASEAN) members set strategies to decrease oil import dependency, including by promoting EVs. ASEAN countries must remove several obstacles to EV penetration and promote market development of plug-in electric vehicles (PEVs), especially cars, powered two-wheelers, and light-duty vehicles (LDVs) or vans. However, EV penetration faces several barriers such as lack of charging stations, long charging time, and EVs' distance range, which all reduce driving mileage. As battery pack costs decrease, however, generalised costs of EV trips are becoming lower than those of internal combustion engine vehicles (ICEVs), which might increase vehicle mileage.

Promoting PEVs should not give rise to climate-change issues. Stakeholders must ensure that the electricity used to feed the vehicles is generated mostly from renewable energy sources, and that additional electricity demand will not increase stress on urban electricity grid systems. The charging management scheme will affect mobility patterns. This paper proposes a framework for future urban mobility in ASEAN countries, which will maximise the benefits of PEV penetration in urban areas.

First, the paper introduces current PEV promotion policies in several Asian and ASEAN countries, their targets, and their progress in deploying vehicles and charging infrastructure. The paper then presents several preliminary assessments of PEV penetration impacts, especially in relation to carbon-emission reduction and the load on the urban power grid. Based on several case studies of urban regions around the world, the paper elaborates the effects of EV penetration on mobility patterns by taking into account (i) PEVs' limited driving range, (ii) PEVs' required charging time, (iii) location of charging stations, and (iv) points and energy sources used to generate electricity. Finally, the paper recommends ways to develop ASEAN urban areas, especially those related to how mobility can maximise the benefits of PEV penetration.

2. Electric Vehicle Penetration in Some Asian and ASEAN Countries

2.1. Policies and Current Progress

Electric mobility is developing rapidly. The global electric car fleet is estimated to exceed 5.1 million, which is 2.0 million more than in the previous year and almost double the previous sales of new electric cars (IEA, 2019). The number of EVs is estimated to have almost tripled globally since 2005 (Raposo Alonso et al., 2019).

China is the world's largest market for electric cars, with nearly 1.1 million sold in 2018 and, with 2.3 million units, accounts for almost half the global electric car stock, followed by Europe (1.2 million) and the United States (US) (1.1 million) (IEA, 2019). China started in 2009 with the '10 cities, 10,000 vehicles' business model to promote PEV development, but established targets only in June 2012: 500,000 vehicles by 2015 and 5 million by 2020. China aims to reach new EV sales shares of 7%–10% by 2020, 15%–20% by 2025, and 40%–50% by 2030 (Marklines, 2017).

Five business models were created in the pilot cities: state leadership in Beijing, based on public sector support; platform-led business in Shanghai, replicating international models; cooperative commercialisation in Shenzhen, based on a leasing model through strategic partnership; flexible rental in Hangzhou; and fast-charging models in Chongqing, which is close to the Three Gorge Power Grid.

In Japan, a leading EV market, government support for battery-powered EV (BEV) development started in the early 1970s. Strong government commitment to promoting EVs is reflected in heavy emphasis on research on and development of vehicle and component technologies, infrastructure, and market support for EV users. The Ministry of Economy, Trade and Industry funded the Clean Energy Vehicle Introduction Project, which provided subsidies and tax discounts for purchasing EVs (InsideEVs, 2013).

In 2017, Japan's EV production ranked fourth in the world at around 8%, after China (50%), Europe (21%), and the US (17%) (Lutsey et al., 2018). The government works with industrial stakeholders to reduce by 80% greenhouse gas (GHG) emissions from domestically produced vehicles (by 90% for passenger vehicles), including exported vehicles, by 2050 with a combination of hybrid electric vehicles (HEVs), BEVs, plug-in HEVs (PHEVs), and fuel cell EVs. Under the new policies scenario, Japan targets increasing EV sale share of all modes (excluding two- and three-wheelers) by 21% and scaling up to 37% market share under the EV30@30 scenario in 2030. To provide more charging stations throughout Japan, in 2018, the government set the goal to have fast chargers every 9.3 miles (15 km) or within every 19-mile (30 km) radius (InsideEVs, 2018a). Japan's success in the EV market is due to government commitment, strong support from the automotive industry, and user-friendly infrastructure.

The Government of India, in 2013, established the National Electric Mobility Mission Plan 2020 and, in 2015, enacted Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India or FAME India. The government has announced its intention to move towards all-EV sales in 2025–2040 and, through EV30@30, to ensure that EVs will account for at least 30% of all vehicle sales by 2030 (Lutsey et al., 2018; IEA, 2019). All vehicles, including two-wheelers, are targeted for electrification. EVs have penetrated the LDV and urban bus markets, accounting for 14% of all passenger cars and LCVs and 11% of all bus sales (IEA, 2019). As a member of the Electric Vehicle Initiative, India is dedicated to accelerating the deployment of EVs.

Delhi, the capital, will be amongst the first cities in India to fully support vehicle electrification by 2023. The Draft Delhi EV Policy 2018 aims to improve Delhi's air quality by driving rapid adoption of BEVs so that they contribute to 25% of all new vehicle registrations by 2023 (InsideEVs, 2018b).

Only two ASEAN countries produce and commercialise PEVs – Thailand and Malaysia. Thailand's first PEV development roadmap – the Electric Vehicle Promotion Plan – was approved by the government in March 2015. In 2017, the Board of Investment (BoI) approved incentives for manufacturers of BEVs, HEVs, and PHEVs, mostly in the form of corporate tax exemptions for 5–8 years. The project to develop next-generation automotive vehicles, focusing on PEVs, was included in the Eastern Economic Corridor, approved in February 2018, to spur investment. In March 2019, the BoI agreed to renew the investment package for HEVs to attract more investment to PEV production. Investors must apply to produce HEVs in 2019 and assemble BEVs within 3 years. HEV and PHEV sales rose by 24.7% in 2017 to 11,945 units whilst BEV sales reached 165 units (Nicholls et al., 2018). All vehicles sold in that year totalled 870,748 units. By 2036, Thailand targets having 1.2 million electric cars on its streets and setting up 690 charging stations.

Malaysia started its PEV programme earlier than Thailand. In 2011, the government exempted from excise duties and import taxes completely built-up, fully imported hybrid cars to encourage manufacturers to invest in PEV production in the country. After the policy failed to boost foreign investment, the government abandoned it in 2014 and extended it only for completely knocked-down models assembled in Malaysia. The government now prefers to deal with manufacturers individually, a strategy that appears to work with several foreign original equipment manufacturers.

A recent tripartite agreement between TNB Energy Services Sdn Bhd (TNBES), Petronas Dagangan Bhd (PetDag), and GreenTech Malaysia resulted in the installation of 100 charging stations across the country by 2018. By the end of 2018, 251 PEV charging stations had been built across the peninsula (Weng, 2019). GreenTech Malaysia is under the purview of the Ministry of Energy, Science, Technology, Environment and Climate Change to spearhead the development and promotion of green technology as a strategic engine for socio-economic growth in line with the Green Technology Master Plan 2017–2030. The number of new registered hybrid vehicles, including conventional HEVs and, in recent years, PHEVs, increased from 138 in 2010 to more than 9,000 in 2017. Malaysia aims to build 125,000 charging stations by 2020.

In the second half of 2018, the Government of Indonesia was to have issued a presidential decree on deploying EVs but it has not yet materialised. Despite the lack of a formal development framework, the Ministry of Industry told a newspaper that the government would target sales of 400,000 EVs by 2025 to reduce GHG emissions by 29% by 2030 (Akhyar, 2019). One source mentions that 400,000 PEVs would be produced domestically by then. Other sources estimate that around 2 million electric-powered two-wheelers would be sold by 2025. Jakarta has around 1,000 charging stations, built by the PLN (State Electricity Company).

2.2. Impacts of PEV Penetration on Reducing CO_2 Emissions

Unless power generation is decarbonised, the effect of reducing BEVs' CO_2 emissions will be limited in Thailand, Malaysia, Viet Nam, and Indonesia, which are largely dependent on coal- and, to some extent, gas-fired power plants. Transitioning from ICEVs to EVs would be a huge advantage (Suehiro and Purwanto, forthcoming).

PEV penetration would not much change the energy self-sufficiency ratio of those countries since the decrease in imports of petroleum products used as transport fuel, e.g., gasoline and diesel, would be cancelled by increasing imports of coal and natural gas used to generate electricity. PEV penetration would, however, considerably improve those countries' import bills. The generous subsidies needed for PEV penetration and the large investment in low-carbon power supply might put pressure on government finances (Suehiro and Purwanto, forthcoming).

2.3. Impacts of PEV Penetration on the Urban Power Grid

ICEV users benefit from well-established refuelling station networks nearly everywhere. In contrast, PEV charging infrastructure is in its early development stage, especially in ASEAN countries.

The expansion of PEVs and their demand for charging facilities have become increasingly important. The associated electricity demand will affect energy markets and the grid infrastructure. Studies on Portugal (Nunes, 2015) and the European Union (Kasten and Purwanto, 2016) show the impact of PEVs on the power grid once they make up 5%–10% of total road vehicles.

PEVs' environmental performance is better than conventional vehicles' when additional electricity demand is met by a low-carbon energy mix (Suehiro and Purwanto, forthcoming). China, the PEV front runner in Asia, is struggling to curb its share of coal-fired electric energy from 75% to 50% and to increase that of renewable sources from 25% to 50% by 2030, bringing down power generation carbon intensity by one-third and ensuring that PEVs will be less carbon intensive than they are now. China uses more electricity from coal-fired generating plants during fast-charging peak demand periods and after working hours in the evening. Slow charging during off-peak hours, when energy from renewables such as wind turbines is available, would reduce CO_2 emissions (Chen et al., 2018).

When and how PEVs are charged determine which generation plants satisfy additional electricity demand and have an impact on emissions. Depending on their total system and marginal costs, different types of power plants may increase production. Including this charging scheme in the analysis might change the calculation results.

Uncontrolled or user-driven charging occurs mostly after work in the evening, when electricity demand is already high, increasing system load and costs of utilities (Brandmayr et al., 2017). User-driven charging raises severe concerns about generation adequacy and may jeopardise the stability of the power system (Schill and Gerbaulet, 2015). Fast-charging stations use large amounts of power for short periods of time, meaning that expensive upgrades will be needed for a relatively low use rate (Hall and Lutsey, 2017). In the US, if PEVs constitute 25% of all road vehicles, uncontrolled charging will increase electricity peak demand by 19%, but spreading charging over the evening hours will increase demand by only 0%–6% (Fitzgerald, 2017).

Both concerns – inadequate reduction of CO_2 emissions and the increasing load on the local grid – clearly need to be solved by managing charging. Possible charging management schemes follow:

- Off-peak or network-oriented charging. Policies and structures that encourage off-peak period charging might include workplace or daytime charging and night-

time home charging to avoid network congestion and physical capacity constraints.

- Cost-oriented charging. This strategy would reduce PEV charging cost by shifting the charging time to periods of low energy prices. PEV owners would benefit from low energy costs and smoothing of load patterns as costs are low when demand is low. If low-cost periods are dominated by conventional generation, however, negative environmental effects could result.
- Smart charging. This includes controlled charging and demand response. The use of in-vehicle timers to take advantage of time-of-use (ToU) rates could help minimise stress on the electrical grid whilst also saving money for consumers.
- Combined smart and cost-oriented charging. Combining smart charging and the least marginal-cost approach lowers real-time prices and, therefore, increases the share of renewable energy such as wind (Dallinger et al., 2012).
- Renewable energy– or low emission–oriented charging. This strategy aims to increase environmental performance or avoid the negative impact of GHG and air pollutant emissions. The measure shifts charging times to periods of high and/or surplus renewable energy generation.

3. Impacts of Electric Vehicle Penetration on Mobility Patterns: Literature Review

3.1. Trip Distance

Newman and Kenworthy's (1989) pioneering research shows the relationship between population density and energy use: per capita automobile usage, represented by gasoline used per capita, drops with rising area population density.

More recent research in line with Newman and Kenworthy's seminal work considers the use of PEVs:

Schuller and Hoeffer (2014) assess the impact of individual socio-demographic mobility patterns on the potential to utilise renewable energy for PEV charging. They find that shorter driving distances increase the relative adoption potential of renewables to generate electricity for PEVs.

Glazebrook and Newman (2018) foresee the emergence of a polycentric city linked by fast electric rail, with local access based on autonomous 'community'-owned electric cars, including small-scale electric cars and buses, supplemented by bicycles, electric bikes, and scooters, with all electricity generated from renewables. The city would likely have, amongst others, (i) an increased concentration of jobs, residents, and activities along old transit corridors and in satellite cities and sub-centres clustered around intensive rail systems; (ii) increasing housing density in all parts of the city; and (iii) a concomitant decline in the share of 'dispersed' activities.

This view on the emerging trend of urban compacting is shared by many researchers such as Vandecasteele et al. (2019), suggesting that new urban developments are promoting higher-

density housing, thereby making public transport more efficient whilst also promoting a new work-live-play urban model whereby all necessary services, housing, and entertainment are within walking distance. The research suggests that legislation and governance measures are needed to ensure that new transport modes such as autonomous EVs complement rather than compete with public transport.

Thakur et al. (2016), however, find that the autonomous era will be shaped by two competing dynamics. First, new autonomous ride-sourcing services may catalyse a move away from private vehicle ownership, which will increase the marginal cost of travel and encourage urban consolidation and regeneration. Second, reduced perceived travel costs will likely encourage citizens to accept longer travel times. A combination of denser inner cores and sprawling development on the urban fringes can be expected.

Ahmadian et al. (2019) believe that PEV penetration might lead to longer travel distances and times and not compact urban form. The combination of PEV penetration and the use of solar photovoltaic (PV) residential roof-based electricity to charge PEVs will result in comparatively clean and free well-to-wheel energy. Solar PV electric energy use by buildings and transport favour lower-density, non-compact urban form as there is an inverse correlation between urban density and transport energy: residential roof-mounted solar PVs in lower-density urban areas can potentially generate more energy than is required for typical transport needs in urban areas. Suburbia can power transport in the city and still have energy to spare. This does not necessarily mean that vehicles need to be charged at home, as various options of distributing renewable energy are assumed.

Byrd et al. (2013) find that low-density suburbia is the most efficient collector of solar energy and generates excess electricity to power daily transport needs and contribute to peak daytime electrical loads in the city centre.

3.2. Trip Origin–Destination and Schedule

PEVs should be charged using an energy source that will reduce carbon emissions and avoid increasing the load on the local electric power grid. This system requires smart charging schemes that can be implemented in public charging facilities.

Determining the optimal location of such facilities has been an important research subject for almost 10 years. Various studies recommend different optimisation rules. Three studies are worth mentioning here:

- Frade et al. (2010) aimed to maximise demand covered within an acceptable level of service and to define the number and capacity of the stations to be installed in Lisbon, Portugal.
- Wagner et al. (2014) used three optimisation objectives to determine locations of charging points and stations in Amsterdam, The Netherlands: maximising charging point utilisation, minimising PEV drivers' range anxiety, and maximising stations' visibility.
- Vazifeh et al. (2019) used call data records to apply a new methodology in Boston, US, and to optimise PEV charging locations. The objective was to cover the entire demand region whilst minimising drivers' total excess driving distance to reach charging stations, related energy overhead, and number of charging stations.

Only a few researchers, however, have studied the effects of charging facility placement on mobility:

Wagner et al. (2014), for example, found that people charge their vehicles at stores where they spend a lot of time. In places such as bakeries, for instance, people stay for too short a time to warrant plugging their vehicles into a charge point outlet.

Çolak et al. (2016) studied how to harmonise smart charging with trip schedules. They analysed a coupling of two unique large datasets on urban mobility and EV energy consumption. Amongst others, they found high temporal flexibility of charging sessions, i.e., vehicles are parked for longer periods than required to fully charge them, allowing room for improvement in scheduling PEV charging. The researchers found a method to shave the daily peak power to alleviate the load on the power grid: peak power values can be shed by delaying charging and adjusting the arrival hours without imposing constraints on departure times, and without violating charging continuity or delaying departure time.

4. Discussion

Reducing GHG emissions, strengthening energy security by reducing imports of petroleum products used for transport fuels, and improving urban air quality are amongst the most-frequent arguments invoked in favour of PEV penetration.

Whilst PEVs should reduce tank-to-wheel (downstream) air pollution in urban areas and reduce demand for gasoline and diesel fuels, ASEAN countries face the big challenge of deploying PEVs to reduce GHG emissions. The countries are mostly dependent on carbon-intensive energy sources such as coal and natural gas to generate electricity.

In countries dependent on fossil fuel–based power plants, such as Indonesia, Malaysia, Viet Nam, and Thailand, policies to ensure energy-efficient urban mobility are highly important. The use of electricity by PEVs should be minimised by encouraging compact urban forms and structures and restraining urban sprawl. Doing so will minimise travel by private car and promote the use of mass public transport and soft modes such as walking and cycling. Newman and Kenworthy's density theory holds in this situation, whilst increasingly compacting urban forms (Glazebrook and Newman, 2018; Vandecasteele et al., 2019) is the trend of the future. Only when a country develops home-based solar PV electricity in suburbia to feed residential and EV needs can urban-form policies be relaxed.

Mobility-related policy measures should be linked to the charging mechanism. The impacts of PEV charging on the grid and on power generation are so far negligible, but battery costs are declining continuously, electricity is cheaper than gasoline and diesel, and urban mobility and car ownership are rising in ASEAN countries. All these factors might lead to a tipping point for EV market penetration. A strategy is needed to implement different charging schemes to avoid pressure on the electric grid and to maximise the use of low-carbon power generation.

Studies in some PEV front-runner countries show that unregulated charging will add pressure to the urban electric grid when household electricity demand is at its peak. Uncontrolled charging after work threatens network grid security, which is generally vulnerable in ASEAN countries. In countries that generate electricity in fossil fuel–intensive

power plants, additional electricity for charging PEVs in the late afternoon (a peak load period) comes mostly from coal- and gas-fired plants.

ASEAN countries should manage their PEV charging mechanisms to avoid peak periods and take advantage of periods when renewables are available to meet additional demand. Locations of public charging facilities should encourage electricity consumption during periods of lowest grid load and when renewable-based electricity is available. For instance, public charging facilities can be installed in workplaces or in parking facilities of stores where people spend a long time when grid load is low and renewable-based electricity is available. PEVs can be allocated special parking spaces or access.

5. Recommendations and the Way Forward

First, because they use a high percentage of fossil fuel to generate electricity, ASEAN countries must adhere to policies that increase urban density and compactness and stop urban sprawl. Generalised costs of PEV travel will continue to decrease significantly, which will increase PEV adoption and average mileage. Only when a country develops renewables such as home-based solar PV energy can it relax its policies on urban sprawl.

Second, ASEAN countries need to locate PEV charging facilities in a way that avoids stress on the electric power grid and maximises the use of renewables.

This research is a preliminary step in building an urban mobility development framework to maximise the benefits of PEV penetration in ASEAN countries' urban areas. The task is challenging because countries and regions produce electricity in different ways, and urban areas vary greatly in structure, characteristics, and mobility patterns.

We recommend two research axes:

- Conduct a more comprehensive literature study on the relationship between EV penetration, mobility patterns, and urban forms.
- Conduct an empirical study on how charging facilities are located in Asian and ASEAN countries' urban regions and how this might interfere with current mobility patterns and policies.

6. References

Aji, G. A. (2017), 'PLN to Install 1,000 Electric Vehicle Charging Posts in Jakarta', Tempo.co (English version), 14 December. https://en.tempo.co/read/914119/pln-to-install-1000-electric-vehicle-charging-posts-in-jakarta (accessed 13 June 2019).

Akhyar, T. (2019), 'Electric car production can generate forex savings of IDR 789 Trillion', Netralnews.com (English version), 9 May. https://en.netralnews.com/news/business/read/26798/electric.car.production.can.generate.forex.savings.of.idr.789.trillion (accessed 27 June 2019).

Bačeković, I. and P.A. Østergaard (2018), 'Local Smart Energy Systems and Cross-System Integration', *Energy,* 151, pp.812–25.

Brandmayr, C., D. Benton, A. George, and C. Kumar (2017), *People Power: How Consumer Choice Is Changing the UK Energy System*. Green Alliance. https://www.green-alliance.org.uk/people_power_consumer_choice.php (accessed 22 March 2019).

Byrd, H., A. Ho, B. Sharp, and N. Kumar-Nair (2013), 'Measuring the Solar Potential of a City and Its Implications for Energy Policy', *Energy Policy,* 61, pp.944–52.

Chan, C. C. and Y. S. Wong (2004), 'Electric Vehicle Charge Forward', *IEEE Power & Energy Magazine*, 2(6), pp.24–33.

Chen, X., H. Zhang, Z. Xu, C. P. Nielsen, M. B. McElroy, and J. Lu (2018), 'Impacts of Fleet Types and Charging Modes for Electric Vehicles on Emission under Different Penetrations of Wind Power', *Nature Energy,* 4, pp.413–21.

CNN Indonesia (2018, 'Target ESDM Bangun 10 Ribu SPLU pada 2050', 6 October. https://www.cnnindonesia.com/teknologi/20181005090713-384-335919/target-esdm-bangun-10-ribu-splu-pada-2050 (accessed 13 June 2019).

Çolak, S., E. C. Kara, S. J. Moura, and M. C. González (2016), 'Coupling Electric Vehicle Charging with Urban Mobility'. Department of Civil & Environmental Engineering, MIT, Cambridge, MA, USA. http://humnetlab.mit.edu/wordpress/wp-content/uploads/2016/03/EV_Mobility.pdf (accessed 13 June 2019).

Dallinger, D., Gerda, S., and Wietschel, M. (2013), 'Integration of intermittent renewable power supply using grid-connected vehicles – A 2030 case study for California and Germany'. *Applied Energy*, 104, 666–682.

Fitzgerald G. and C. Nelder (2017), 'From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand'. Rocky Mountain Institute. https://rmi.org/insight/from_gas_to_grid/ (accessed 4 July 2019).

Frade, I., A. Ribeiro, G. Gonçalves, and A. P. Antunes (2011), 'Optimal Location of Charging Stations for Electric Vehicles in a Neighbourhood in Lisbon, Portugal', *Transportation Research Record Journal of the Transportation Research Board*, 2252 (1), pp.91-98.

Glazebrook, G. and P. Newman (2018), 'The City of the Future', *Urban Planning,* 3(2), pp.1–20, DOI: 10.17645/up.v3i2.1247. https://www.researchgate.net/publication/324732295_The_City_of_the_Future (accessed 5 July 2019).

Government of Indonesia (2019), Presidential Decree 22/2017 on the General Planning of National Energy (RUEN) (in Bahasa Indonesia). https://www.hukumonline.com/pusatdata/detail/lt58ed9d355f616/node/534/peraturan-presiden-nomor-22-tahun-2017 (accessed 13 June 2019).

Hall, D. and N. Lutsey (2017), *Emerging Best Practices for Electric Vehicle Charging Infrastructure*, White Paper. Washington, DC: The International Council on Clean Transportation. https://www.theicct.org/sites/default/files/publications/EV-charging-best-practices_ICCT-white-paper_04102017_vF.pdf (accessed 11 December 2018).

InsideEVs (2013), 'Japan Extends EV Subsidy Program'. https://insideevs.com/news/319125/japan-extends-ev-subsidy-program/ (accessed 1 July 2019).

InsideEVs (2018a), 'Japan's EV Infrastructure Is Massive, Electric Car Sales Not So Much'. https://insideevs.com/news/338290/japans-ev-infrastructure-is-massive-electric-car-sales-not-so-much/ (accessed 1 July 2019).

InsideEVs (2018b), 'Delhi Would Like To Achieve 25% Electric Car Penetration By 2023'. https://insideevs.com/news/341749/delhi-would-like-to-achieve-25-electric-car-penetration-by-2023/ (accessed 3 July 2019).

International Energy Agency (IEA) (2019), *Global PEV Outlook 2019: Scaling-up the transition to electric mobility*. Paris: IEA.

Kasten, P., J. Bracker, M. Haller, and J. Purwanto (2016), 'Assessing the status of electrification of the road transport passenger vehicles and potential future implications for the environment and European energy systems'. Final Report – Task 2, Specific Contract under Framework Contract EEA/ACC/13/003, Trinomics BV, Rotterdam, 74p. https://www.oeko.de/fileadmin/oekodoc/Assessing-the-status-of-electrification-of-the-road-transport-passenger-vehicles.pdf (accessed 22 March 2019).

Lutsey, N., M. Grant, S. Wappelhorst, and H. Zhou (2018), *Power Play: How Governments Are Spurring the Electric Vehicle Industry*. Washington, DC: The International Council on Clean Transportation.

Martin, C., F. Starace, and J-P. Tricoire (2018), *Electric Vehicles for Smarter Cities: The Future of Energy and Mobility*. Geneva: World Economic Forum.

Marklines (2019). www.marklines.com/portal_top_en.html (accessed 13 June 2019).

Nicholls, A., A. M. Baisden, B. Lakshminarasimhan, and X. Boucherat (2018), *Special report: The ASEAN auto industry*. United Kingdom: Automotive World Ltd.

Nunes, P., T. Farias, and M. C. Brito (2015), 'Day Charging Electric Vehicles with Excess Solar Electricity for A Sustainable Energy System', *Energy,* 80, pp.263–74.

Raposo Alonso, and M. B. Ciuffo (eds.) (2019), *The future of road transport – Implications of automated, connected, low-carbon and shared mobility*. Luxembourg: European Commission.

Schill, W-P. and C. Gerbaulet (2015), 'Power system impacts of electric vehicles in Germany: Charging with coal or renewables?' *Applied Energy*, 156, 15 October, pp.185–96.

Schuller, A. and J. Hoeffer (2014), 'Assessing the Impact of PEV Mobility Patterns on Renewable Energy Oriented Charging Strategies', 8th International Renewable Energy Storage Conference and Exhibition, IRES 2013, *Energy Procedia,* 46, pp.32–29. https://reader.elsevier.com/reader/sd/pii/S1876610214001714?token=9FB4C4BBB8E9AA9E64F54B81DF1C5B2DBC84995279FA3906EEF5021F272C5E698E748C554946DAE322BB5AE283CF6078 (accessed 13 June 2019).

Soeriaatmadja, W. (2019), 'Indonesia charging ahead with electric vehicle ambitions', *The Straits Times*, 15 January. https://www.straitstimes.com/asia/se-asia/indonesia-charging-ahead-with-electric-vehicle-ambitions (accessed 13 June 2019).

Suehiro, S. and A. J. Purwanto (forthcoming), Study on Electric Vehicle Penetration's Influence on 3Es in ASEAN, ERIA Research Project Report. Jakarta: Economic Research Institute for ASEAN and East Asia.

Thakur, P., R. Kinghorn, and R. Grace (2016), 'Urban form and function in the autonomous era', Australasian Transport Research Forum 2016 Proceedings, 16–18 November, Melbourne Australia. https://www.atrf.info/papers/2016/files/ATRF2016_paper_138.pdf (accessed 14 June 2019).

Transportation Research Board and National Research Council (2015), *Overcoming Barriers to Deployment of Plug-in Electric Vehicles.* Washington, DC: The National Academies Press. https://doi.org/10.17226/21725 (accessed 4 July 2019).

United Nations (2018), 'World Urbanization Prospects: The 2018 Revision'. https://population.un.org/wup/ (accessed 25 June 2019).

Vakakos, M. (2013), 'The Impact of electric drive vehicles on travel patterns and the urban form of Lisboa Metropolitan Area'. Dissertation for a master's degree in complex transport infrastructure systems, MIT Portugal Program, Técnico Lisboa, Lisbon, Portugal.

Vandecasteele I., C. Baranzelli, A. Siragusa, and J.P. Aurambout (eds.) (2019), *The Future of Cities – Opportunities, challenges and the way forward*. Luxembourg: European Commission. https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/future-cities (accessed 5 July 2019).

Vazifeh, M., H. Zhang, P. Santi, and C. Ratti (2019), 'Optimizing the deployment of electric vehicle charging stations using pervasive mobility data', *Transportation Research Part A,* 121, pp.75–91.

Wagner, S., T. Brandt, and D. Neumann (2014), 'Smart City Planning – Developing An Urban Charging Infrastructure for Electric Vehicles', Twenty Second European Conference on Information Systems, Tel Aviv, Israel. https://www.researchgate.net/publication/286597848_Smart_city_planning_-_Developing_an_urban_charging_infrastructure_for_electric_vehicles (accessed 14 June 2019).

Case Study Paper

Comprehensive Evaluation and Dynamic Evolution Analysis of Shanghai's Urban Vulnerability

Tian QIN; CAUP of Tongji University; China

Abstract

Urban vulnerability refers to the ability of a city to resist internal and external natural and human factors. With global environmental changes and urbanization continuing at pace, the urban planning and development strategies of cities, especially mega-cities, are facing comprehensive and unprecedented issues. This paper takes Shanghai, one of the largest mega-cities worldwide and the global cities in China, as an example, using the comprehensive evaluation index method which includes natural resource vulnerability, eco-environment vulnerability, economic vulnerability and social vulnerability, to build a comprehensive vulnerability index evaluation system of the city. Through the dynamic evolution analysis conductive to a deeper understanding of the changing laws of urban vulnerability, explore the persistence and transformation mechanism of urban functions after perturbations, and realize the sustainable development of cities, the paper found that: firstly, during 2002 -2017, the comprehensive urban vulnerability index of Shanghai has been declining, among which the decline rate was large during the years of 2004 -2006 and 2010-2012, which was the result of urban events promoting urban construction. Secondly, Shanghai has changed from an absolute dominant eco-environment vulnerability to a more balanced vulnerability, indicating that cities have greater resistance, adaptation and transformation capabilities to multiple perturbations including natural resource, ecological environment, economic and social development. Thirdly, Shanghai's eco-environment vulnerability has continued to decline in recent years, but it is still the dominant factor of the urban vulnerability. Fourthly, as Shanghai has been facing an increase in migrant population and huge arable land pressure, the contribution rate of natural resource vulnerability continues to be high and has increased in recent years. Facing the changing environment and risks, we must plan for resilience, and build, evolve and secure quality of life for dwellers.

Keywords

Urban vulnerability, evolutionary research, Shanghai

Shanghai's new round of master plan puts forward the vision of "Striving for the Excellent Global City". Under the background of a new historical starting point and adapting to the new development trend, Shanghai is also faced with many challenges such as sustained population growth, environmental resource constraints, and urban functional transformation. The combination of endogenous contradictions and external adverse effects of urban development leads to the vulnerability of cities in resource utilization, ecological environment, economic construction and social development.

In order to evaluate the urban development of Shanghai in the past ten years more comprehensively and intuitively, this paper makes a longitudinal study of the evolution characteristics of Shanghai's urban comprehensive vulnerability in the past 15 years based on statistics from 2002 to 2017. The paper deeply studies the development status and vulnerability evolution characteristics of Shanghai in the last stage, in order to effectively regulate and control the urban vulnerability and provide some inspiration for Shanghai to move towards sustainable development.

1. Introduction

The term "vulnerability" came from the field of natural disaster research (Turner et al., 2003), and then it was widely used in ecology, economics, geography, sociology and other disciplines (Fang and Wang, 2015). Urban vulnerability refers to the ability of cities to resist the interference of internal and external natural and human factors such as ecological, economic and social development. When this anti-interference ability is lower than a critical threshold, the city will enter a vulnerable state (Wang and Fang, 2014). Currently, researches on urban vulnerability in China mainly focuses on the assessment and classification of eco-environment vulnerability and the vulnerability assessment of disaster-prone cities (Zhang et al., 2016). In recent years, researches on the issue have changed from a single system to a diversified ones. For example, Fang and other scholars evaluate the comprehensive vulnerability of cities from multiple subsystems (Fang and Wang, 2015).

Based on previous relevant studies on urban vulnerability by domestic and foreign scholars, the influencing factors of urban vulnerability can be divided into two categories: natural conditions and human activities. Urban vulnerability includes four elements: resource vulnerability, eco-environment vulnerability, economic vulnerability and social vulnerability. Considering the reliability and validity of the data, this paper chooses the period from 2002 to 2017 to conduct a diachronic study on the comprehensive vulnerability of Shanghai city from four aspects: resources, ecology, economy and society.

2. Urban Vulnerability Assessment Method and Evaluation System Construction

2.1. Construction of Evaluation Index System

Based on assessment systems constructed by Fang and Wang (2015), this paper constructs the urban comprehensive vulnerability evaluation system according to the principles of non-collinearity and accessibility of index data (Fig. 1).

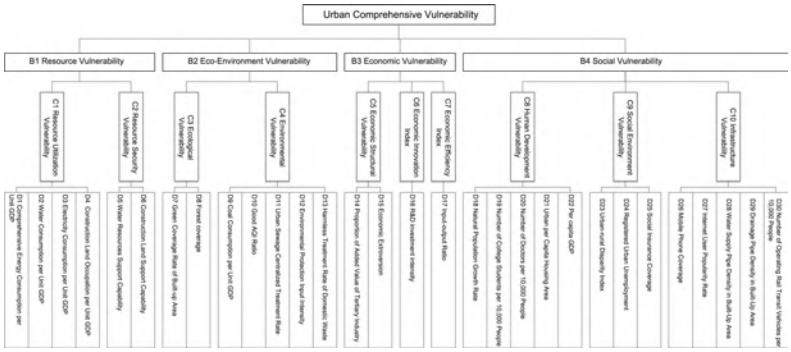


Figure 1 Urban Comprehensive Vulnerability Assessment System

Source: Self-organized, summarized and made

The target level is divided into four sub-elements including urban resources, ecology, economy and social vulnerability. The whole system contains 30 third-level indicators and 10 second-level indicators.

2.2. Identification of Typical Indicators and Determination of Weight Coefficient

2.2.1. Quantitative Identification and Explanation of Typical Indicators

(1) Water resources support capacity. The study measure the urban water resources support capacity by the ratio of urban available water resources to actual urban water demand (Fang and Wang, 2011). The calculation method is as follows:

$$WPSI_{\mathrm{i}} = \frac{DWS_i \times T}{YTWS_i} \qquad (1)$$

where: $WRSI_i$ refers to the water resources support capacity. $DWSi$ is the daily water supply of urban tap water. T is the number of days in a year. $YTWS_{\mathrm{i}}$ is the total water consumption of the city and is calculated according to the total water supply in the Statistical Yearbook of Urban Construction over the years. The closer the index is to 1, the higher the water resources support capacity of the city is. When the index value equals 1, it indicates that the current water production capacity of the city does not destroy the ecological balance, but also meet the needs of urbanization development (Fang and Wang, 2015).

(2) Construction land support capacity. According to the National Land Use Change Survey Report and related research, the per capita arable land area in cities is taken

as the basis for estimating the underlying conditions of land[1]. And the actual per capita construction land area and the healthy per capita construction land area are taken as the basis for evaluating the development potential of regional construction land①. The calculation method is as follows:

$$LCSI_i = \frac{1}{2}\left(\frac{PAA_i}{HPAA_i} + \frac{PCA_i}{HPCA_i}\right) \quad (2)$$

where: $LCSIi$ is the construction land support capacity. $PAAi$ is the per capita cultivated land area (calculated by permanent population), and $HPAAi$ is the minimum per capita cultivated land area needed[2]. PCA_i is the area of construction land per capita (calculated by urban population). $HPCA$ is healthy per capita construction land area (calculated by living, service facilities, road traffic, green space and other construction land standards closely related to per capita land use indicators, this paper determines that the healthy per capita construction land area in Shanghai is 140 sqm). When the construction support capacity index is 1, it means that the city has enough development space (Fang and Wang, 2015).

(3) Coal consumption per 10,000 yuan GDP. Because carbon emission data per unit output value is difficult to obtain, and coal consumption accounts for more than half of the major energy products in Shanghai, coal consumption per 10,000 yuan GDP is used as an indicator to measure urban environmental vulnerability.

(4) Economic extroversion. That is, the degree of dependence on foreign trade, which is used to measure the degree of close economic ties, openness and dependence on foreign trade between Shanghai and other countries. This index is quantified by the ratio of total urban exports to GDP.

(5) Input-output ratio. The input-output ratio of government finance is taken as the basis to measure urban economic efficiency. This paper adopts a quantitative method to calculate the ratio of general budget revenue to expenditure of local finance.

(6) Urban per capita housing construction area. Taking urban per capita housing area as an index to measure urban human development, this paper takes per capita

[1] The index of construction land security in this paper only reflects the development support and potential status of urban construction land, and is different from the rationality of construction land allocation. According to the relevant research, if the current situation of construction land is relatively healthy per capita construction land area exceeds the standard, although the urban land security capacity is strong, but the land use efficiency is low. Such land allocation is unreasonable.

[2] The smallest per capita cultivated land area in Shanghai in 2004 was 0.045 hectares according to relevant study (Zhu and Zhang, 2007). Statistics show that the per capita cultivated land area of China is 0.09 hectares in 1998-2007 and 0.08 hectares in 2008-2017, respectively. In this paper, the minimum per capita cultivated land area is 0.04 hectares per person.

housing construction area as an index. Before 2007, the index was converted into per capita housing area, with a conversion rate of 51%[3].

(7) Urban-rural disparity index. It is the ratio of disposable income of town residents to per capita net income of rural residents. The closer the index is to 1, the smaller the income gap between urban and rural areas is, the higher the sharing level of urban and rural development results is.

(8) The registered urban unemployment rate. This paper calculates the indicator by the ratio of registered unemployment in cities and towns to the sum of registered unemployment in cities and towns. Due to the change of statistical methods, the unemployment rate of urban survey is taken as the index after 2011.

(9) Social insurance coverage. The index refers to the proportion of urban and rural insured persons in the permanent population, which is based on the permanent population and takes into account both urban and rural conditions. Because of the great changes in China's urban and rural social insurance system, the number of people who have basic medical insurance in urban enterprises and institutions (including retirees, individual businesses and freelancers) as well as the basic medical insurance for urban workers, basic old-age insurance for urban workers, social old-age insurance for urban residents, rural cooperative medical insurance, new rural social old-age insurance and the basic medical insurance for urban and rural residents and other types of insurance data are calculated in this study. The selection and calculation of indicators should not overlap or omit as much as possible.

2.2.2. Determination of Weight Coefficient

The weights of urban vulnerability index and related indexes are calculated by analytic hierarchy process (AHP). The impact and mechanism of each index on urban vulnerability are different. The index system of urban comprehensive vulnerability measurement and its related values, index properties and the corresponding data sources are shown in Table 1 below.

Table 1 Table of Comprehensive Measurement Index System of Urban Vulnerability

Target Level	Weight	Principal Level	Divided Weight	Indicator Layer	Unit	Property	Data Source
B1 Resource Vulnerability	0.2	C1 Resource Utilization Vulnerability	0.45	D1 Comprehensive Energy Consumption per Unit GDP	Tons of standard coal / 10,000 yuan	+	"2017 Shanghai Statistical Yearbook"
				D2 Water Consumption per Unit GDP	m³/10,000 yuan	+	calculated according to the Statistics Yearbooks
				D3 Electricity Consumption per Unit GDP	kWh/10,000 yuan	+	calculated according to the Statistics Yearbooks
				D4 Construction Land Occupation per Unit GDP	k ㎡/10,000 yuan	+	calculated according to relevant data
		C2 Resource	0.55	D5 Water Resources Support Capability	—	-	calculated according to relevant data

[3] This value is calculated based on the data of the "Shanghai Statistical Bulletin on National Economic and Social Development" in 2008 and following years.

		Security Vulnerability		**D6** Construction Land Support Capability	—	-	calculated according to relevant data
B2 Eco-Environment Vulnerability	0.3	**C3** Ecological Vulnerability	0.36	**D7** Green Coverage Rate of Built-up Area	%	-	"Shanghai Statistical Yearbooks"
				D8 Forest coverage	%	-	National Data& "Shanghai Statistical Yearbooks"
		C4 Environmental Vulnerability	0.64	**D9** Coal Consumption per Unit GDP	Tons / 10,000 yuan	+	calculated according to relevant data
				D10 Good AQI Ratio	%	-	"Shanghai Municipal Environmental Status Bulletin"
				D11 Urban Sewage Centralized Treatment Rate	%	-	"Urban Construction Statistical Yearbooks"
				D12 Environmental Protection Input Intensity	%	-	"Shanghai Statistical Yearbooks"
				D13 Harmless Treatment Rate of Domestic Waste	%	-	"Urban Construction Statistical Yearbooks"
B3 Economic Vulnerability	0.2	**C5** Economic Structural Vulnerability	0.33	**D14** Proportion of Added Value of Tertiary Industry	%	-	"Shanghai Statistical Bulletin on National Economic and Social Development"
				D15 Economic Extroversion	%	-	"2017 Shanghai Statistical Yearbook"
		C6 Economic Innovation Index	0.37	**D16** R&D investment intensity	%	-	"Statistical bulletin on national science and technology funding"
		C7 Economic Efficiency Index	0.30	**D17** Input-output Ratio	%	-	calculated according to the National Data
B4 Social Vulnerability	0.3	**C8** Human Development Vulnerability	0.37	**D18** Natural Population Growth Rate	‰	-	National Data
				D19 Number of College Students per 10,000 People	people	-	"2017 Shanghai Statistical Yearbook"
				D20 Number of Doctors per 10,000 People	people	-	"2017 Shanghai Statistical Yearbook"
				D21 Urban per Capita Housing Area	㎡	-	calculated according to "Shanghai Statistical Bulletin on National Economic and Social Development"
				D22 Per capita GDP	10,000 dollars	-	"2017 Shanghai Statistical Yearbook"
		C9 Social Environment Vulnerability	0.33	**D23** Urban-rural Disparity Index	—	+	calculated according to "Urban Statistical Yearbook of China"
				D24 Registered Urban Unemployment	%	+	"Urban Statistical Yearbook of China"
				D25 Social Insurance Coverage	%	-	calculated according to "Shanghai Statistical Bulletin on National Economic and Social Development"
		C10 Infrastructure Vulnerability	0.30	**D26** Mobile Phone Coverage	%	-	calculated according to "Shanghai Statistical Bulletin on National Economic and Social Development"
				D27 Internet User Popularity Rate	%	-	calculated according to "Shanghai Statistical Bulletin on National Economic and Social Development" & National Data
				D28 Water Supply Pipe Density in Built-Up Area	km/k ㎡	-	"Urban Construction Statistical Yearbooks"
				D29 Drainage Pipe Density in Built-Up Area	km/k ㎡	-	"Urban Construction Statistical Yearbooks"
				D30 Number of Operating Rail Transit Vehicles per 10,000 People	vehicle	-	"Urban Construction Statistical Yearbooks"

Source: Self-organized, summarized and made according to relevant information

Note: The process data of the number of permanent resident population, gross regional product, city total annual water supply , city annual electricity consumption, year-end total construction land area, daily water supply capacity of municipal tap water, year-end cultivated land area, city annual coal consumption, general budget revenue and expenditure of local finance, disposable income of urban residents, per capita net income of rural residents, number of basic medical insurance for urban and rural residents, number of basic medical insurance for workers and staff, year-end number of railway vehicles et al. are from the "Urban Construction Statistical Yearbooks",

"Shanghai Statistical Yearbooks", "Shanghai Statistical Bulletin on National Economic and Social Development" and the website of the National Bureau of Statistics.

2.3. Data Processing and Analysis Method

(1) Data standardization

The original data from the statistical yearbook are standardized to eliminate the influence of dimensional differences among different indicators. Thirty-one indicators in the evaluation system can be divided into positive and negative categories according to their impact mechanism on urban vulnerability, which are explained and dealt with as follows:：

Positive evaluation index: The larger the value, the greater the vulnerability. The processing method is as follows:

$$X_i = \frac{x_i - \min\{x_i\}}{\left|\max\{x_i\} - \min\{x_i\}\right|} \tag{3}$$

Negative evaluation indicator: The larger the value, the smaller the vulnerability. The processing method is as follows:

$$X_i = \frac{\max\{x_i\} - x_i}{\left|\max\{x_i\} - \min\{x_i\}\right|} \tag{4}$$

where: Xi represents the dimensionless index of 30 indicators x_i ; $\max\ \{x_i\}$ and $\min\ \{x_i\}$ are the maximum and minimum values of the evaluation index in the study period.

(2) Sub-index measurement (Layer C)

The sub-index vulnerability indexes (Layer C) refer to the indexes in the Indicator layer. The calculation formula is as follows:

$$UVI_e = \left(\sum_{i=1}^{n} x_i\right) / n \tag{5}$$

where: X_i is the standardized value of individual indicators; n is the number of individual indicators contained in each sub-factor vulnerability index; UVI_e represents the sub-index of urban vulnerability, including 10 sub-indexes such as resource-utilization vulnerability index, eco-environment vulnerability index, environmental vulnerability index, economic structure index and human development index.

(3) Sub-factor measurement (Layer B)

The urban sub-factor vulnerability indexes (layer B) are indexes in the Principal level. The index is calculated by weighting method and the formula is as follows.

$$UVI_s = \sum_{i=1}^{m} (UVI_e)_i W_i \tag{6}$$

where: UVI_e represents the vulnerability index of each sub-index. m is the number of sub-factor vulnerability indexes. W_i is the weight of each index at the Principal level. UVI_s refers the urban sub-factor vulnerability indexes including resource vulnerability index, eco-environment vulnerability index, economic vulnerability index and social vulnerability index.

(4) Comprehensive vulnerability measurement

The urban comprehensive vulnerability index is calculated by weighting the sub-factor vulnerability indexes. The calculation formula is as follows:

$$UVI = Q_1 \times UVI_{s1} + Q_2 \times UVI_{s2} + Q_3 \times UVI_{s3} + Q_4 \times UVI_{s4} \quad (7)$$

where: UVI_{si} refers the sub-factor vulnerability indexes. Q_i is the corresponding weigh. UVI is the urban comprehensive vulnerability index.

3. Evolution Characteristics of Sub-factor Urban Vulnerability in Shanghai

3.1. Evolution Characteristics of Resource Vulnerability

Shanghai's urban resource vulnerability fluctuated but remained high between 2002 and 2008. From 2008 to now, it has shown a decreasing trend, but it has a certain volatility (Fig. 2). The fluctuation of the index is greatly influenced by the sub-index resource security vulnerability index (C2), while the resource utilization vulnerability index (C1) of Shanghai has been in a steady decline, indicating that the utilization of energy and resources such as water, electricity and land has been steadily increasing.

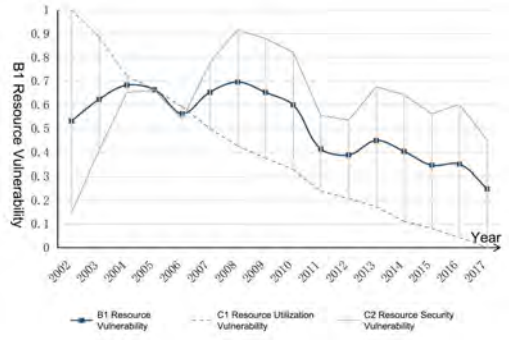


Figure 2 Trend of Urban Resource Vulnerability in Shanghai (2002-2017)

Source: Drawn by the author

From the perspective of resource security vulnerability, it is found that, except for 2006, the resource vulnerability of Shanghai increased from 2002 to 2008, and declined after 2008. The urban construction land security capacity in Shanghai has always been under great pressure, especially the per capita cultivated land area. In recent years, the rapid development of Shanghai in the context of globalization has brought tremendous demand for living space of urban population. Therefore, urban cultivated land is facing severe pressure. In 2015, the per capita cultivated land area

of Shanghai is only 0.008 hm^2/person, accounting for only 8.15% of the national average (0.982 hm2/person) (Gao, 2018). Food the city demand is largely transferred from other provinces. In 2013, Shanghai established the basic land use strategy of "total lock-in, incremental decline, stock optimization, flow efficiency enhancement and quality improvement". Then the government put forward population restriction and a series of related policies to clarify that the city has entered the "reduced development" mode in order to implement population structure optimization and move towards a new stage of innovative urban development.

3.2. Evolution Characteristics of Eco-Environment Vulnerability

Shanghai's eco-environment vulnerability index decreased from 0.755 in 2002 to 0.133 in 2017, which indicates that the carrying capacity of urban eco-environment has increased greatly, and the capacity of eco-environment as the material carrier of the city has been greatly enhanced. The sub-index urban ecological vulnerability index (C3) shows a downward trend in general, but the fluctuation is large. The whole evolution process can be divided into three stages: the fluctuation is flat during 2002 to 2004, the rapid decline during 2004 to 2009 and the slow decline after 2009 (Fig. 3). The change of the index reflects that China's urban development has moved from the dominant stage of economic construction to the period of green ecology and sustainable development. The concrete manifestation of urban construction is that the forest coverage and green coverage of built-up areas in Shanghai have increased rapidly in the past 15 years. According to the data of Shanghai Statistical Yearbook 2017, the forest coverage and green coverage of built-up areas in Shanghai are 16.2% and 39.1% respectively.

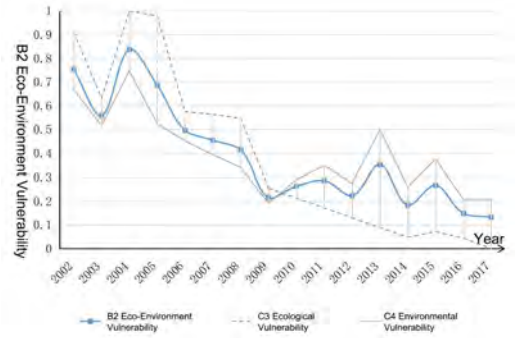


Figure 3 Trend of Urban Eco-environment Vulnerability in Shanghai (2002-2017)

Source: Drawn by the author

In contrast, the reduction rate of urban environmental vulnerability index (C4) is smaller. In recent years, good results have been achieved in the construction of ecological environment in Shanghai: the carbon emission per unit GDP has decreased, the centralized treatment rate of urban sewage has been over 90% since 2012, and the domestic waste has been treated completely harmlessly since 2014. Relevant data show that Shanghai's air quality index(AQI) has improved significantly in the pre- and mid-2010 World Expo, indicating that the implementation of the four rounds of "three-year action plan for environmental protection" since 2000 and the implementation of air pollution control measures during the Expo have achieved

remarkable results. From 2009 to 2012, the ratio of days with good air quality has been above 90%. However, after the World Expo, air pollution rebounded seriously, and air quality declined sharply since 2013 (66% in 2003). Although AQI of Shanghai has increased in recent years, it is still lower than the national average. The decrease of air quality is mainly manifested in the obvious increase of NO_2 and PM_{10} concentrations. Besides the unfavorable diffusion of pollutants in winter, the main reasons are the relaxation of temporary control measures during the World Expo, the large number of construction projects, the rise of construction dust pollution, the rebound of straw incineration and garbage incineration, and the aggravation of local air pollution (Huang et al., 2013).

3.3. Evolution Characteristics of Economic Vulnerability

Overall, the vulnerability of Shanghai's urban economy has continued to decline over the past 15 years, with a sharp decline during 2003 to 2007, an upward trend during 2007 to 2009 and a flat fluctuation in the past four years (Fig. 4).

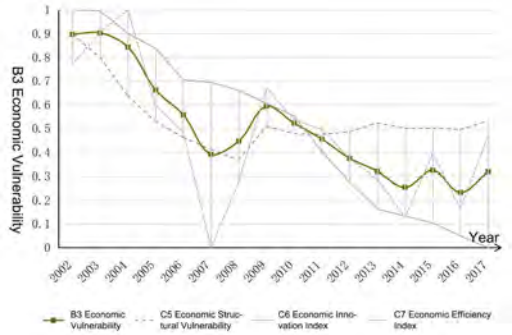


Figure 4 Trend of Urban Economic Vulnerability in Shanghai (2002-2017)

Source: Drawn by the author

Among them, economic structural vulnerability (C5) declined steadily from 2002 to 2008, and then the change became flat. During 2002 to 2008, Shanghai's industrial structure was in a period of rapid transformation. During this period, the economic development aimed at adjusting and optimizing industrial structure and improving industrial innovation ability. The proportion of tertiary industry to GDP rose rapidly. The dependence on urban foreign trade the ratio of total urban exports to GDP) increased first and then decreased, and finally stabilized at about 43%. The index of economic extroversion has both positive and negative aspects. Under the background of economic globalization, Shanghai is in the vanguard position of integrating into the international network, and its market openness ranks first in China. However, while gaining export growth to accelerate economic growth, Shanghai recognizes that there are huge risks behind the higher degree of dependence on foreign trade - the regional economy will be very sensitive to the fluctuations of the world economy.

Therefore, Shanghai focuses on the cultivation and development of the domestic market, optimizing the industrial structure, and vigorously developing technological progress and technological innovation in order to increase the resilience and adaptability of the urban economy to external influences. Shanghai's investment

intensity in R&D has increased from 1.9% in 2002 to nearly 3.9% in 2017. Focusing on technological innovation capability can improve Shanghai's position in the world economy, change the situation of high dependence on the international market, and develop the self-control of enterprises' living conditions.

3.4. Evolution Characteristics of Social Vulnerability

Social vulnerability consists of human development vulnerability (C8), social environment vulnerability (C9) and infrastructure vulnerability (C10). The analysis finds that Shanghai's social vulnerability has been declining steadily from 2002 to 2017, and the decline rate of urban social vulnerability is the fastest from 2010 to 2012 (Fig. 5).

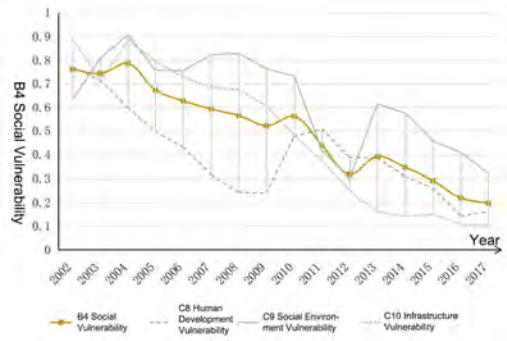


Figure 5 Trend of Urban Social Vulnerability in Shanghai (2002-2017)

Source: Drawn by the author

From 2010 to 2012, the rapid decline of urban social vulnerability is mainly affected by social environmental vulnerability (C9). This change is reflected in the rapid decline of urban registered unemployment rate and the rapid rise of social insurance coverage at indicator layer (Layer D) . It can be seen that the construction of Shanghai's urban social welfare and basic security system is advancing. Urban development is paying more and more attention to "social justice", and vulnerable groups are receiving more attention and social security.

In addition, the material living standards of residents have steadily improved, with the annual growth rate of per capita GDP in Shanghai reaching 10.7% between 2002 and 2017. Urban infrastructure construction has been improved, and the medical, educational and housing conditions have been improved. However, the difference between urban and rural areas in Shanghai is very significant. In 2004, the difference index between urban and rural areas in Shanghai reached the highest level, which was 2.36. And the average value in the past five years is 2.29, which has always been above the international standard value of 2. In the new period of "urban-rural integration" development, we need to explore the road of rural revitalization, promote the coordinated development of urban-rural economy and society, and build a new urban-rural relationship.

4. Evolution Analysis of Urban Comprehensive Vulnerability

4.1. Evolution Characteristics of Urban Comprehensive Vulnerability

From 2002 to 2017, Shanghai's urban comprehensive vulnerability declined from 0.74 to 0.2, and the overall vulnerability fluctuated continuously in the form of "N" (Fig. 6). The development process of urban comprehensive vulnerability can be roughly divided into five stages: fluctuation rising stage (2002-2004), extreme decline stage (2004-2006), slow decline stage (2006-2010), rapid decline stage (2010-2012), fluctuation declining stage (2012-2017). The peak value of urban comprehensive vulnerability is 0.79 in 2004, and the ecological vulnerability is also at its maximum. This shows that Shanghai's ability to resist external adverse effects such as climate change and natural disasters is very weak in 2004, and the possibility of damage is the greatest, and the cycle of restoring urban functions is the longest.

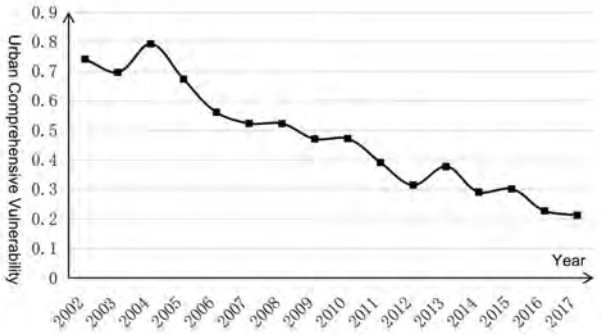


Figure 6 Trend of Urban Comprehensive Vulnerability in Shanghai (2002-2017)

Source: Drawn by the author

Since 2006, with the adjustment and effective implementation of Shanghai's targeted urban development strategy, the contradictions of various systems in the process of urbanization have been constantly mended. In addition, the hosting of the 2010 Shanghai World Expo international events has greatly promoted the construction of the ecological environment, economy and society in Shanghai.

4.2. Factor Interconnection Analysis

Overall, from 2002 to 2017, the vulnerability of urban resources, ecology, economy and society in Shanghai showed a downward trend as a whole, but there was a complex synergistic and causal relationship between the evolution of the four elements (Fig. 7).

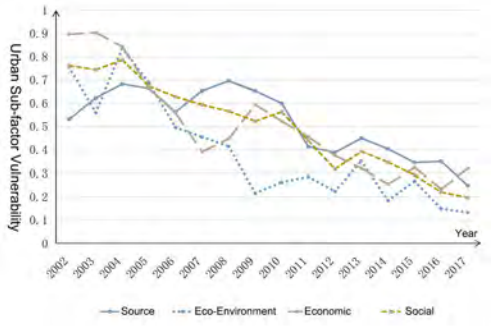


Figure 7 Trend of Sub-factor Vulnerabilities in Shanghai (2002-2017)

Source: Drawn by the author

From the point of view of the contribution rate of resources, ecology, economy and social vulnerability to urban comprehensive vulnerability, the mechanism (positive or negative) and magnitude of each sub-factor have great fluctuation (Fig. 8). The obvious evolution characteristics are as follows: (1) the contribution rate of economic vulnerability is the lowest, but it has increased significantly in the past 15 years, from 6.2% in 2002 to 35.0% in 2017; (2) the contribution rate of ecological vulnerability is the largest, but the dominant position of urban comprehensive vulnerability has weakened in recent years.

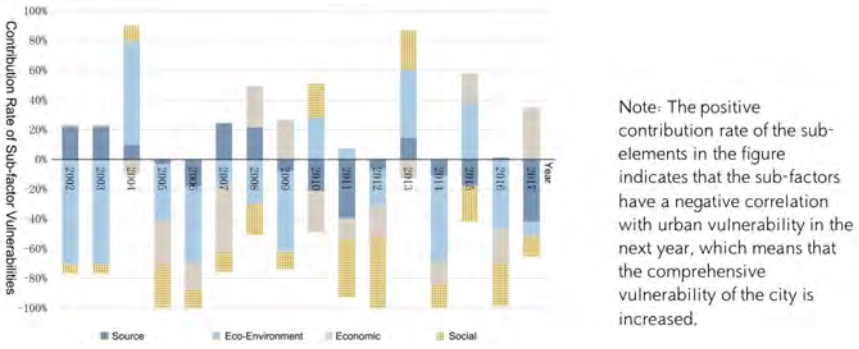


Figure 8 Contribution Ratio of Sub-factor Vulnerabilities (2002-2017)

Source: Drawn by the author

This shows that Shanghai has changed from the absolutely eco-environment-dominant vulnerability to a more diversified and balanced vulnerability composition pattern. It also shows that the city is more resistant, adaptable and transformable in the face of adverse disturbances from resources, ecology, economy and society. Shanghai is more capable of sustainable development.

5. Conclusion and Research Prospects

5.1. Conclusion

In the face of adverse events such as global climate change, the protection of urban basic security and sustainable development should be given priority. Urban vulnerability is a matter of "survival". This paper evaluates Shanghai's urban

vulnerability from four sub-factors: resources, eco-environment, economy and society. The results show that:

①During 2002 to 2017, the urban comprehensive vulnerability of Shanghai showed a fluctuating downward trend, among which the rate of decline during 2004 to 2006, and 2010 to 2012 was relatively high, which was the result of the urban construction driven by mega-events.

② Shanghai has changed from an absolutely eco-environment-dominant vulnerability to a more diversified and balanced vulnerability structure. Now four sub-factor vulnerabilities develop in a balanced way. It shows that the city has more resistance, adaptability and transformation ability when facing adverse disturbances of resources, ecology, economy and society.

③The contribution rate of resource vulnerability has also risen. This is mainly due to the enormous pressure on cultivated land and the increasing demand of foreign population in Shanghai.

④What can not be ignored is that the reduced ecological vulnerability is still the main cause of urban vulnerability, which is mainly due to the loosening of urban air quality control and changes in climatic conditions after the World Expo.

5.2. Research Prospects

Because of data limitation, the time interval of this study is too short to observe the coupling mechanism between Shanghai's development law and the four sub-factors more holistically and objectively. In addition, this paper evaluates the comprehensive vulnerability of Shanghai in order to explore the transformation and sustainable development path under the new development challenges. But how to measure urban vulnerability? How to explore the occurrence function of urban vulnerability? What is sustainability and transformation mechanism of urban function under adverse interference? These are the research problems that this paper can not solve but need to be discussed in depth.

6. References

An, Shiwei; Wan, Sanmin; Li, Xiaojian (2017) "Evaluation and Risk Control on Urban Vulnerability in Henan Province", Economic Geography, Vol. 37 No.5:81-86.

Cheng, Lin; Xiu, Chunliang; Zhang, Zhe (2011) "Urban vulnerability and preventive measures to it", Urban Problems, No.4:45-47.

Fang, Chuanglin; Wang, Deli (2011) "Comprehensive measures and improvement of Chinese urbanization development quality", Geographical Research, Vol. 30 No.11:1931-1946.

Fang, Chuanglin; Wang, Yan (2015) "A comprehensive assessment of urban vulnerability and its spatial differentiation in China", Acta Geographica Sinica, Vol. 70 No. 2:234-247.

Gao, Jing (2018) Spatial and Temporal Change Characteristics and Influencing Factors of Cultivated Land in Shanghai Suburbs, Master, East China Normal University.

Gu, Honghong (2016) Social Vulnerability Assessment of Natural Disasters in Shanghai Based on Community Scale, Doctor, Shanghai Normal University.

Huang, Yanmin; Wei, Hai-Ping; Duan, YuSen; Zhang, YiHua (2013) "Ambient Air Quality Status and Reason Analysis of Shanghai World Expo", Environmental Monitoring in China, Vol. 29 No.5:58-63.

Li, Bo; Han, Zenglin (2010) "Regional System Vulnerability of Man-Land Relationship in Coastal Cities -a Case Of Dalian City", Economic Geography, Vol. 30 No.10:1722-1728.

Liu, Haiyan (2008) Study on Urban Land Use Guarantee in the Process of Urbanization in China, Doctor, Institute of Geographical Sciences and Natural Resource Research, Chinese Academy of Sciences.

Pan, Runqiu; Ma, Jun(2016) "Vulnerability and Its Pattern Changes of Shanxi's Coal-Based Cities", Resources & Industries, Vol. 318 No.3:1-6.

Turner, B. L., Kasperson, R. E., Matson, P. A., McCarthy, J. J., Corell, R. W., Christensen, L., ... & Polsky, C. (2003) "A framework for vulnerability analysis in sustainability science", Proceedings of the national academy of sciences, Vol. 100 No. 14, 8074-8079.

Wang; Lucang; Shi, Kaiwen; Liang, Zhen (2017) "Study on Comprehensive Evaluation and Dynamic Evolution of Urban Vulnerability: Taking Lanzhou City as an Example". Ecological Economy, Vol. 33 No.9:137-141+179.

Wang, Yan; Fang, Chuanglin (2014) "Comprehensive Evaluation and Dynamic Evolution Analysis of Daqing's Urban Vulnerability", Scientia Geographica Sinica, Vol. 34 No.5:547-555.

Xu, Jun; Li, Guifang; Wang, Yuhong (2015) "Review and prospect of resource-based city vulnerability in China and Abroad", Resources Science, Vol. 37 No.6:1266-1278.

Yu, Yingying (2011) "Research on evaluation system of city vulnerability", Journal of Beijing Institute of Machinery, Vol. 26 No.1:57-61+72.

Zhang, Xiaorui; Li, Tao; Fang, Chuanglin; Wang, Zhenbo (2016) "Comprehensive Measurement of Urban Vulnerabilit", Geography and Geo-Information Science, Vol. 32 No.02:89-93.

Zhao, Yinbing; Zhang, Tingting; Hong, Yan (2018) "On the Evolution of Urban Vulnerability in Chengdu", Scientific and Technological Management of Land and Resources, Vol. 35 No.3:98-107.

Zhu, Hongbo; Zhang, Anlu (2007) "Analyzing Temporal and Spatial Distribution Characteristics of Pressure Index of Cultivated Land in China", Resources Science, Vol. 29 No.2:104-108.

Case Study / Project

Reinventing the City Centre

Implementation Strategies for TOD Concept in Existing Built Environment in Jakarta

Putrikinasih SANTOSO

Abstract

Transit Oriented Development (TOD) has been a concept floating around the professional realm in the field of urban planning, urban design, and urbanism for decades now. It has a certain distinct approach in promoting slow traffic mobility for pedestrian and cyclists in areas 700 - 1.000 meter away from the transit facilities, generating ridership by inducing compact and dense mixed-use development in the precinct. Jakarta, Indonesia is currently facing a major change in the means of transportation by adding up a new MRT line to the latest urban mobility network. This addition is, naturally, expected to alter the urban form within the TOD areas, which are mostly built existing environment.

This paper aims to posit an exercise on the implementation of TOD concept in a built existing environment including the challenges in implementing TOD concept in such areas and possibilities for redevelopment within those TOD areas. To exemplify, several case studies will be presented, including Dukuh Atas, Cipete, and Haji Nawi TOD areas.

Research Paper

Measurement of spatial equity

: a case study of nursing institution

Xin Sui, Tongji University; China
Yifan Yu, Tongji University; China
Liu Huhui, Tongji University; China

Abstract

Equity and justice have always been important norms in the field of urban planning. With the gradual deepening of understanding of residential environment, the research context of equity and justice related to location is becoming more and more sophisticated. Recently, varieties of subjects Including Public Health and Geography focus on the inequity of public resources in spatial distribution and how to measure the degree of this gap. In general, the mainstream measurement methods can be summarized into two categories: (1) The description of phenomenon caused by the spatial inequities, and accessibility is a typical method of this type. (2) the direct quantification of inequity, such as Gink Coefficient which is originated from the economics field and introduced into the measurement of health equity, and Getis-Ord General G, together with Moran' index is the most commonly method used into the general spatial autocorrelation. In this paper, based on the overall literature review of the concept of equity in the study using these methods and a summary of their specific context of the measurement using, nursing institution in Shanghai, China are regarded as a typical case to practice these methods and compare the differences in using. Meantime, the impact of the politics and planning related to this special facility is also been considered. Results show that, accessibility of nursing institution among elderly groups is much different under different research distance, and the overall trend seems like the research units in suburb appears higher accessibility than those in highly urbanized area. And Gink Coefficient helps us determine the proportion of the elderly population in different reachable areas in Shanghai is within a reasonable range. However, Global Moran' index provide reliable evidence that the existence of the aggregation combined by the high-value units. It indicates that there are inequities among the distribution of aged-nursing resources, and Local Moran I （LISA）help us to find the specific boundaries of these areas. In general, in the study of the equity related to location, accessibility can only reflect the differences phenomenon in distribution, but it is not clear to describe this gap to what extent, and it's difficult to achieve the possibility of comparison among different periods and different subjects. The Gini coefficient often focuses on the unfairness of the distribution of people, but ignored the aggregation characteristics of the spatial dimension, which the analysis of spatial autocorrelation can make up. All these methods proved that it's necessary to consider both the spatial distribution of supply and demand. And the discussion about equity related to location should be strictly qualified in study.

Keywords

Elderly nursing institution, Accessibility, equity

1. Introduction

Maximization of equity and efficiency is the most important prerequisite to ensure the public service facilities' service level, quality and citizens' benefits. Different from the traditional location theory which pursues the profit maximization of non-public products, public facility location theory holds the idea that equity and efficiency should be considered in the distribution of public resource. (Teitz Mbjpotrsa,1968) At the beginning of urbanization, the population size and density distribution among different cities or different districts are homogeneous and nearly identical, so that traditional methods to lay out the public service facilities such as thousand-person indicators and service radius can be basically satisfied the goal of "space equity". However, as the degree and speed of the urbanization processing, the groups with different social and economic attributes begin to gradually gathering in the specific space. And that is the reason why traditional methods could not meet the space equity's needs anymore. Meanwhile, the marketization procession also provides varieties of the patterns of public service supplement, this process may aggravate the degree of inequity among to people's access to public service.

While the development of public service facilities is diversifying, China's aging is also growing up. By the end of 2017, the total number of elderly people over the age of 60 in China reached 240 million, accounting for 17.3%, and the total number of elderly people over 65 years old reached 158 million, accounting for 11.4%. According to United Nations standards, when the proportion of people over 60 years old in a region reaches 10% of the total population or the proportion of people over 65 years old accounts for 7% of the total population, that means this area has entered an aging society. Due to the Spindle-shaped population structure, the degree and speed of China's aging will continue to grow in the near future. In this context, the study of aging urban countermeasures has gradually attracted more and more attention from urban planning scholars. Recently, relevant departments have promulgated a series of public policies ranging from architectural design to urban pension service provision, in order to guarantee the legitimate rights and benefits belong to the elderly.

Although the quantitative research on the spatial layout of public service facilities has attracted more and more attention in the world, quite a few scholars have carried out case studies on specific cities for nursing institutions. The existence of inequity has neglected the extent of this inequity and how it is reflected in specific space. Therefore, such research may reveal the lack of facilities or the surplus, However, it is difficult to make horizontal contrast which covers different cities or vertical contrast which covers different period.

Therefore, the main purpose of this paper is to summarize the current study about spatial equity of public service facilities, and to discuss the requirements of relevant policies in Shanghai's local elderly service system to explore whether Shanghai's elderly nursing service provided by elderly nursing institutions exists inequity and how degree it is. Shanghai's elderly nursing institutions have developed for a long time, with long-term construction experience and relatively perfect legal norms and technical standards.

In this paper, we will discuss the spatial equity of elderly nursing institutions in four parts. Part two reviews the existing research on the accessibility and f spatial equity of the public service facilities caused by distribution. And related researches from China are summarized, in order to propose a two-dimensional framework for the study of spatial equity of elderly

nursing institutions. In the third part, the method concluded from the second part is applied to the local case in Shanghai. Analysis and results are presented in part four together with a summary of key findings and important policy implications.

2. Research review: spatial equity related to location

"Spatial equity" is a complex concept. In the supply of public services, the core of its concern is "reasonable distribution of social group interests" or "method of social resource allocation" (Zhongxiao C ,2009)(Li J et al.,2015). As a blender of urban space resources, urban planners pay special attention to the issue of equity and justice related to space in the provision of public service. "Inequity means that the distribution of public services or facilities has institutional and systemic discrimination against certain special groups, but it is difficult to define equity."(Harries K et al.,1994), The existing methods of quantifying the spatial equity of public services are often reflected by the differences between regions. The choice of variables in the process of quantification can reflect the scholars' specific choice of the concept of spatial equity. Generally, the definition of spatial justice has not yet formed a unified definition (Klaus R,1998)， historical features(Haiyan J et al.,2011)and facility supplying procession are both taken into account. Today, more and more social factors are being considered in the analysis of spatial equity, accessibility is often used as a spatial indicator to measure this gap (Klaus R,1998)， Although the specific definition of spatial equity has not been formed, from the perspective of development, it presents a simple geographical spatial distribution to the matching between population and facilities to a specific evaluation that emphasizes different types and different levels of demand.（Junbo G et al.,2009）

At present, research on public service such as green space, health facilities, and educational facilities, especially kindergartens combined with China's conditions has achieved certain results. The issue of spatial equity in the public service facilities' distribution is essentially a discussion of the dialectical relationship between people (demand), facilities (supply), and location (the link between supply and demand), And citizens should be regarded as the final measure to measure the equity of the spatial layout of public service facilities. Therefore, in the, the practical significance of equity evaluation is to measure the absolute equity gap between public service distribution and spatial distribution in the population. The equity evaluation of public service facilities is a quantitative means of reflecting the equity of urban resource allocation, and is also an important basis for optimizing and adjusting the layout of facilities. Therefore, scholars often reflect the inequity of resource allocation through spatial differences in public services.

Now days, the evaluation of the spatial inequity caused by facilities' allocation can be divided into two categories: the description of inequity and the description of the degree of inequity. The former can intuitively reflect the relative supply of public service resources between different research areas. By reflecting the difference in relative supply to reflect the existence of inequality between regions, accessibility is the most important research medium in this type of research; the latter can directly measure this difference directly. It often draws on economics or spatial statistics to directly reflect the inequity of public service allocation under the spatial layout model.

Accessibility which is one of the main methods to describe the spatial inequity of public service allocation, is also a key concept in the evaluation of the spatial layout of public service facilities in the field of geography. Due to the diversity of methods and the different analytical concepts, accessibility itself has a rich definition. Accessibility emphasizes the resistance or ease between the start and the end. As quantitative research progresses, factors such as the size of the OD, the shape of the transportation network, and the road structure are gradually taken into account.

At present, the research on the accessibility of public service facilities has obtained rich research results in the fields of medical and health care, old-age services, and park green space, providing experience for the study of public service facilities in China. In the study of the concept of accessibility, accessibility can be used as a tool to directly measure the level of public service(Talen,1998)(Nicholls,2011)(Zhen L et al., 2007)(Zhuolin T et al.,2014), and as a spatial indicator of the research unit(Talen ,1997)(Park,2012)(Xiao Y et al.,2017), which can often expand the research ideas of the built environment, and the statistical method is accommodated. The two-step floating catchment area (2SFCA) and potential model are the most representative methods used to measure Public service facility service level caused by specific position pattern(Zhengna S,2010). On the other hand, these models are expandable to adapt different research needs, and they also can be adapted according to the characteristics of the facility itself. Thanks to the idea of two-step floating catchment, E2SFCA is easier to practice and understand (Zhuolin T ,2016). The characteristics of supply and demand are comprehensively considered. In this paper, E2SFCA is used to describe inequity of the elderly nursing institutions(Lianhong C,2014)(Aihua Z,2013)(Wei X et al.,2017).

In the terms of measure the degree of equity caused by the location, multiple disciplines have contributed. The study of the equity of health public services has always been one of the key contents in the research of public health where methods in economics are absorbed(Keqin R et al.,1998) , and formed a sound evaluation system. At present, the methods widely used in health services mainly include the Tyre index(Zhang Nan,2014), the concentration index, and the Gini coefficient and the Lorenz curve(Horev T,2004). With the implementation of the concept of equity and justice in the urban planning field, the logic of the measure of equity of health services has gradually been introduced into the study of the equity of other types of public service space in urban areas (Barbati M,2016).The results of accessibility are treated as the index to describe the differences in public services, and that allowed the spatial equity of the public facilities such as green space(Zilai T et al.,2015) ,elderly school and hospital etc, could be quantified(Yifan Y,2018).

The traditional economics measurement method can help us to find the gap between a certain service or resource caused by location in the population, which can reflect the inequity distribution of public resources due to the different spatial layout patterns. [4] In the field of urban planning and geography, scholars are more concerned with the spatial distribution difference of the inequity caused by the layout of public service facilities, which could be reflected by the degree of spatial clustering(Talen, 1997) In 1950s, Moran proposed the Moran's I Index (also known as the Global Moran Index), focusing on the spatial differences of factors, describing the overall distribution of elements in space, and judging the existence of agglomeration trends. To located the specific location of clustering, Anselin developed local Moran's I (LISA) based on the global Moran index(Anselin L,1995)(Zhang Songlin,1996)(Talen,1998).

As the age of aging continues to deepen, more and more Chinese scholars are beginning to pay attention to the of elderly service facilities. It is generally believed that the freedom of location of the elderly nursing institutions is more flexible, unlike the facilities used by residents daily. Due to the scarcity of land in the central urban area and the high land price, most urban elderly nursing institutions are located in the suburbs in China. In fact, this has led to the ineffectiveness of the service of the elderly nursing institutions. The elderly nursing institutions in the downtown area have higher occupancy rates compared to those in the suburbs, which indicate the mismatch between supply and needs (Wei D，2011). Older people have a high sense of dependence on the familiar community environment(Yao D,2015)，most of them want to enjoy the caring service in the community where they have been living.(Keenan T A,2010)That's the reason why location is still an important factor elderly are taking into account, Older people tend to choose a nursing institutions which is closer to home(GaoXao L,2013).

3. Methodology

3.1. Study area and data source

In this paper, Shanghai is the site where the study carried out. As one of the earliest cities entering aging society, Shanghai already has a certain amount elderly nursing institutions. We have obtained information on all current elderly nursing institutions in Shanghai, including the establishment time and carrying capacity. In this study, a total of 673 elderly nursing institutions in Shanghai were collected, with a total of 121,200 beds(Representing carrying capacity).

At the same time, we obtained local elderly population data of over 60 years old in Shanghai in 2000, 2010 and 2014 respectively. Among them, the population data for 2000 and 2010 are from the fifth and sixth census data, and the 2014 population data is from the police department. The population and facility data from the three periods are matched to ensure that supply and demand are in the same state.

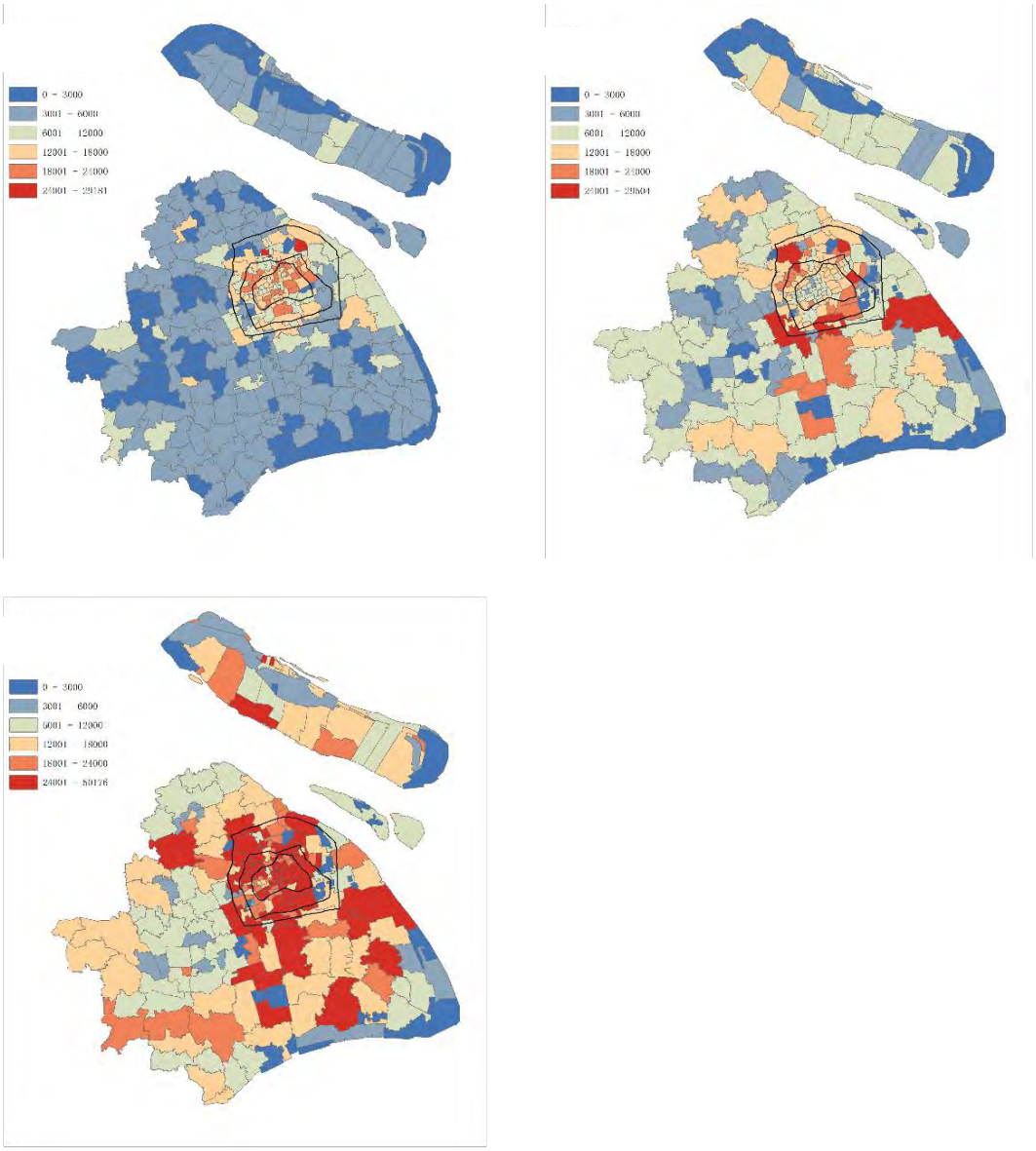


Figure 2 2000, 2010, 2014, Shanghai elderly distribution

The whole Shanghai is our research areas, and “jiedao” is our basic research unit, which is the most basic space unit for the configuration of elderly nursing institutions. According to the administrative regulations of Shanghai, in 2000, there were 331 “streets” in Shanghai, all of

them were taken into consideration. After 2010, there were total 230 “streets” in Shanghai, including 19 special streets used in industrial areas, no elderly living in there, was deleted, and the remaining 211 "jiedao" is our research unit. Figure 2 Shows the number of different “jiedao” elderly people in three periods. As we can see, the number of elderly people shows a trend from high to low from the center to the suburbs.

3.2. Measuring accessibility to parks

In this paper, the two-step floating catchment area search method is used to measure the accessibility of individual street care institutions, and is also a method to describe whether

there is inequity. The basic idea is that, under a given search radius d0, the first step, for each service supply point ji, search for all demand points in the range of d0, ki, calculate the supply-demand ratio Rj of each supply point j, In the second step, for each demand point ki, the search range, all the supply points ji in d0, the supply and demand of all the supply points ji in the range are compared with Rj, and finally the reachability Ak of each demand point is obtained. The formula is as follows:

First step:

$$R_j = \frac{S_j}{\sum_{k\in(d_{ij}\le d_0)} P_k}$$

Among them, Rj is the supply-demand ratio, Sj is the service capability of the supply point ji, and Pk is the population of the demand point k in the range of d0.

Second step:

$$A_i = \sum_{k\in(d_{ij}\le d_0)} R_j$$

Among them, Ak is the reachability of the demand point k in the range of d0. In order to simulate the attenuation effect from center point, this paper introduces a Gaussian function. The final model is as follows:

First step:

$$R_j = \frac{S_j}{\sum_{k\in(d_{ij}\le d_0)} P_k G(d_{kj}, d_0)}$$

Second step:

$$A_i = \sum_{k\in(d_{ij}\le d_0)} R_j G(d_{kj}, d_0)$$

And:

$$G(d_{kj}, d_0) = \begin{cases} \dfrac{e^{-\frac{1}{2}\times(\frac{d_{kj}}{d_0})^2} - e^{-\frac{1}{2}}}{1 - e^{-\frac{1}{2}}} & ,if \ \ d_{kj} \le d_0 \\ 0 & ,if \ \ d_{kj} \ge d_0 \end{cases}$$

Where G represents a Gaussian attenuation function, e is a natural logarithm, and the rest of the values have the same meaning as the formula above.

For the elderly nursing institutions, the number of beds is the core indicator for measuring the scale of their services, and also the direct conversion index for planning the land for the aged care institutions. Therefore, this paper selects the number of beds in the elderly nursing institutions as its scale parameters. In terms of the basic unit of research, in general, the basic allocation unit of the elderly nursing institutions as a public service facility is the street level. Considering the matching with the population data, the basic spatial unit of the

study is the street division of the Sixth census period. Since the direct demand population of the elderly nursing institutions is the elderly population, the geometric center of each street in Shanghai is obtained as the demand point of the elderly nursing institutions through the "element-point-pointing" tool in GIS, and the population of the elderly population over 60 years old is used as the demand point. The spatial indication of scale, involving population and facility data during the fifth census period, is treated in the same way.

In general, the determination of the search radius mainly needs to consider the factors of the facility itself and the mode of transportation. The minimum proximity distance, which is the maximum value of the shortest distance between all the supply points and the demand point, is one of the important basis for the selection of the search radius. In this case , The maximum distance from the central point of each street in Shanghai is 6010 meters. That means, at a search distance of 6010 meters, at least one elderly nursing institutions can serve all the streets. Considering the similarities between big cities, this paper selects6010 meters,9000 meters, and 18000 meters as the distance threshold of the search radius, and establishes a network database through Shanghai vector road network data. Since the road network data is difficult to obtain in different periods, all the road network-based spatial analysis in this paper adopts the 2014 Shanghai Road Traffic Network.

3.3. Measuring equity to parks

Accessibility can reveal the difference in the resource allocation of the elderly nursing institutions in various areas of Shanghai, but it is difficult to directly quantify the overall equity of the distribution of resources of the elderly nursing institutions in Shanghai. After comprehensive comparison, this paper selects the Gini coefficient and Lorenz curve method as a measure of the spatial equity difference between the services of the elderly nursing institutions, using the global and local Moran's I as a measure of the spatial equity difference between the spatial distribution of the elderly nursing institutions.

The Gini coefficient and the Lorenz curve are important methods for measuring income differences in the field of economics. They are the earliest applied to the equity of public medical resources in the study of the equity of public service facilities. In this paper, the accessibility of the elderly nursing institutions is used as the spatial variable of the elderly nursing institutions. As mentioned above, since the size of the supply point is represented by the number of beds, the accessibility value can actually indicate the number of beds per capita that can be obtained by the elderly in each street. Therefore, the meaning of the Gini coefficient of the accessibility of the elderly nursing institutions indicates that the distribution of the relative supply of the elderly nursing institutions in the elderly population is different under the influence of the spatial layout. Specifically, the lower the value of the Gini coefficient of the elderly nursing institutions indicates that Shanghai is located at different The more reasonable the proportion distribution of the elderly population in the sexual interval street town unit, and if the Gini coefficient of the accessibility of the elderly nursing institutions is greater than 0.4, it indicates that the elderly population in the high accessibility segment accounts for a small proportion of the elderly and is highly accessible. Sexual services are concentrated in a small number of elderly people, most of whom are in the accessibility of low-age care institutions, and the inequity distribution of the services provided by the elderly nursing institutions is significant.

The principle of the Lorenz curve is: the horizontal axis is the cumulative percentage of the population; the vertical axis is the cumulative percentage of the elements. The point on the

curve indicates the correspondence between the cumulative percentage of the population and the cumulative percentage of the elements. The Gini coefficient is the ratio of the area between the Lorenz curve and the diagonal to the area under the diagonal. The formula is:

$$G = 1 - \sum_{k=1}^{n} (P_K - p_{K-1})(R_k + R_{k-1})$$

Among them, R is the cumulative proportion of the elderly population variables in each street, and R is the cumulative proportion of the accessibility of the elderly nursing institutions. In general, the meaning of the Gini coefficient is to analysis the relationship between the distribution of a certain factor and the proportion of the population. In the study of public service facilities, since the statistical unit of the population has spatial attributes, the acquisition of public services related to it is also based on Spatial location, in this type of research, the meaning of the Gini coefficient actually refers to the difference in the distribution of population and public service factors under the influence of geographical distribution.

In general, the value of the Gini coefficient is between 0 and 1. When the value of the Gini coefficient is 1, it means that all the elements are concentrated in one person. Generally speaking, when the Gini coefficient is lower than 0.2, it is an absolute average, 0.2 to 0.3. It shows a comparative average. When the Gini coefficient is between 0.3 and 0.4, it indicates that the resource allocation is in a relatively reasonable range. When the Gini coefficient is greater than 0.4, it means that the resources have a large number of clusters in the distribution, and the inequity phenomenon More obvious.

The global and local Moran's I are used to evaluate the equity of the spatial distribution of pension institutions' resources. An element has a clustering feature in space, including a high agglomeration zone and a low agglomeration zone, which can indicate the spatial correlation of this element in geographical distribution. For public resources, the characteristics of their distribution are not only related to the facilities themselves, but also to the population distribution. Therefore, regardless of the demand distribution, the areas where the absolute supply of public services is only high can't reflect the supply under the influence of spatial layout. It is also difficult to demonstrate the spatial equity of the distribution of public service resources. The calculation method of accessibility of public service facilities gradually combines the matching of population and resources, taking into account the traffic and distance obstacles between the two, and the meaning of accessibility reflects the relative supply of public services. From a spatial point of view, under ideal conditions, the relative supply of public services between urban and rural areas should be in an equal state, and residents in any location should have the same access to public service facilities of a certain type of demand. The existence of high and low concentration areas of public service facilities means that there are agglomerations of advantages or disadvantages in space, indicating that geographical location affects the demand for public services, and there is significant inequity in the layout of facilities.

This paper mainly studies the accessibility of the elderly nursing institutions through the global and local Moran's I. Compared with other methods, Moran's I coefficient can not only judge the existence of spatial agglomeration, but also recognize the existence of abnormal space.

The formula for the global Moran's I is as follows:

$$I = \frac{n}{S_0} \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j} z_i z_j}{\sum_{i=1}^{n} z_i^2}$$

Where zi is the deviation of the attribute of i from its mean value, wij is the spatial weight between i and j, n is equal to the total number of i, and the set of S0 bit space weights.

$$S_0 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij}$$

Zi calculation formula is

$$z_i = \frac{I - E[I]}{\sqrt{V[I]}} = \frac{I - (-\frac{1}{n-1})}{\sqrt{E[I^2] - E[I]^2}}$$

It can be seen from the formula that including the spatial variable itself, the factors affecting the global Moran's I and the choice of the spatial weight matrix, considering the purpose of the study and the characteristics of the Shanghai administrative unit, this paper uses the proximity distance threshold to generate the spatial weight matrix. According to Geoda's calculation results, the farthest distance between each research unit is 8996 meters, and 9000 meters is obtained after rounding as the proximity distance threshold.

The global Moran's I range is from -1 to 1. When the global Moran's I is greater than 0, it means that there is a spatial positive correlation between the features in the study area, and the closer to 1 indicates the higher the degree of feature aggregation; when the global Moran's I is less than 0 , indicating that there is a spatial negative correlation between the elements in the research scope; when the global Moran's I is equal to 0, it means that there is no spatial correlation of the elements, and the elements are randomly distributed within the research scope. The reliability test for the global Moran's I should be determined by the p and z values. When P is less than 0.05 and Z is greater than the critical value of 1.96, the result is reliable, only 5% of the data has random possibility; when Z is less than 0, and through the significance test, indicates that there is a negative correlation, there may be low and high agglomeration and high and low agglomeration.

lobal Moran's I can verify whether there are spatial correlations among the elements in the study, but it cannot be determined in the distribution of high-value aggregation and low-value aggregation. Therefore, local Moran's I need to jointly determine the specific types and boundaries of spatial agglomeration.

The formula for local Moran's I is as follows:

$$I = z_i \sum_{j=1, j \neq i}^{n} w_{ij} z_j$$

Where zi and zj are values normalized by the region attribute, and other meanings are as above.

4. Analysis results

4.1. The equity caused by the location: study in elderly nursing institutions from Shanghai

By the end of 2017, there were 673 elderly nursing institutions in Shanghai that met the requirements of this study, with an annual population of 4.836 million [97], an increase of 14.3% compared with the end of 2014. In order to ensure the matching of research population data and facility data, In 2014, Shanghai's street population data increased to the end of 2017 according to the population weight of each street to match the facility data to ensure the comparability of research in different periods.

Taking 6010m, 9000m and 18000m as the search radius of the facilities, the spatial accessibility of Shanghai 2017 elderly nursing institutions was analyzed. The analysis results

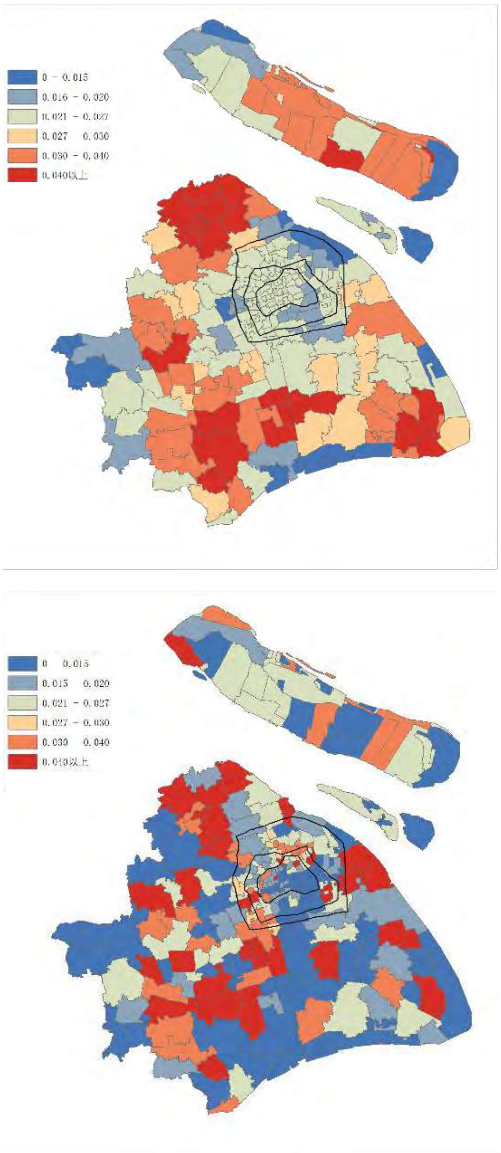


Figure3 d0=6010m Shanghai elderly nursing facilities'accessibility (top left),

d0=9000m Shanghai elderly nursing facilities'accessibility (top right)

d0=18000m Shanghai elderly nursing facilities'accessibility (bottom left)

are shown in the figure (Fig. 3).

It can be found that no matter the search radius, the accessibility between different streets in Shanghai is quite different. With the increase of the search radius, the regularity trend of this difference begins to appear, and the level of accessibility is high. The agglomeration of values in space is becoming more and more obvious. Regardless of the search radius, the accessibility of the elderly nursing institutions in Shanghai is obviously lower in the central city and higher in the suburbs. This trend is more obvious at the search radius of 9000 meters and 18,000 meters.

As far as the central urban area is concerned, the total number of beds in the elderly nursing institutions is insufficient, and the elderly nursing institutions in each street are also responsible for the services of the surrounding areas. In the range of travel distance d0=18000 meters, the elderly in the central city only have difficulty in improving the travel distance. More adequate services for the aged care institutions are available, because the absolute number of elderly people in the area is also high, and there is a competitive relationship between the use of the elderly nursing institutions in the streets, which is also consistent with the phenomenon that the old people in central city is hard to find a proper facility.

The suburbs show the opposite trend. The elderly population in these areas increases the cost of travel within the effective service of the elderly nursing institutions to obtain institutional pension services that meet the policy needs (Figure 3). Most of the elderly people in the suburbs can get more adequate services for the aged care institutions within 18,000 meters. Some streets are in the lower accessibility range under the condition of d0=6010 meters, and the accessibility increases with the increase of the search radius obviously.

Therefore, compared with the simple street as a statistical unit, the two-step mobile search method can more accurately reflect the actual aged care services that can be obtained in each street. The reachability map can intuitively reflect the differences in institutional resources obtained by each region. This difference represents the inequity of resources in the distribution of different regions.

Accessibility can only represent the existence of inequity from the phenomenon level. The result is the relative magnitude of population and resources. It is difficult to describe the specific inequity in general, and it lacks the support of horizontal or vertical comparison of the equity of facility space layout. Therefore, the Gini coefficient and the Lorenz curve are used to analyze the inequity caused by the distribution of elderly nursing institutions under different search radii (Fig. 4). Judging from the Gini coefficient of accessibility of elderly nursing institutions in 2017 (Fig. 4), regardless of the search radius, the Gini coefficient of accessibility of the elderly nursing institutions did not exceed 0.4, indicating that the overall pension institutions in Shanghai are in the elderly population. The distribution is relatively fair, which means that the absolute number of elderly people in the streets with high accessibility is in a relatively reasonable range, and the service resources of the elderly nursing institutions are not excessively concentrated in a few elderly groups.

The equity of the spatial distribution of the services of the elderly nursing institutions was evaluated by the global Moran's I (Fig. 4). The results show that under the condition of d0=6010 meters, the agglomeration trend is not obvious, and the global Moran's I index is close to 0 (0.008). And not significant, indicating that under the search radius of 6010 meters, the street units with different reachability values appear spatially randomly distributed.

From the perspective of the equity of spatial distribution, the elderly have the opportunity to obtain the resources of the elderly nursing institutions. Position is irrelevant. Under the conditions of d0=18000 meters and d0=9000 meters, the streets with similar accessibility of Shanghai elderly nursing institutions have a significant agglomeration trend in space, which means that for the elderly in different locations, the resources of the elderly nursing institutions are available. Significant differences. Comparing the values of global Moran's I and z values at three scales, as the search radius increases, the spatial agglomeration is also increasing, indicating that the inequity of spatial distribution is also increasing, especially at d0=18000 travel distance, The distribution of accessibility has a clear agglomeration trend in space.

Local Moran's I (LISA), as a complement to the global Moran's I, can reflect the specific agglomeration of specific elderly nursing institutions in Shanghai (Figure 5). According to the calculation results of local Moran's I, it can be found that the accessibility of the elderly nursing institutions in Shanghai has the following characteristics: 1, The low-accessibility cluster is mainly concentrated in the central city, while the high-accessible cluster is distributed in the suburbs, along with d0. The increase is more and more obvious. The high-accessibility cluster is gradually concentrated in the suburbs, and the low-accessibility unit gradually spreads from the central city. 2, As the search radius increases, the number of abnormal space units also decreases, gradually assimilation with the surrounding agglomeration core.

From the perspective of equity, this kind of differentiated spatial agglomeration means that the opportunities for accessing the resources of the elderly nursing institutions in different regions are different. The elderly in the low-value clusters have unfair spatial access to the services resources of the elderly nursing institutions.

It can be seen that as of 2017, from the perspective of demand, there is still a certain gap in the realization of the spatial distribution of the resources of Shanghai's elderly nursing institutions. From the point of view of population distribution, the high-accessible street-town unit carries a relatively reasonable number of elderly people, but from the perspective of spatial distribution, this difference is gradually increasing, which means low-reachability gathering area. The elderly population within the group bears more inequity in the services of the aged care institutions.

Relative to the description of the phenomenon itself, the local Moran's I calculation clearly defines the range of high-aggregation and low-aggregation areas with different search radius options. At present, the service of Shanghai's elderly nursing institutions is relatively fair in the distribution of people, but the spatial flatness is particularly significant. With the increase of the search radius, the suburban elderly space can obtain more resources for the aged institutions, but the elderly in the central city is difficult to achieve the same effect.

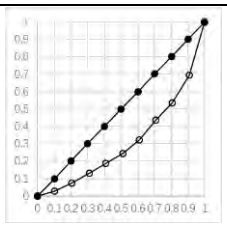
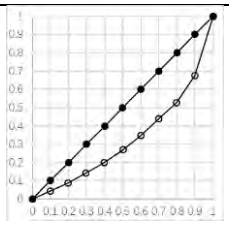
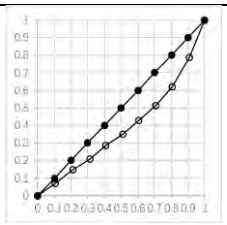
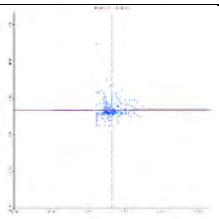
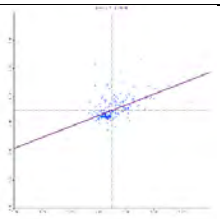
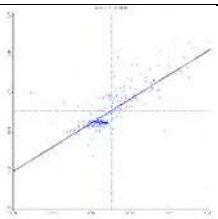
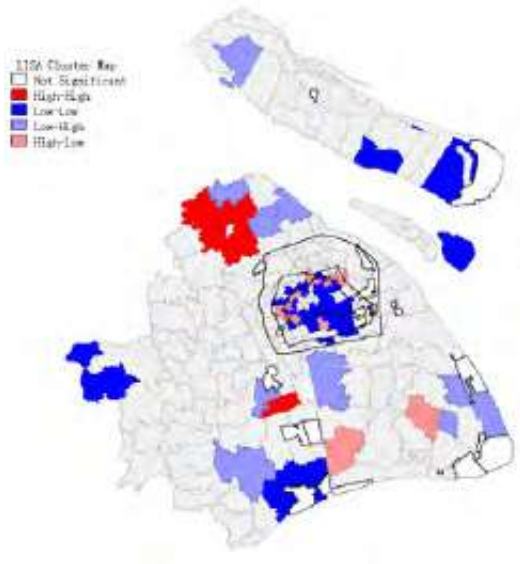
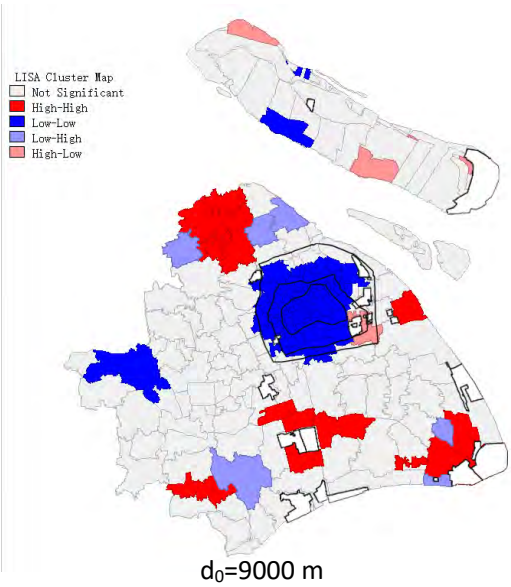
t=2017	d0=6010m	d0=9000m	d0=18000m
Gini Coefficient	0.38	0.35	0.23
Lorenz curve			
global Moran's I	I=0.008, Z=0.3, p-value: 0.3	I=0.39, Z=10.4, p-value: 0.001	I=0.61, Z=15.7, p-value: 0.001
Global Moran's I scatter plot			

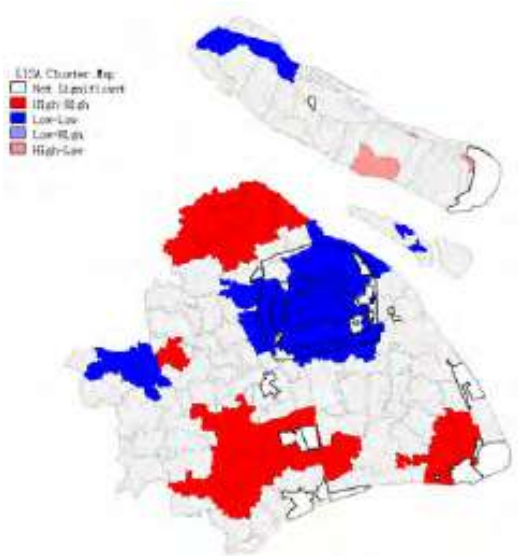
Figure4 Comparison of the degree of equity with different search radii



d_0=6010 m



d_0=9000 m



d_0=18000m

Figure5 Local Moran I of different search radius

4.2. The development of the equity caused by the location: study in elderly nursing institutions from Shanghai

From a development perspective, the emergence of spatial phenomena in cities is associated with specific historical periods, especially for public services. In urban development environments, there is a dynamic match between the growth of the total and the demand population. Relationships, diachronic comparisons help to help planners grasp the changes in the matching relationship between public service facilities and the demanding population during the construction process, and lay the foundation for further layout optimization in the future.

By comparing the equity of the spatial layout of the Shanghai elderly nursing institutions in d0=18000 meters in 2000, 2010 and 2014, the data of the population and elderly nursing institutions at the same time were matched to reflect the equity of Shanghai's elderly nursing institutions in different periods. Development.

From the perspective of the accessibility development in different periods (Figure.6), in 2000, the spatial differentiation of Shanghai's accessibility has begun to appear. The accessibility of the elderly nursing institutions has gradually changed from the central city to the suburbs. In terms of total volume, from 2000 to 2017, the accessibility of the elderly nursing institutions in Shanghai is increasing, and the total number of elderly nursing institutions in the high-accessibility range is increasing (Figure.7).

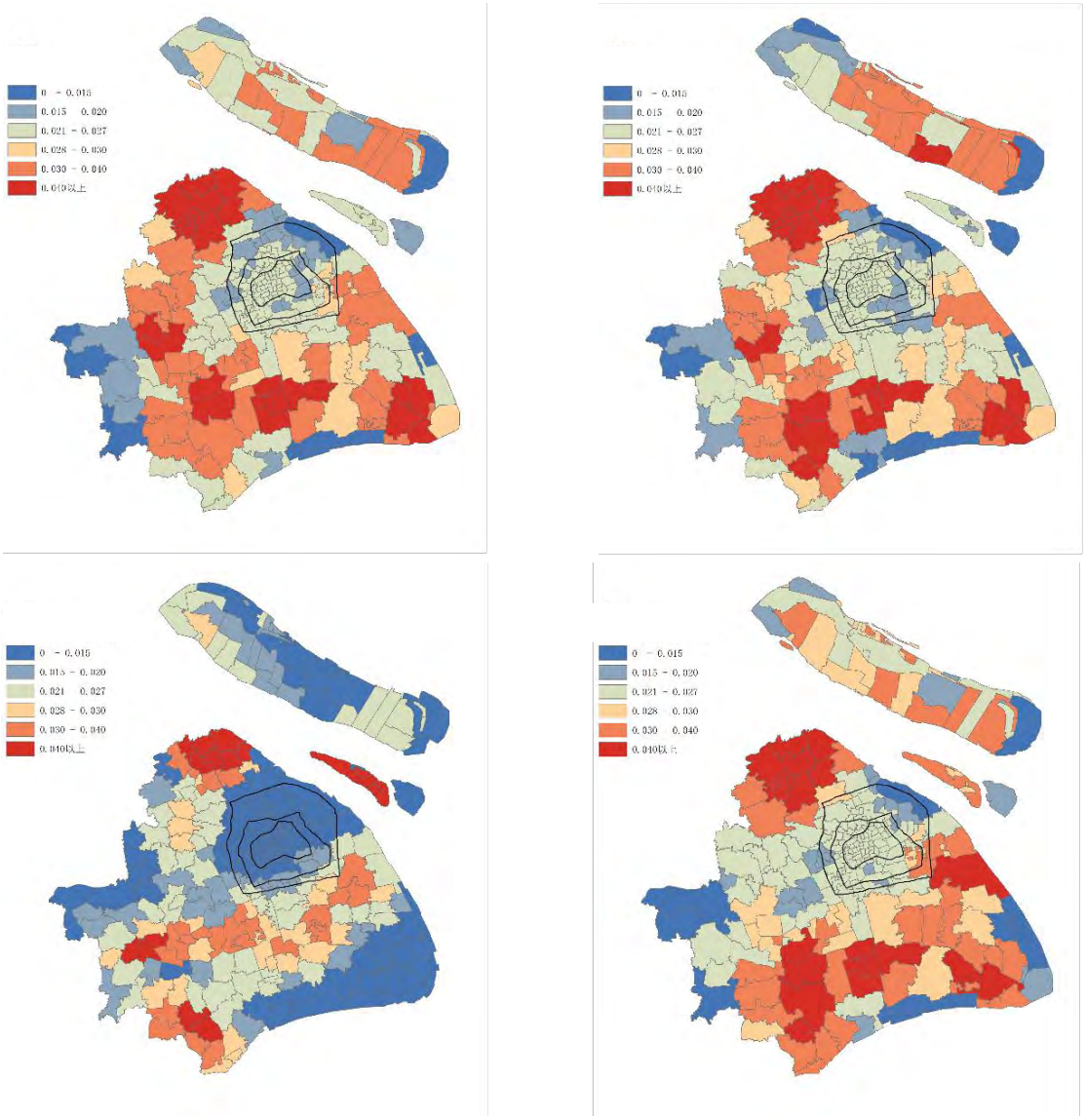


Figure 6 t=2000 Shanghai elderly nursing institutions' Accessibility (Top left), t=2010 Shanghai elderly nursing institutions' Accessibility (Top right) ,t=2014 Shanghai elderly nursing institutions' accessibility (bottom left) t=2017 Shanghai elderly nursing institutions' Accessibility (bottom right)

Accessibility can only represent the existence of inequity from the phenomenon . The result is the relative magnitude of population and resources, and it's difficult to describe the specific inequity in general. Therefore, Gini coefficient and Lorenz curve are used to analyze the degree of equity about the different service provided by the elderly nursing institutions, which is caused by the location, among the elderly (Figure.6). Although the distribution of accessibility between different research years showed a similar trend, from the perspective of the equity of the distribution of service population (Figure.3), Judging from the Gini coefficient of accessibility of Shanghai's elderly nursing institutions, in 2000, the Gini coefficient of the accessibility of different intervals in Shanghai reached 0.43. In the "big gap" interval, the number of elderly people in high-accessible streets is too low, and the inequity of population distribution is significant, but since 2010, this situation has improved.

The Gini coefficient of accessibility distribution gradually returns to the normal interval, which indicates that the coupling between the growth of the resources of the elderly nursing institutions and the changes of the distribution of the elderly is gradually increasing in recent years, and the limited supply of resources has achieved the role of promoting the equity of the distribution of the population.

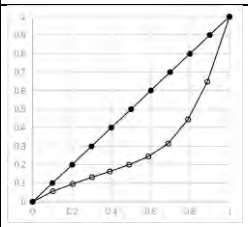
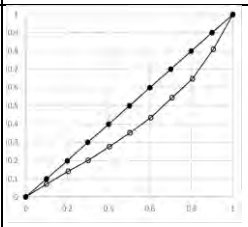
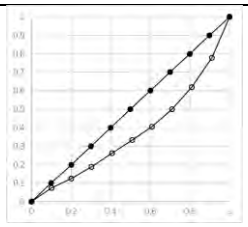
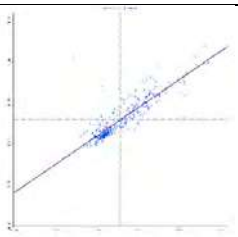
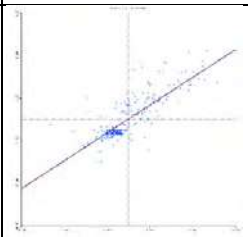
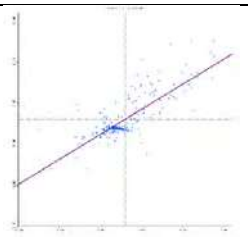
d0=18000 meters	2000	2010	2014
Gini Coefficient	0.43	0.21	0.26
Lorenz curve			
global Moran's I	I=0.68, Z=27.4, p-value: 0.001	I=0.61, Z=15.7, p-value: 0.001	I=0.65, Z=16.3, p-value: 0.001
Global Moran's I scatter plot			

Figure7 Comparison of the degree of equity with different years

Different from the improvement of the equity of the population distribution, in recent years, the improvement of the equity of the spatial distribution of the elderly nursing institutions has been minimal. The global Moran's I (Figure.7) is at a significant interval at each time ($p<0.001$, $Z>2.56$), and both are positive, indicating that at any time, at 18,000 search radius, Shanghai's elderly nursing institutions are reachable. The sexual distributions all show spatial positive correlation, the similarity units of the similarity show agglomeration in space, and the overall effect of agglomeration is similar, indicating that the spatial distribution of the accessibility values is not random, and the clustering of the research units The growth is

proportional, and the inequity of this spatial distribution is not only accidental, but the result of the long-term development of Shanghai's elderly nursing institutions and the elderly.

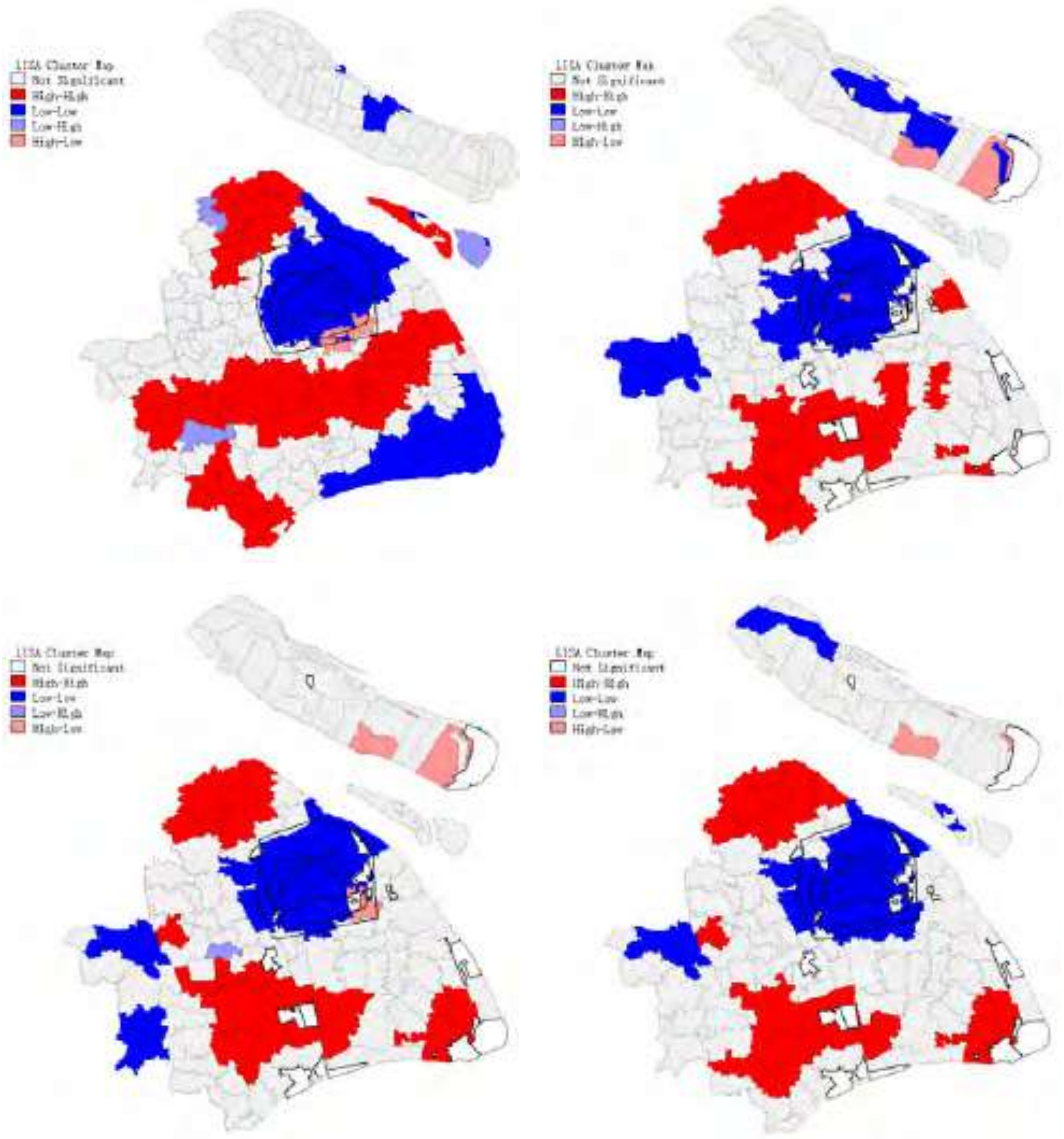


Figure8 Local Moran I of different search years, t=2000 (Top left), t=2010 (Top right) ,t=2014 (bottom left) t=2017 (bottom right)

This trend is analyzed by local Moran's I. From 2000 to 2014 (Figure.8), the overall trend is the trend of low-accessibility units concentrated in the central city and high-accessibility units concentrated in the suburbs. At the same time, it can be found that the distance of the high-accessible agglomeration area from the outer ring line boundary is gradually increasing, and gradually concentrated in the suburbs. Relatively speaking, the central city area has been in a low-accessibility gathering area, and the change is relatively low. Service has always existed. However, there are exceptions to the development of equity in service space. In 2000, the low-accessibility agglomeration space in the southern part of Shanghai gradually turned into a high-value clustering unit, indicating that the resource input of the elderly nursing institutions in this area is relative to the population. The growth is faster, the

investment in resources has achieved certain results, and it has reached a higher level of service in Shanghai. It can be seen that although the increment of the elderly nursing institutions in the city area is increasing, the inequity of the distribution of the service space of the elderly nursing institutions is also easing, but there are still areas where the equity and growth are faster than the increase in the demand population. The development of equity cannot completely replace the changes in local areas.

overall, from 2000 to 2014 (Figure.8), the inequity of the spatial layout of elderly nursing institutions showed a general trend of mitigation, and the differences in the distribution of services among the elderly groups were weakening, while the spatial distribution was inequity. But it is constantly focusing. The development of past elderly nursing institutions was based entirely on the lack of spatial planning. During this period, the formulation of public policies for elderly nursing institutions promoted the equity of their services in population distribution, which is common to market and policy supply. As a result, it is also inseparable from the cross-regional recommendations of the elderly population. Another convenience, this shows that the intervention of spatial planning has a high necessity to promote the equity of the redistribution process of public service resources. Per capita indicators and market mechanisms can follow the changes in demand to a certain extent, thus achieving the easing of inequity attributes of the distribution of service groups in the elderly nursing institutions, but this lack of analysis on the spatial level is difficult to optimize and solve strategies at sunrise, even It will aggravate the existence of inequity distribution of relative supply in the space. The latter not only exacerbates the inequity of the layout of public service facilities, but even causes waste of resources.

At the same time, it should be noted that from 2010 to 2014 (Figure.8), the inequity of the distribution of people in Shanghai's elderly nursing institutions and the inequity of spatial distribution have fluctuated slightly. The trend, on the one hand, shows that in recent years, the equity of the distribution of the services provided by the elderly nursing institutions has been well maintained, but the equity of the spatial distribution has not been well adjusted, and the overall pattern of the high and low accessibility spaces is On the other hand, this kind of volatility also reflects the instability of the equity pattern. Under the dual dimensions of time and space, the goal of building a new public service facility should not only make up for the gap in the low-service space unit, but We must also pay attention to the changes in overall spatial equity from a dynamic and global perspective.

5. Conclusion

At present, within the search radius of d0=18000 meters, Shanghai's elderly nursing institutions generally show a lower central urban accessibility and a higher suburban trend, but the distribution of old-age care services among the population is in a fair and reasonable range, but In terms of space, there is a significant agglomeration trend. The central urban area is a typical low-accessibility gathering area, while the suburbs form three high-level areas with Jiading Baoshan junction area, Songjiang Fengxian and Jinshan junction area, and Pudong Da Tuan town as the core. Daren gathering area.

From the perspective of development, compared with 2000, the distribution trend of the accessibility of the elderly nursing institutions in Shanghai has not changed much in recent years. In general, it still shows the characteristics of low suburban high in the central city, but

with the population. With the dynamic development of facilities, the equity of the distribution of old-age care services in the elderly has been significantly improved, and the disparity in 2000 has gradually turned to a relatively reasonable space. However, the inequity of spatial distribution has not been significantly improved, but it has become more focused on the scope. From the perspective of the migration of different agglomeration spaces, the southern part of Pudong New Area has been transformed from a remarkable low-accessibility cluster in 2000 to a high-accessibility cluster, indicating that the construction of the elderly nursing institutions has achieved remarkable results relative to the population growth. .

Compared with the overall elderly nursing institutions, the inequity of the population distribution and spatial distribution of the basic elderly nursing institutions is more significant, and this part of the content has not been effectively reflected in the existing planning, which can explain the disadvantages of the elderly population. For the group, it is more difficult to obtain fair resources for the elderly nursing institutions. They are at a more unfair interval in the provision of services for the aged care institutions at the basic demand level.

The evaluation method of accessibility can reflect the existence of inequity of resource distribution, and its high and low range can clearly reflect the spatial distribution difference of relative supply. Under the traditionally equal allocation of ideas, relying on administrative units as the basic statistical unit, it is difficult to take into account the complementary roles between the streets, so the actual service level of some streets will be too low or too high (Figure 3.9-3.10) , which in turn will cause interference to further spatial layout optimization. It can be seen that the choice of evaluation methods affects the accuracy of the understanding of the supply of public resources on the status quo. On the one hand, it is necessary to combine the characteristics of data to adopt a more accurate research method to reflect the status quo; at the same time, to study the layout of different types of public service facilities. In the middle, we should rationally and objectively analyze the characteristics of various facilities, and pay attention to the rigor in the choice of methods and parameters. At present, under the condition that the goal of the elderly nursing institutions in all streets of Shanghai has been basically completed, the accessibility can explain the matching relationship between supply and demand more accurately, and has more effective guiding significance for reflecting the supply situation of the facility.

Although accessibility helps to guide the further supply optimization of public service facilities, it cannot reflect the degree of inequity at the global scale, and it is difficult to clearly define the global distribution of limited resources. The existing equity evaluation of public service facilities can be divided into two aspects: population orientation and spatial orientation. The former reflects the differences in access to public services by different groups of people, while the latter reflects the agglomeration of public services in spatial distribution. The equity of public services in the distribution of people reflects the degree of overall matching between supply and demand, while the equity of spatial distribution can reflect the preference between

resource supply policies in different regions. The emergence of agglomeration areas of public service resources should attract the attention of planners. Based on a comprehensive analysis of future population, economic and industrial development trends, suggestions for further optimization and allocation should be made.

6. References

Aihua Z, Xiao F(2013)" Research on Accessibility of Emergency Evacuation Sites in Beijing Urban Area Based on Two-Step Mobile Search Method",Journal of Safety and Environment,Vol.13No.250-253.

Anselin L (1995)" Local Indicators of Spatial Association—LISA", Geographical Analysis, Vol.27No.93-115.

Barbati M(2016)" Equality measures properties for location problems", Optimization Letters, Vol.10No.903-920.

David, Hasegawa Naoki, Suzuki Bozhi (2011) "Preliminary Study on the Construction and Use of Beijing Aged Care Service Organizations——On the Rational Planning of the Construction of Aged Services Organization Urban Planning", Vol. 35No.60-67.

Gao Xiaolu (2013) "Preference Characteristics and Community Differences of Urban Residents in Aged Agencies", China Soft Science, Vol. 1No.23-32.

Haiyan J,Chunshan Z,Junbo G(2011)" Research Progress on the Fairness of Public Service Spatial Distribution in Western Cities", Urban planning, Vol. 35No. 72-77.

Harries K, Smith D Mjjoei(1994)" Geography and Social Justice", Journal of Economic Issues, Vol. 17 No. 335-344.

Horev T , Pesis-Katz I , Mukamel D B(2004)" Trends in geographic disparities in allocation of health care resources in the US", Health Policy, Vol.68No.0-232.

Junbo G, Chunshan Z (2009)" Theories and research progress of urban public service facilities supply in western countries", Global geography research, Vol. 18No. 81-90.

Keenan T A(2010)" Home and Community Preferences of the 45+ Population",AARP Research, Vol. 23No.68-72.

Keqin R, Wei X, Lixuan Q(1998)" Measurement Method of Health and Fairness", China Health Economics, Vol2.NO.30-32.

Klaus R. KunzmannI(1998)" Planning for spatial equity in Europe" International Planning Studies, Vol. 3 No. 101-120.

Li J, Xiaopei Y,(2015)" Social justice, benefit distribution and spatial planning",urban planning, Vol.39 No. 9-15.

Lianhong C.(2014)"Hospital Layout Evaluation Based on Gaussian Two-Step Mobile Search Method Spatial Accessibility Model", Chinese Hospital Management, Vol. 34No.31-33.

Nicholls Sarah(2001)" Measuring the accessibility and equity of public parks: a case study using GIS", Managing Leisure, Vol. 6No. 201-219.

Park S J (2012)" Measuring public library accessibility: A case study using GIS",Library & Information Science Research, Vol. 34No. 13-21.

Talen E(1998)" Assessing spatial equity: an evaluation of measures of accessibility to public playgrounds", Environment and Planning,Vol. 30No.595-613.

Talen Emily(1997)" THE SOCIAL EQUITY OF URBAN SERVICE DISTRIBUTION: AN EXPLORATION OF PARK ACCESS IN PUEBLO, COLORADO, AND MACON, GEORGIA", Urban Geography, Vol. 18No. 521-541.

Talen Emily(1998)" Visualizing Fairness: Equity Maps for Planners", Journal of the American Planning Association", Vol. 64No. 22-38.

Talen, & Emily(1997)" The social equity of urban service distribution: an exploration of park access in pueblo, colorado, and macon", Urban Geography, Vol.18No. 521-541.

Teitz M B,(1968)" Toward a Theory of Urban Public Facility Location", Papers in Regional Science, Vol.21 No. 35-51

Wei X, Yuan Z(2017)" The Spatial Distribution Pattern and Accessibility Evaluation of the Aged Service Facilities in Nanjing——Two-Step Mobile Search Method Based on Time Cost",Modern Urban Research,Vol2.NO.1-11.

Xiao Y , Wang Z , Li Z (2017)" An assessment of urban park access in Shanghai – Implications for the social equity in urban China",Landscape and Urban Planning, Vol. 157No.383-393.

Yao Dong (2015) "Study on Space Measures for Inhabited Elderly in Big Cities", Urban Planning Journal, 2015(4).

Yifan Yu, Xin Sui(2018)" Evaluation of the Spatial Distribution of Aged Service Facilities under the Vision of Fairness——An Empirical Study Based on the Elderly Education Facilities in Shanghai", Social Policy Research.

Zhang Nan, SunXiao jie, Li Cheng(2014)" Analysis of the Fairness of Health Resource Allocation in China Based on Theil Index", China Health Care Management, Vol31.NO.88-91.

Zhang Songlin, Zhang Kun(2016)" Research on Moran and G Coefficients of Spatial", Autocorrelation Local Indicators, Vol.27No.31-34.

Zhen L, Suiqiang G, Huihua J (2007)" Application of GIS-based two-step mobile search method in the evaluation of accessibility of medical treatment in Beijing" ,Surveying science, Vol. 32No. 61-63.

Zhengna S , Wen c, Guixiang g,(2010)"Spatial accessibility of public service facilities and its measurement methods",Progress in Geography, Vol. 29No. 1217-1224.

Zhongxiao C(2009)" The Realistic Interpretation of the Equity View of Economic Law in Contemporary China——An Interpretation of the Equalization of Basic Public Services", Contemporary jurisprudence,Vol. 23 No.92-99.

Zhuolin T, Yang C, Teqi D(2014)"Evaluation of Spatial Accessibility of Beijing Aged Facilities", Progress in Geography, Vol. 33No. 61-63616-624.

Zhuolin T, Yang C.(2016)"Research Progress of Two-Step Mobile Search Method and Its Extended Forms", PROGRESS IN GEOGRAPHY, Vol. 35No. 589-599.

Zilai T, Gu Wei(2015)" Social Performance Evaluation of Public Green Space Distribution in Shanghai Downtown Area: From Regional Equity to Social Equity",Urban Planning Journal.

Research Paper

Study on an Integrated Agent-based and Spatial Analysis Modelling for Energy-efficiency and Demand Analysis in Urban Planning

1 Yu SUN School of Architecture, Harbin Institute of Technology, Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, Harbin, China;

2 Hong LENG School of Architecture, Harbin Institute of Technology, Harbin 150000, China;

3 Tian WEI Mechanical Engineering, Tianjin University of Science and Technology, Tianjin , China;

Abstract

Cities and towns account for more than two-thirds of world energy consumption, a significant proportion of which is spent on operating buildings. Ambitious national energy and emission reduction targets necessitate that energy demand due to buildings is considered as an important measure when any future evolution of a district or city is planned. Energy consumption of buildings in cities is influenced by their immediate local environment. Factors such as local temperatures, wind speed (street-canyon effect), air pollution levels, human activities, access to daylight, etc. Indeed, in order to reduce energy consumption and associated carbon emissions globally, more attention should be focused on urban-scale energy analysis of the built environment. Nowadays, with the rise of the scientific paradigm shift and model theory, and the development of the spatial data, the use of the complex model of urban-system analysis become one of the important research of urban theory. Under this circumstance, this research will focus in the research stream, the application of a new integrated agent-based and spatial analysis modeling for energy prediction and energy-saving policy analysis in Urban Planning. The basis of the research will be to develop new, general purpose, computer models that can be used to assess the distribution of energy demand according to the spatial scale of the evaluated policy (e.g. local, city level). These models will look not only at the individual building level, but also at the district and city scales, in order to be able to assess the impact of urban planning policy and practice in land economy and spatial building pattern or design interventions on the energy demand of the wider scale.

Keywords

Spatial analysis, District energy efficiency, Urban planning.

1. Introduction

Cities and towns account for more than two-thirds of world energy consumption, a significant proportion of which is spent on operating buildings(Bose, 2013); (Robinson, 2011). Ambitious national energy and emission reduction targets necessitate that energy demand due to buildings is considered as an important measure when any future evolution of a district or city is planned. Not only the accounting of present-day energy consumption of

the built environment by regions and by sectors, but also the prediction of achievable reductions to meet relevant emissions targets. (Keirstead, 2012). Indeed, in order to reduce energy consumption and associated carbon emissions globally, more attention should be focused on urban-scale energy analysis of the built environment (Heo and Choudhary, 2012).

Energy consumption of buildings in cities is influenced by their immediate local environment. Factors such as local temperatures, wind speed (street-canyon effect), air pollution levels, human activities, access to daylight, etc. Typically referred as micro-climatic factors, these are largely anthropogenic, resulting from local agglomerations of density of buildings and population, equipment, land-cover, activities of a city or region. In addition, many studies have proven that human behavior has a significant role in energy consumption patterns of buildings in urban settings (Frayssinet and Merlier, 2018). It is very likely behavior factors affecting energy use have positive spatial autocorrelation in city context. Therefore, it is important to consider spatial effects as well as occupants' behaviours in analysing energy consumption patterns of buildings in urban settings. However, there are still many limitations in current research technology and methodology, especially the interaction between energy consumption and occupant behavior in daily activities should be further discussed. Nowadays, with the rise of the scientific paradigm shift and model theory, and the development of the spatial data, the use of the complex model of urban-system analysis become one of the important researches of urban theory (Choudhary and Tian, 2014). Under this circumstance, the paper follows the technical waves, application of a new integrated agent-based and spatial analysis modeling for energy prediction and energy-saving policy analysis in Urban Planning. The basis of the research will be to develop new, general purpose, computer models that can be used to assess the distribution of energy demand according to the spatial scale of the evaluated policy (e.g. local, city level). The new integrated energy model that can be used to analyses energy consumption patterns due to buildings at the district scale, which also enables a technological innovation by ABM for behavior modeling.

We named the new integrated analysis environment: IUBEA from the initial letters of Integrated Urban Building Energy Analysis. The data used in the IUBEA includes physical features of buildings (e.g., size, volume) per use type and per district, demographics, economics (e.g., cost of land), and energy data at various spatial scales in cities. Another important feature of this computer model is that it is programmed within an open-source software (Netlogo), which allows other users to access it easily. In addition to being open-source, Netlogo (Tisue and Wilensky, 2004) is chosen in this project because it has many functions, such as scenario-based analysis, GIS environment, and agent-based modelling. Furthermore, it has several extensions to link with other programs, such as statistical program R and numerical computing environment MATLAB.

In IUBEA, we implemented the model methods and validations through a case study of London. Agent-based modeling (ABM) in the integrated analysis environment (IUBEA) is a technique for bottom-up simulation, providing an alternative perspective to those that can be attained by using optimization or general-equilibrium approaches(Zhao and Wang, 2010) . This paper explores techniques to integrate a spatial analysis environment in the field of urban building energy assessment in cites to make full use of current spatial data relevant to urban-building energy consumption and energy efficiency policies. So, users of the model are able to easily relate building and spatial characteristics parameters to policy or utility

figures, which can lead to an efficient energy model, which contributes the body of knowledge of energy modeling beyond the single building scale.

2. The framework of the Integrated Agent-based and Spatial Analysis Modelling

The main purpose of the research on urban scale building energy model is analysis the relationships and key factors affecting energy use in spatial autocorrelation in city context. Ensure that the planner can make reliable decision-making solutions based on system analysis of the mechanism of energy use and urban development. Techniques for extending building models to quantify energy consumption of a district, or city region have come into closer scrutiny as policy-implementers are under pressure to take large-scale actions for reducing energy consumed by regions, districts (Choudhary, 2012). In order to provide the reliable techniques for the low-carbon urban planning, researchers should use qualitative and quantitative analysis to evaluate the design of energy-saving policies before the implementation of energy-saving policy. On the one hand, to quantify the implementation effect of energy-saving strategies in different object's spatial position and scale. On the other hand, by comparing the environmental and socio-economic (include occupant behavior) impacts in spatial context, choose a more effective planning strategy that reduces the energy demand of district or city level. Therefore the typical steps for energy-efficiency analysis in urban planning as shown in Figure 1.

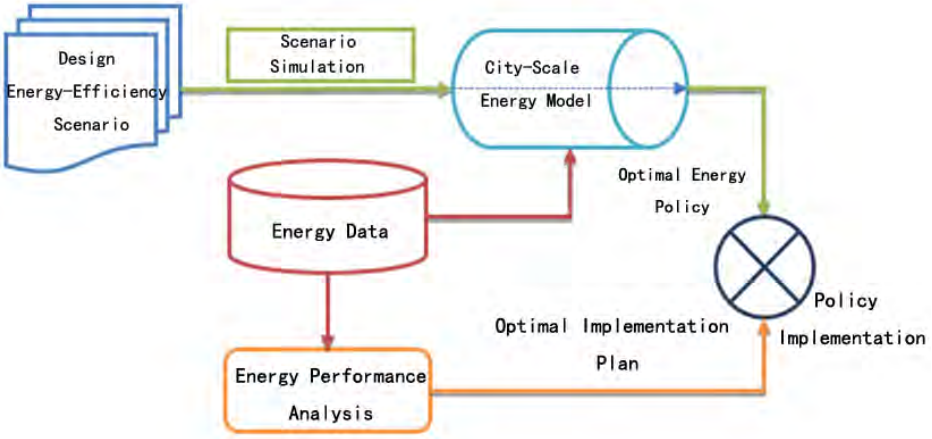


Figure 1 Composite relation of energy effectivity research

In addition, there are interactions and influence mechanisms of energy consumption and various spatial factors in built environment, named "spatial heterogeneity" (behaviour uncertainty caused by spatial position differences). By the influence the space phenomenon, policy-implementers should come into closer observation the energy-efficient in spatial to adopt different policies and implementation efforts in different regions to achieve the energy-saving purposes in the most economical way. Based on the above simulation key features, the systematic framework for the study of the integrated spatial analysis modelling for energy-efficiency and demand analysis in urban planning is constructed as shown in section3.

3. Contents and Methods in the Integrated Model Environment

The analyses in IUEBA are implemented through four functions. The first displays the data spatially and can be used for data query at different spatial levels in cities. The second is to explore the relationship between various factors and energy consumption using correlation and regression analysis and create statistical energy models. The third is to study the effects of different scenarios on building energy use, named “scenario analysis”. The fourth is to investigate the optimization zones using mixed-use method based on energy use intensity of districts. This section will describe these four main functions in detail.

3.1. Spatial distribution analysis of the energy consumption in city scale in IUEBA

These spreads (or distributions) can be used for estimating the probability distribution of the gross energy consumption per local authority in Greater London. The work is driven by the need to quantify future energy demand of buildings in their urban context as a function of projected growth of buildings and populations, refurbishments, policies incentivizing energy efficiency measures, and changes in building operation.

when predicting the energy consumption of a district in a city level, the actual value can vary significantly from the prediction, due to the different spatial contexts in which each district has its own unique characteristics that influence the energy consumption in various manners. The influence of the immediate environment and climate change on energy consumption or carbon emission in urban environment by the robust mathematical modeling method has been explored before (Cheng and Steemers, 2011). Geo-computation of existing distribution of energy consumption for an analysis of policy scenarios of energy use abatement is a case, where the context of the urban planning can be assessed and understood in detail, by gathering geospatial data, energy bill data and information using methods such as GIS and survey. Besides, advanced Geo-modeling methodologies of spatial analysis of energy consumption need be developed to improve the way in which observed data is used to spatial statistical test and validate models.

In this study the energy consumption of a set of uniform buildings within an area is normalized and expressed as kWh/m2/year. The total energy consumption of buildings in a district can be expressed as the sum of energy consumption of its constituent buildings in the following form:

$$E_k = \sum_{i=1}^{N} EUI(i) \cdot PA(i,k) \qquad (1)$$

where, E_k is the energy consumption of a district k in kWh/m2/ year, normalized by its total building floor area. $EUI(i)$ is the energy use intensity of a building type i in kWh/m2/year, $PA(i,k)$ is the percentage of built floor area of building type i in district k, and N is the total number of building types.

A common feature in EUI studies is that even in the same type building, the difference of EUI is existence due to the varies in building age, sub-functions, and equipment performance. The hypothetical model does not fully reflect the actual energy consumption. So the energy density of

different types of buildings is more appropriately expressed in the form of probability distribution show as （2）.

$$G_k \sim N(E_k, \sigma^2), \quad \text{for k=1,2,3,...,D} \qquad (2)$$

where, G_k is the observed energy consumption of a district k in kWh/m^2/ year, D is the number of all observation points. σ^2 is the variance of the distribution, which represents the error in the measurement process, accommodating any differences between the recorded gross energy consumption of a district and that of its individual buildings. These errors may be systematic, owing to how energy consumption is recorded or due to other reasons in the observations.

There is also an external spatial influence value of building energy consumption in each district. Spatial analysis techniques of SAR and GWR is used to quantify spatial influence in energy consumption of a neighbourhood, district level.

We first use spatial autoregressive methods to incorporate spatial influences into the calculation of building energy density. The spatial feature quantity b(k) is used to characterize the spatial characteristics of energy consumption in different regions as show in （3）

$$E_k = \sum_{j=1}^{N} I_j P_{k,j} + b(k) + \alpha, \quad \text{for k=1,2,3,} \cdots \text{,D} \qquad (3)$$

Where α is a constant term; however, the spatially distributed intercept α is varies in different regions, it is assumed that it satisfies a stable uniform distribution; *b(k)* is a spatial feature of a certain district; It is expressed as the follow:

$$b_k | b_{k-1} \sim N\left(\frac{1}{n_k}\sum_{j=1}^{n_k} b_j, \tau^2\right), \quad \text{for k=1,2,3, } \cdots \text{,D} \qquad (4)$$

Where n_k is the number of adjacent areas affected by the area *k;* τ represents the accuracy of the distribution and is expressed in the model as follows:

$$\tau = \frac{1}{\varphi^2}, \quad \varphi \sim uniform(0,100) \text{D} \qquad (5)$$

Where ϕ is the variance parameter obeys the uniform distribution ：Uniform (0,100).

A common feature in these studies is that the energy consumption of a set of uniform buildings within an area is normalized and expressed as kWh/m2/year. This value, referred as energy use intensity (EUI), is derived from published standards of typical building consumption patterns, or from auditing energy consumption of a representative sample of buildings, or computed using statistical or physics-based energy models of representative buildings. It is a standard normalization because it enables scaling-up energy consumption of a large set of buildings into gross energy use of a district, and likewise, allows delegating total energy use of a district to its consumers (buildings).

3.2. Spatial factors analysis of the energy consumption in city scale in IUEBA

The immediate local environment has important influence on energy consumption of buildings which has been explored before. Such as local temperatures, wind, access to daylight, pollution, noise levels, etc. These spatial factors result in significant differences in the amount of energy use such heating, cooling, ventilation and lighting required to maintain a building at acceptable conditions. How to identify spatial influence factors, improve the accuracy of key factors, and eliminate the interference of non-critical factors on model predictions, is still a problem to be solved in the integrated environment. In this paper we use spatial statistical methods to quantify the influencing factors in the energy simulation.

The regression analysis in this project has two main aims: interpretation and prediction. The interoperation is to understand the spatial relationship between energy and independent variables. For instance, how population number or floor area can influence the energy consumption and whether the floor area or population has more significant effects on energy consumption. The prediction is to investigate the effect of changed independent variables on energy consumption. Note that this regression analysis can deal with one or multiple independent variables. The regression analysis can be used for interpretation to understand the relative importance of independent variables on energy consumption. This analysis can also be very helpful to determine the variations of energy consumption explained by the independent variables in the regression.

The spatial form factors is shown as example how the regression analysis is implemented in IUBEA environment, as shown：

$$\hat{E}_t = Constant + \beta_{building} \times S_t^{building} + \beta_{road} \times S_t^{road} + \cdots + \varepsilon \quad (6)$$

where: $\hat{E}_t$ is estimated energy consumption of a given area, $\beta_{building}$, β_{road}, etc. are the coefficients of building, road, etc. $S_t^{building}$, S_t^{road}, etc. are the area of building, road, etc. ε is the random error term.

Implement of correlation analysis on spatial socio-economic features with energy consumption. Normative building energy model has many parameters that may not be sensitive to analysis the Socio-economic features impact EUI distribution in spatial. The procedure of the Correlation and regression analysis is to apply a sensitivity analysis to a set of parameters to reveal the relations of distribution of Socio-source features with energy consumption in spatial.

The influence of the local environment on energy consumption of buildings has been explored Anthropogenic factor, such as local agglomerations of buildings and population types, equipment , activities, across various parts of a city as well as socio-economic features such as income levels, wealth, and demographics have also been shown to influence the energy consumption patterns in buildings. Given the feasible ranges of model variables, the next step is to generate data samples and retrieve the corresponding model outcomes for variable sensitivity analysis with the distribution of Socio-economic features. The method for sensitivity analysis is the same in different types of application in building energy analysis as show in Figure. 2 (Tian, 2013).

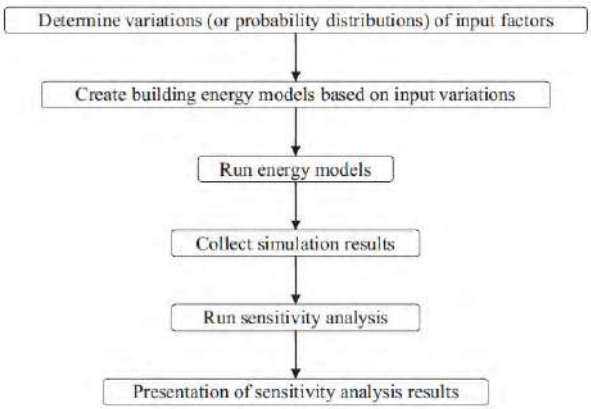


Figure 2 Flow diagram for sensitivity analysis in building performance analysis

3.3. Energy prediction and scenario analysis in city scale in IUEBA

1. Energy prediction

Based on the analysis in section 3.1 and 3.2, the prediction analysis can be implemented if the independent variables can be used to explain most of variations of energy consumption. Then the regression model is used to predict the change of energy consumption due to the variations of independent variables. The total energy consumption of buildings in a district can be expressed as the sum of energy consumption of its constituent buildings in the following form

$$E_k = \sum_{i=1}^{N} EUI(i) \cdot PA(i,k) \quad (1)$$

The results from formula above should be verified with actual energy data to make sure that both energy use intensity and area data are reasonable at a given spatial scale. Then analysts can change energy use intensity or floor area to explore the possible effects of these changes on energy consumption in the same or different spatial scales in cities.

2. Scenario analysis

Baseline Scenario:

Scenario analysis is used for what-if analysis. The function in this section is different from "regression analysis", as explained in Section 3.3. Scenario analysis does not implement regression method, but it depends on only independent variables. Therefore, this method is more flexible compared to regression analysis because it is suitable for the situation where energy consumption data are unavailable in some spatial scales or some areas of a city. To implement the scenario analysis, analysts should have good knowledge on the effects of these independent variables on energy consumption. Furthermore, some form of validation of energy calculations is necessary to confirm that the prior assumptions in the model are appropriate.

New Scenario design:

This section will describe three new scenarios to explore the possible change of energy consumption in cities.

(1) Electrification Scenario: It seems there are more benefits for electrification in building sector if grid electricity can become gradually carbon intensive. As an example, electricity emission factors in the UK have been reduced around 35% from 1990 to 2010 (UK Defra & DECC, 2012). This energy scenario is to explore how the total energy would change if building sector would use electricity instead of gas for heating.

(2) Building type conversion scenario: In urban environment, it may have some reasons to change building types due to economic or social reasons. Then, it may be of interest to investigate change of building types on total energy consumption in cities.

(3) Energy efficient Scenario: In order to reduce carbon emission, it is important to understand how the improvement of energy use efficiency may influence total energy consumption in cities. Thus, this scenario allows analysts studying the influences of change of energy use intensities for different building types.

3.4. Optimal simulation of energy consumption based on ABM model in IUEBA

Implement Agent based model for energy efficiency and human behaviour simulation

The application of this section will facilitate deployment of energy efficient buildings, socio-economic impacts and energy supply technologies in city design, by developing quantifiable, system-level models that assess their feasibility and implementation in the wider context of socio-economic, and regulatory characteristics of the city. The system-level model will not only enable a more robust scaling-up of the impact of technological innovations up to the city level, but also allow trade-offs between their environment, societal, and economic impacts to inform regulations and policy scenarios.

1. Initiate model environment

In this agent model we apply

- Energy Consumption Source:

lighting, HVAC(heating, ventilation, air-condition, cooling), Equipment,

- Energy Sources:

Gas, (Oil), Electricity, Renewable Energy(Solar, Wind, Biogas, Bio-diesel)

- Environment Sources

Residential, Commercial, Industrial, Transport

In this mobility model we consider people like household employment consumption is the main part of energy consumption of a city People migrate to cities for the following reasons: For better employment, education, treatment, amenities and thus an increased quality of life.

2. Formulation & Methodology of model simulation

$$EUI_{msoa} = \alpha \times e^{\frac{N_{population}}{c_p \times \sum_{j=1}^{M} S_{building}}} + \beta \times e^{\frac{N_{employment}}{c_e \times \sum_{j=1}^{M} S_{building}}} \quad (7)$$

Where $\mathrm{EUI_{msoa}}$ is the energy use intensity of middle super output area (MSOA). $\mathrm{N_{population}}$ and $\mathrm{N_{employment}}$ are number of population and employment respectively in MSOA. $\mathrm{S_{building}}$ is the floor area of each building type, and M is the number of building types. $\mathrm{c_p}$ and $\mathrm{c_e}$ adjust the strength of population and Employment that can be determined before regression controlling weights of population and employment.

4. Results analysis

4.1. A case study of London

London has been used as a case study to explore its building energy patterns with this new integrated IUBEA model environment. In this case-study, London has three spatial scales: LA (local authority), MSOA (middle layer super output area), and LSOA (lower layer super output area). London has 32 local authorities and the city of London is also regarded as a special LA in this study. According to UK census 2001, London has 983 MSOAs and 4765 LSOAs. MSOA and LSOA areas are created based on population and household number.

Note that there is a change of these MSOA and LSOA areas in 2011 census due to population and household changes.

Theme	Data set	Reference
Energy	Electricity /Gas at borough level	(DECC, 2013c)
	Electricity/gas at MSOA and LSOA	(DECC, 2013b) (DECC, 2013a)
	EPC (energy performance certificate) & DEC (Display energy certificate) in London	(UK DCLG, 2013)
Area	Land use area from UKmap	(UKMap, 2011)
	Floor area	(UKMap, 2011) (Choudhary, 2012)
Social economy	Population	(London datastore, 2013)
	Household	

Table 1. Date source used in this analysis

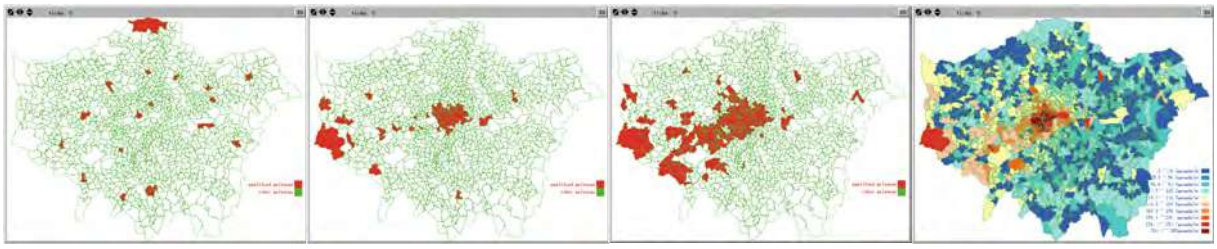
Table 1 lists the data sets used in this paper. These data can be divided into three categories: energy, area, and social economic factors.The energy data used in this analysis includes regional data and point energy data in London. The regional energy data means the total energy in a specific spatial scale, while the point energy data is the energy data for individual buildings. Both electricity and gas data in domestic buildings in London has good quality from LA to MSOA levels although the energy data in a few number of MSOA areas is unavailable (DECC, 2013a, b, c). For non-domestic energy data, there are full data at LA level from UK DECC. For MSOA gas data in London non-domestic sector, the data quality is also fine except for a small numbers of MSOA areas, whereas the electricity data at MSOA level is almost impossible to use since most of data are unavailable due to disclosure issues (DECC, 2013b) . The point energy data in this paper is from UK DCLG, including DEC (display energy certificate) and EPC (energy performance certificate) (UK DCLG, 2013).

4.2. Results

As described in section 3, many types of analysis can be implemented. In this section, we only show some results of corresponding the main functions described in section 3.

1 Spatial factors analysis

To show the area percentage of school and offices at MSOA levels in London. Figures 2 present the descriptions of the visualization cases. Cases a and b calculated by two modes absolute/relative only, are used to analyse the scaled /absolute distribution Area of Offices



(a) (b) (c) (d)

Figure 3 (a) Retail floor area of MSOA more than 20% in Greater London. (b) Office floor area of MSOA more than 20% in Greater London. (c) Office cost of MSOA more than 50% of 983 polygons in Greater London. (d) Office cost distribution of 983 MLSOA in Greater London

and Schools per MLSOA in London in London. It refers to the operation between properties in polygons, which is very important to quantify the change of some variables per-district.

Figures 4 Figure4 (a) (b)the non-domestic electricity is replaced by domestic electricity and the results presents the regression with residential floor area and population. We attempt to explain whether; floor area or employment can explain more on the variations of non-domestic electricity based on R^2.

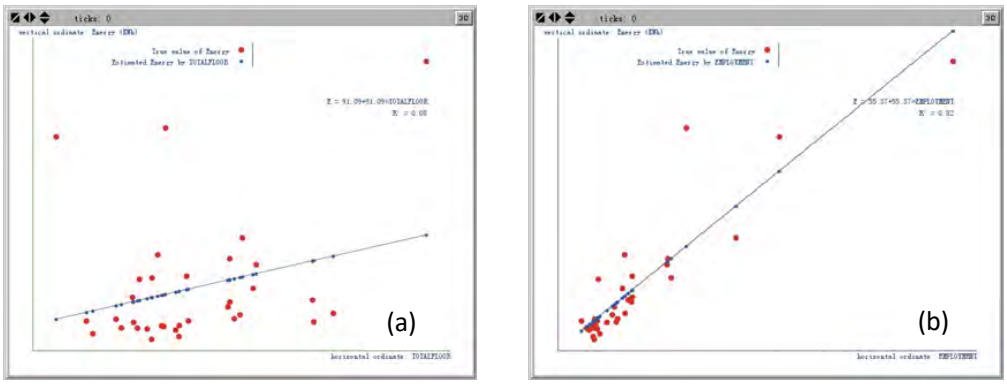


Figure 4 a) regression of domestic-electric/floor-area; b) domestic-electric/population

2 Spatial distribution analysis

In the "I-UBEA" combined with GenBUGS software to process the spatial statistical based on Bayes analysis, the model runs 20,000 times, of which "Burn-in Period" is 2000 times. Based on the distribution of the energy density of 13 different types of non-residential buildings in London, this section selects the main proportion of community buildings in London to show the model application. Based on the distribution of the energy density of 13 different types of non-residential buildings in London, this section selects the main proportion of community buildings in London to show the model application. By comparing the density distribution results of 13 building types, the distribution of building energy consumption shows obvious spatial polarization characteristics, and some spatial forms have obvious polarization. Figure 5 shows the distribution of the mean of the posterior distribution of community buildings in the tested 953 MLSOAs. Among them, the high-energy buildings obviously have a concentrated trend, but they do not form a group distribution pattern. Instead, they form a concentrated high-energy-consuming area near the center of the city, and shows distinctly different from the multi-center patterns compare with other types of buildings

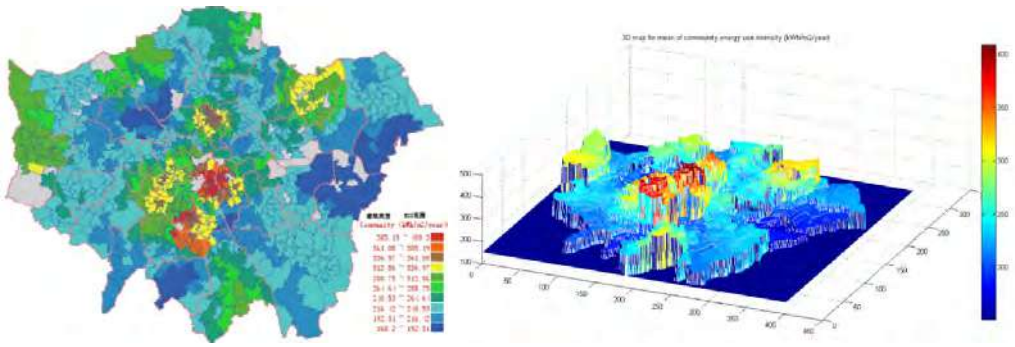


Figure 5 Posterior distributions of calculated area weighted EUIs of community building in MLSOAs of London

3 Scenarios analysis

The input data are included all local geography data and historical energy consumption records of recent years. In this section figures 5 presents the comparison results between three scenarios due to electrification in London building sector. The results are based on the distributions of EUI from both DEC and EPC data. Then the results from both base case and electrification scenario distributed in Figure 6.

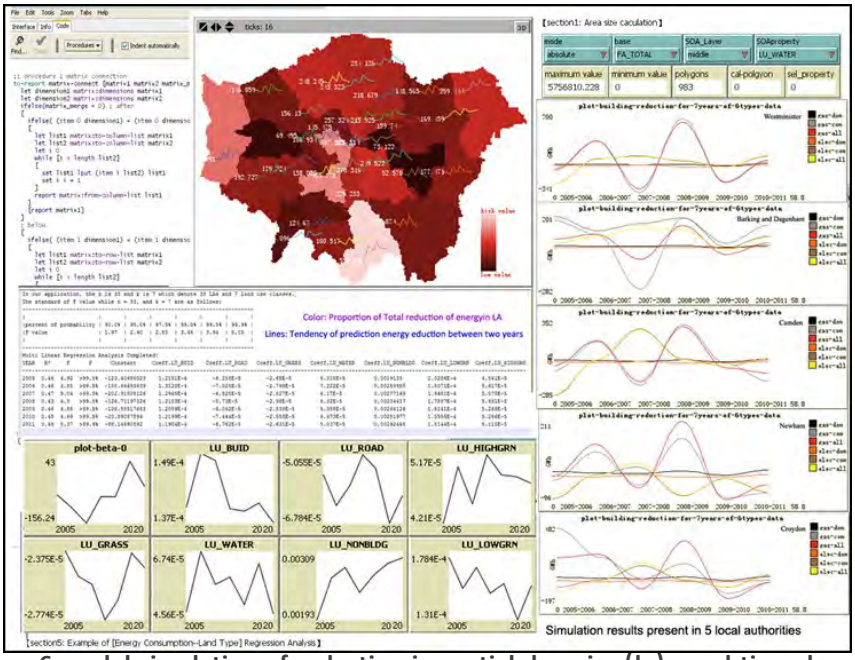


Figure 6 model simulation of reduction in spatial domain（la） and time domain（ 2005-2020）

4 Agent-based energy models

Figure 8 shows the people migrates to neighboring MSOA according to accumulation of different energy sources. Weights of each energy source can be set, thus denoting different policies. From the results each MLSOA has its own distribution of resources and population , thus energy use intensity (EUI) in there. Some polygons have higher EUI than others. Statics plots in figure 7 show how the interaction between energy consumptions, socio-demographic characteristics, environmental conditions and human behaviour which all combine in unique ways to create very different energy saving opportunities for each local authority.

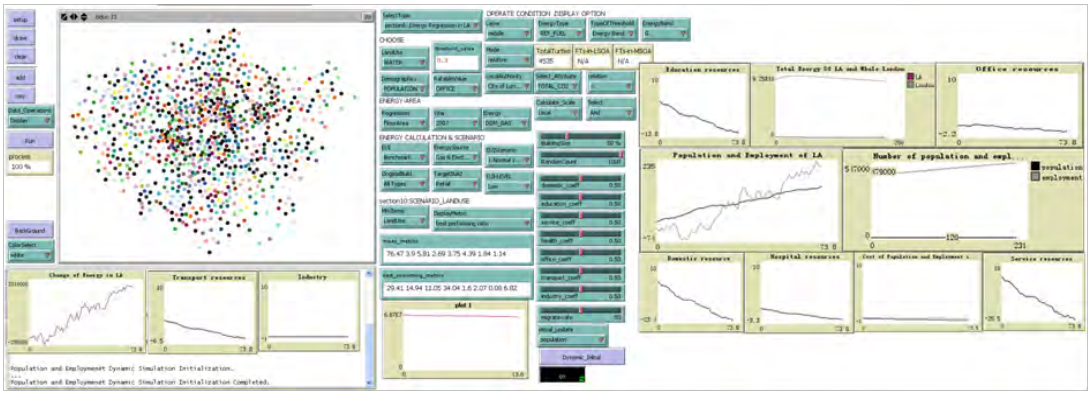


Figure 7 Agent based model for energy prediction in terms of population mobility generated from IUBEA results

5. Conclusion

This paper has described a new integrated GIS environment to make thorough analysis of energy performance in city buildings. This energy analysis environment can be used for multiple functions, including spatial data visualization, data query, regression analysis, scenario analysis, energy optimization, and agent-based energy analysis. London has been used as a case study to illustrate its main functions.

The following conclusion also can be drawn from this research:

- Urban scale energy models should consider the effects of spatial dependence when dealing with energy use at urban scale. Or at least, the immediate local environment factors should be analyzed whether there is significant spatial correlation.
- ABM (Agent-based-model) can be a feasible tool to tackle intellectual challenges (uncertainties) in energy modeling. The uncertainty that is caused by occupant behaviors accounts for a significant discrepancy between the predicted and actual energy usage that typically have strong interactions.
- As a result, the research proved the possibility of the integrated approach in simulation, and the analysis of energy-efficiency which is influenced by comprehensive factors including spatial context and human interventions. The final adoption example of London demonstrated that the integrated analysis environment as a feasible tool for building energy consumption have unique advantages and wide applicability.

Funding: This research was funded by National Natural Science Foundation of China, Fund No. 51678178; China Postdoctoral Science Foundation, Fund No. 2018M630361; Postdoctoral Science Foundation of Heilongjiang province, Fund No. AUGA4110003717.

6. References

Bose, R. K. (2013). "Energy efficient cities," The World Bank. 2013, 35, 270–283.

Robinson, D. (2011). Computer Modelling for Sustainable Urban Design; Earthscan: London, UK.

Keirstead, J.; Jennings, A. A review of urban energy system models: Approaches, challenges and opportunities. Renew. Sustain. Energy Rev. 2012, 16, 3847–3866.

Heo Y , Choudhary R , Augenbroe G A.(2012).Calibration of building energy models for retrofit analysis under uncertainty[J]. Energy and Buildings, 47(5):550-560.

Frayssinet, L.; Merlier, L.; Kuznik, F.; Hubert, J. (2018). Modeling the heating and cooling energy demand of urban buildings at city scale. Renew. Sustain. Energy Rev. 81, 2318–2327.

Choudhary, R.; Tian, W. (2014). Influence of district features on energy consumption in non-domestic buildings. Build. Res. Inf. 42, 32–46.

Zhao, F.; Wang, J.; Koritarov, V.(2010).Agent-based modeling of interaction between commercial building stocks and power grid. 2010 IEEE Conference on Innovative Technologies for an Efficient and Reliable Electricity Supply, Waltham, MA, USA, 27–29 September; pp. 225–232.

Choudhary, R. (2012). Energy analysis of the non-domestic building stock of Greater London. Building and environment (51), 243-254.

Cheng, V.; Steemers, K. (2011). Modelling domestic energy consumption at district scale: A tool to support national and local energy policies. Environ. Model. Softw. 26, 1186–1198.

Tian W. (2013). A review of sensitivity analysis methods in building energy analysis[J]. Renewable & Sustainable Energy Reviews, 20(4):411-419.

UK Defra & DECC. (2012). Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting, Produced by AEA for the Department of Energy and Climate Change (DECC) and the Department for Environment, Food and Rural Affairs (Defra), UK; UK Defra & DECC: London, UK.

DECC.(2013).LLSOA (Lower Layer Super Output Area) Electricity and Gas; DECC (Department of Energy & Climate Change): London, UK.

EPC.(2013). (Energy Performance Certificate). DEC (Display Energy Certificate) Database Maintained by Landmark, Department for Communities and Local Government, UK; UK DCLG: London, UK.

Case Study Paper

Why We Need Participatory Mapping ?

Amandus Jong Tallo, Urban and Regional Planning Department Agung Podomoro University; Indonesia

Abstract

More than 50% Kapuas Hulu regency conservation area, where forests are the world's buffer zone in the face of global warming. The availability of conservation areas causes social inequality for Dayak people in Mensuai village, Kapuas Hulu Regency, West Kalimantan Province, Indonesia. This study aims to delineate management boundaries area palm oil between community forest, which were carried out for two years, using participatory action research involving related stakeholders. FPIC (Free, Prior, Inform, Consent) are principles in this research process. Free; in which the community is given an understanding of conservation areas and the constraints of management space that are provided at the beginning without coercion, and the choice of rejecting activities (prior) understood by society through shared social learning), consent ends in people who do it (participatory principles are actually implemented) through several stages including, mapping of stakeholders (functions & authority), making mental maps, spatial learning (learning using tools in the form of Global Positioning System/GPS and arc gis training for village communities), and public consultation. The results of this study indicate that the community consciously feels it has its own area through participatory mapping activities carried out. The resulting map is in the form of a village boundary map that has been communicated with boundary villages and companies, land use maps with existing uses, tenure maps containing types of land ownership (communities, companies, government), village spatial maps (structure and spatial patterns). The success of the mapping process is supported. The output produced is not only a map, but also a very complete village product, by calculating the lack of food security of the local community, in terms of carrying capacity of the land. Participatory mapping addresses the spatial challenges of land tenure rights and land history, spatial layout, and various the interests of sustainable village development.

Keywords

conservation,map, sustainable.

1. Introduction

Spatial problem is how to place humans and activities in a fixed area (Tallo, 2016). The dynamics of development in Indonesia are not accompanied by a planning process, so that open space arrangements are interpreted as laws and guidelines for development, only in the form of spatial planning in the licensing process. Spatial problems in Indonesia are caused by the top-down planning process, not bottom-up (Nurdin, 2017).

The process of spatial planning as a political process in development causes a crisis of spatial information (Brandusescu and Sieber, 2018). The smallest administrative spatial unit in Indonesia is a village, where the presence of a village law requires the village to have a map and village profile (Indonesia, 2014). The map needed is a coordinated map with clear village

boundaries, but village boundaries cannot explain the potential of the area, so a land use map is needed. Village maps are a mandate from the state for villages to develop the area (Fisiko, 2015).

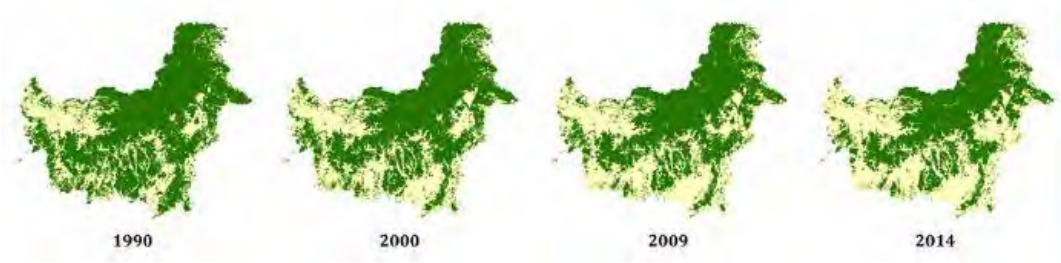


Figure 1 Degradation Rate of Forest Areas in Kalimantan Province (Ruhyat Hardansyah, 2016)

Every village has the potential, both the potential for natural resources in the form of land, water, climate, geographical environment, livestock, agriculture, mining, fisheries, and the potential of Human Resources (HR) in the form of communities with diverse cultures, and interactions (Koto, 2017). Kalimantan Island as one of the lungs of the world, experiences land conversion (forest to cultivation area) approaching 50% of 60% land area (Ruhyat Hardansyah, 2016).

The spatial system in Indonesia is likened to a human body, where there is a sensory center with a network system and also a body part that needs to be maintained and can help the body's motor system. Spatial planning is a manifestation of the structure and pattern of spatial use (Umum, 2007).

The author's view from an academic point of view, Indonesian spatial planning still speaks technically, positivistically, regardless of the social aspect as the basis for forming space. The unit of space is actually formed from the smallest element is land, so that the use of land in carrying capacity is a challenge in planning. The ability of the land to accommodate activities and support for elements of land units as part of the land needs is spatially delineated so that spatial clarity of location becomes a measure of land use.

Villages in Indonesia are formed from traditional settlements, where a group of families (father, mother and child) occupy a location. Families form a village based on genealogical similarity, marriage and so on, and eventually form a village administrative unit. The experience of the author when entered the village, did not yet have clarity on the boundaries of the territory, even the boundaries of the agricultural area were not spatially determined because the community assumed that the agricultural boundary was the extent to which a resident could cultivate agricultural land, thus requiring a social approach.

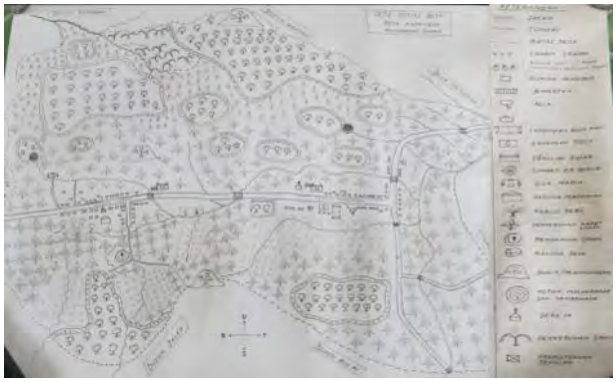


Figure 2 Sketch of Kerengas Village, Suhaid Sub-district, Kapuas Hulu Regency, West Kalimantan Province Indonesia

Starting from the need for a map as a spatial picture and a technocratic spatial system that requires community participation as a solution in spatial planning. Making maps in eliminating the imaginary boundaries of each region is the basis of thinking in spatial land tenure studies based on community participation (Masschelein and Quaghebeur, 2006). This paper talks about the author's experience of approximately 5 years accompanying several communities in mapping the territory.

2. Methodology

This study activity used an inductive method, where researchers carried out discussions with the community in producing coordinate maps. The basis for the mapping process is the FPIC (Free, Prior Inform and Consent) approach, where community rights are upheld in every decision (Colchester and Ferrari, 2007). According to (Joko Waluyo, Andi Kiki, 2015), descriptions of FPIC are as follows:

a. Free means that decisions must be achieved through processes that respect the interests of each party, without violence, intimidation, threats, or bribery and coercion, and there should be no fake or deceptive results.

b. Prior means that the negotiation must take place before the government, investor, or company decides what they will do. This means that before the government, investors, companies enter and start doing something within the territory of indigenous peoples

c. Prior means that negotiations must take place before the government, investors, or companies decide what they will do. This means that before the government, investors, companies enter and start doing something within the territory of indigenous peoples.

d. Consent means that every decision or agreement reached must be carried out through an open and gradual process that respects customary law and selected community authorities. The parties must build a dialogue that opens the opportunity for the community to find the right solution and is useful in an atmosphere of mutual respect, full and fair participation, with sufficient time to reach a decision.

In the process of making maps, there are several stages, including; (1) request for permission from the parties, (2) confirmation of approval and rejection from the community, (3) establishment of a mapping team, (4) data collection and verification, (5) public consultation. The five stages in this paper are explained in 3 major stages, namely the preparation of mapping and making village sketches, the mapping and verification process, and public consultation. The duration in each stage varies depending on the conditions in each field.

3. Results & Discussion

3.1. Community organization as Success Key of Activity

The key to the whole mapping process is communication. The formation of the communication process must be built by a facilitator with the soul of a community

organizer/CO (Tonn, Zambrano and Moore, 2001). Being a big question, in building a social process in the context of participatory mapping, is it a CO or a facilitator? The facilitator can be understood as someone who understands the technical implementation of mapping in the field (use of mapping tools; drones, compasses, gps/global positioning systems, retrieval of coordinate points, digitization processes, so that maps can be displayed according to mapping rules). A CO, must be able to have a positive continuity of curiosity towards the goals to be achieved (Murphy, 1990).

Figure 3 Communication process with Mensusai Village Community, Suhaid Sub-District, Kapuas Hulu Regency, West Kalimantan Province Indonesia

CO itself is a person or group of people from a particular organization sent to the community in carrying out the tasks of an organization in building a social movement in a better direction. CO is present in the community to build social awareness. A CO in relation to participatory mapping must be equipped with standard (general) skills and spatial abilities (understand about mapping problems). CO works in the midst of society in accordance with the interests or issues mandated. So facilitators are more directed at technical matters, while CO plays a role in the process of social communication. The process of building social communication will be ideal if there is a division of roles between CO and facilitator, but it would be better if a facilitator must be able to have the spirit of CO.

Inland communities in Indonesia, are very friendly and open to outsiders. Openness will get closer, if a CO presents the intent and purpose in the activity at the beginning. Introductions in the middle of the village/region, of course, become foreign to a CO, especially to traditional communities

Figure 4 Process of Team Teaching in the Field When Mapping in Mensusai Village

Introductions do not have to discuss what we are going to do together, there are many alternatives that can be done, including discussions about village potential, such as: arwana fish (siluk), or declining rubber prices (2015 personal survey, Rp.5,500 / kg) , or the potential of rice. Diplomatic creativity must be built on the initial process. The importance of the process will affect the next process. It is expected that a CO can hear more, while asking critical questions. CO can play a role in cases of advocacy, arbitration, monitoring and evaluation, identification and various social cases in a spatial framework.

In general Friedmann, 1992 develops 4 stages that CO is doing in facilitating an activity including Perception, Summarization, Authorization, Impelentation. The four stages are detailed in the following points:

a. Perception (perception on community)

   The presence of CO in society at this stage aims to study fragmented and unsystematic ideas. This understanding will refer to actor relations, social factors in general that affect the living system of the local community. The results of the investigation are in the form of mapping problems and individual relations in the community. The main themes are the existing social relations. Don't pretend to be the most indigenous, a CO feels the most expert at knowing, and looking for problems in the field.

b. Summarization

   Summary is a brief and clear field record, accurate and easy to understand. Reports are written based on the observations obtained, but are still focused on the issue. Written facts based on community relations, without giving intervention. The report will be given to the organization that sent the CO in the community, from the report all the actions and movements carried out can be documented.

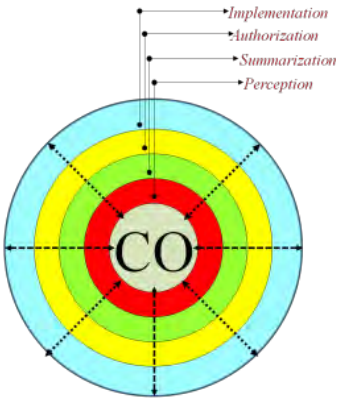


Figure 5 Four stages of CO (developed by author adopted by Friedmann, 1992)

c. Authorization (Communication with Authority)

Communicate each movement to the highest organization. At this stage, field progress updates are carried out, related to the availability of citizens, when the initial meeting/socialization meeting will begin, the availability of village sketches. The purpose of co-ordination is that CO can work in accordance with the mandate given, and comply with the normative requirements of the organization. The process of communication with the community must still be maintained, not to reduce the social relations that have been built. Communication was also carried out by CO with the local government (Head of Sub-District/Regency), so that the legality of CO's presence would not become alienated in the community.

d. Implementation

The results of communication with tertiary organizations are communicated back to the community, becoming an agreement belonging to the community. It is intended that the proposals and suggestions of the community be accommodated, so that the agreement is a community agreement. This stage is the initial stage of starting socialization with the community.

3.2. Participatory Mapping in Mensusai Village

Mensusai Village is located in Suhaid Sub-district, Kapuas Regency, West Kalimantan Province, Indonesia. An area; 4259.77 hectares, which are divided into 3 hamlets namely Langsat, Rambai and Mawang. Topographically, the area includes hilly areas, where there are 12 hills including; Baderi Hill, Sungai Muntik Hill, Sangkap Hill, Merbai Hill, Jeluti Hill, Sebendung Hill, Telujung Hill, Budu/Untut Hill, Linang Hill, Tembesuk Hill, Rimbak Besar Hill and Penunduk Hill.

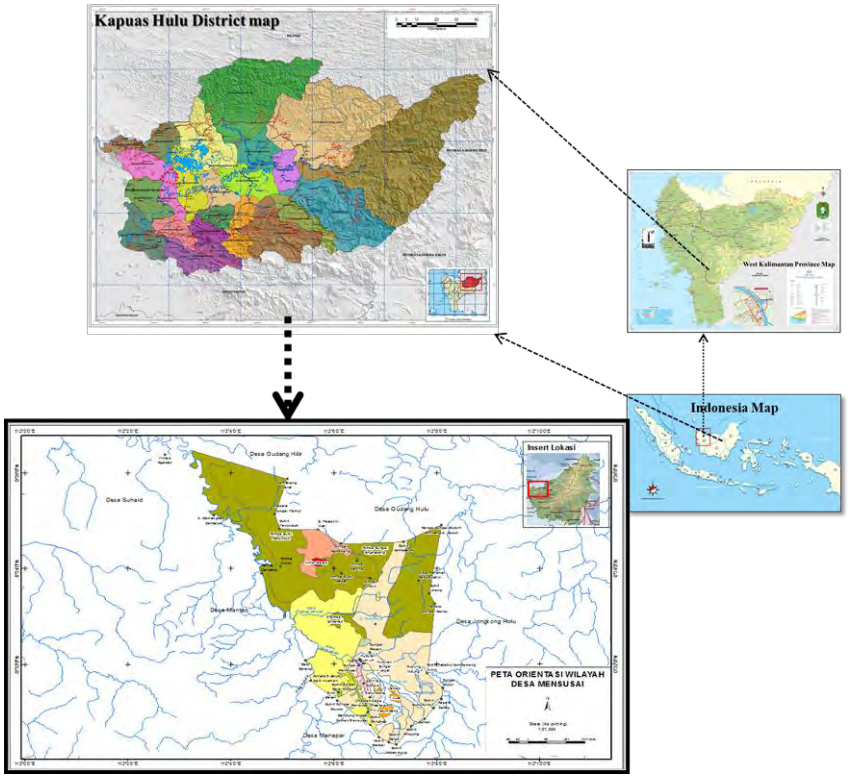


Figure 6 Orientation of Mensusai Village

The distance from Mensusai Village to the Subdistrict Capital City (Suhaid Sub-District) requires 1 hour trip (25 km), if it goes to the Capital City of Regency it takes around 5 hours with a distance of about 120 km, and to the Provincial Capital City takes around 12 hours distance of about 300 km. In general, to access the location, people use motorbikes, especially to go to the Sub-District and Regency capitals, while going to the Provincial Capital City by car.

Figure 7 Decree of the Village Mapping Team

Demographically, the population of the village of Mensusai is dominated by women, of which 60% of the population is in Langsat Hamlet. 70% of the village community has elementary school education, with a livelihood of 85% being farmers. This village is very unique, because it borders on oil palm plantations, the area is still maintained, so there is no conversion of land to oil palm.

3.2.1 Formation of Team and Village Sketch

The preparation of the mapping process was preceded by the presentation of the intent and purpose by the author to the village head, and the village community agreed. The agreement was then carried out by the village administrator, by making a decision letter from the village mapping team. Related to village boundaries have been resolved with limited villages in the previous process.

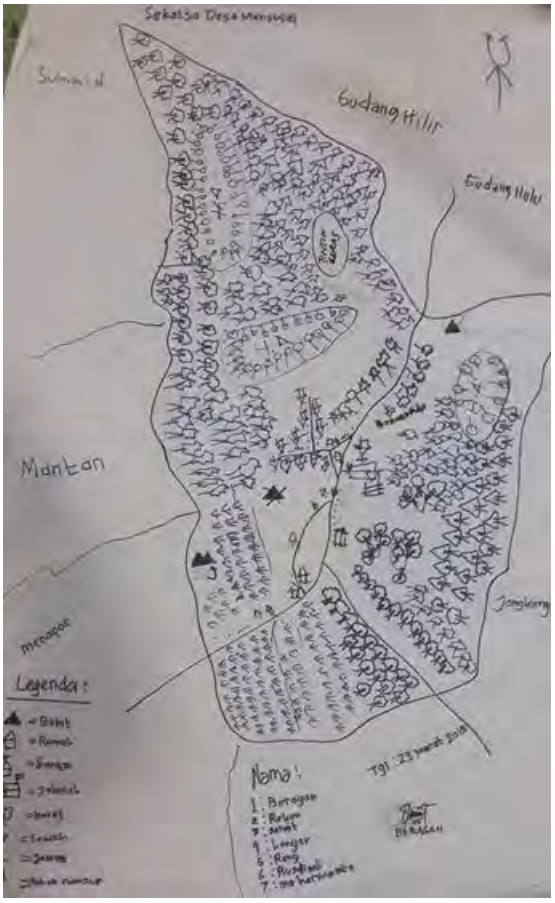


Figure 8 Mensuai Village Sketch

The next process is determining the timing of the implementation and the number of teams that depart. The obstacle faced is that the map needs to be sketched into a village so that it becomes a guide in the process of taking coordinates in the field. The team that was formed then discussed with the author to carry out the process of making a village sketch.

The sketching begins with the making of a duplicate of the Mensusai Village Map which contains some basic information, including village boundaries, village roads and rivers, then from the basic information, participants fill in and describe some of the land uses in the village, such as where settlements, yards, gardens, rice fields, mine sites, customary land and

others. The final goal in the village sketch is that the community has a mental map in the work process in the field, besides that it also becomes a guideline for the community in dividing the team and the location to be mapped..

3.2.2 Mapping Process

The team was divided into 4 groups, based on the number of GPS available. Each team consists of 5 people. The time of data collection was carried out on March 27-28 2015. The mapping location was quite challenging, because there were many large rivers and ± 5 m deep peat areas.

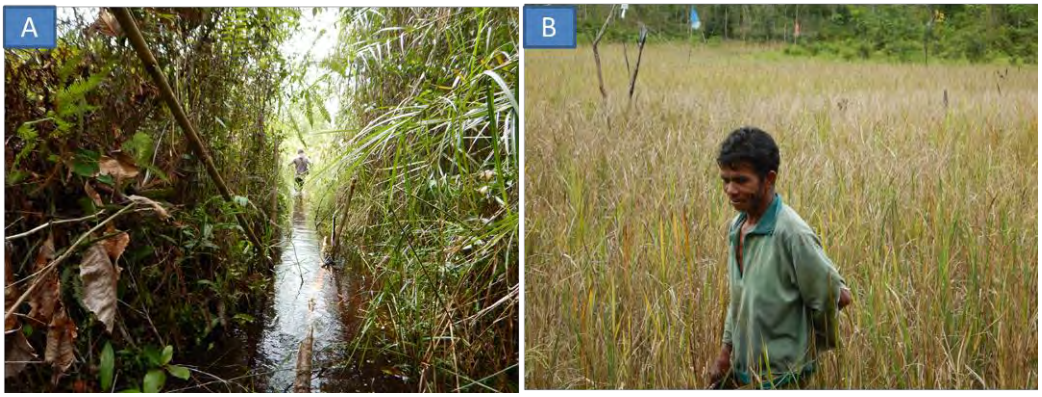


Figure 9 Condition of Swamp (A), and Community Field (B) in Mensuai Village

Land use is the focus of taking coordinates. Point collection is carried out every 100 m using GPS. Mapped locations include settlements, paddy fields, rubber gardens, graves, reserves and tembawang. According to the head of tribe, this village is an old village, where the first start was the Mayan Dayak tribe, who lived around the Mayan river. This is the author got when entering the sacred forest (Gupung Nibung) with an area of 2 hectares. There are many ancient pottery that can still be seen around Gupung Nibung.

Figure 10 Map of Sacred Place and Traditional Pottery in Gupung Nibung

Every night the author and the team conduct a review related to mapped locations. The purpose of the review is the spatial learning to the public on field information that has been

mapped (fulfilling the inform consent aspect). The verification process must involve cross gender and age, so that aspects of representation in the participatory process can work.

Figure 11 Verification of Mapping Results.

The verification process was carried out in two stages, namely daily verification and final verification. Daily verification was performed at night after returning from the field. Final verification was performed at the end after the map is ready to be printed in the size requested and ready to be ratified by the village government and tribe. During the verification process, one of the team members coordinated with the village administrator, to create a village profile. The division of tasks, in order to speed up the mapping process in the field.

3.2.2 Public Consulatation Forum; Spatial Discussion

The consultation forum was held during a public consultation activity on May 21, 2015. The purpose of the public consultation activities was as a discussion room between the village community and the mapping team. This activity begins with remarks from stakeholders (head of village/sub-district), followed by exposure from the facilitator to convey the entire mapping process, and the results of mapping to the community.

Figure12 Public Consultation Process

The presence of stakeholders helped the team in the mapping process. Stakeholders were present: (i) representatives of the Suhaid Sub-District Government, (ii) Representatives from the Suhaid Sector Police, (iii) Bordering villages such as Mantan Village, Jongkonghulu Village, (iv) community representatives such as community leaders, tribe leaders, youth leaders, teachers, representatives of the PKK.

There are several products produced from the mapping process including: land use maps, spatial interactions, boundary maps, structures and spatial patterns, tenurial maps and village profiles. The maps were generated from 450 coordinate points assisted by village teams and CO.

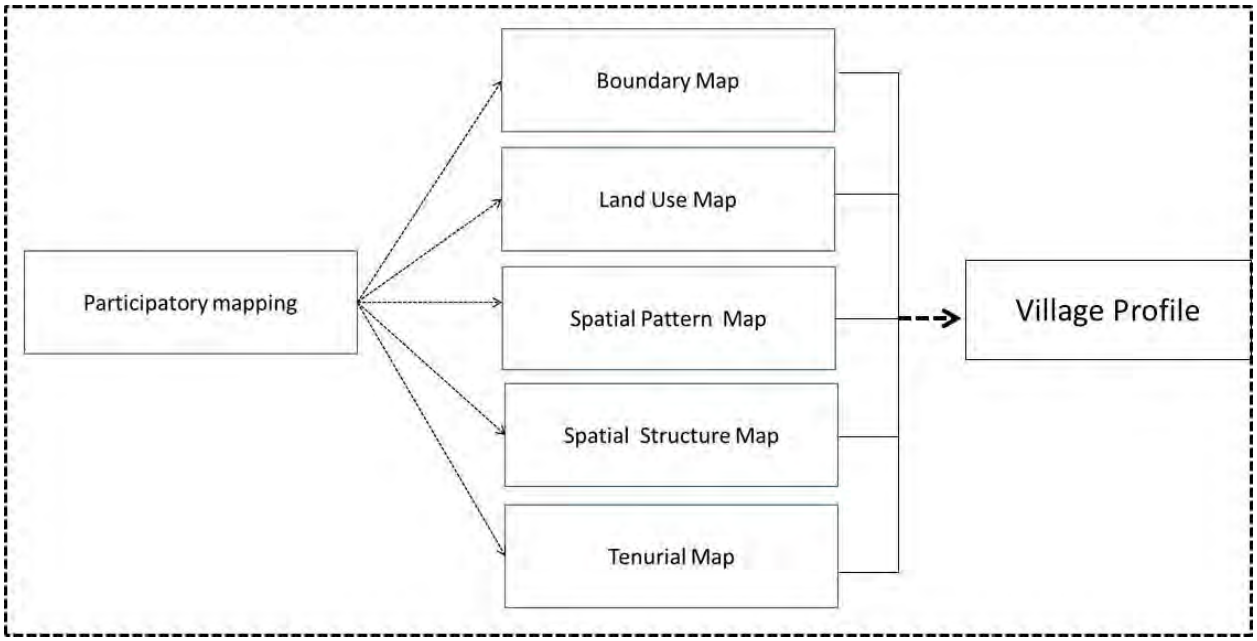


Figure 13 Results of Participatory Mapping

From the picture above explains that participatory mapping can help villages capture areas, plan areas and document spatial information. Participatory mapping also talks about how to protect the area through a map of spatial patterns (areas that need to be maintained), looking at patterns of ownership of individuals, communities, villages (government) and participatory mapping that will explain the history of the village (Amandus Jong Tallo, 2018).

3.3. Prai Ijing Traditional Village

Prai Ijing Traditional Village is located in Tebara Village, Waikabubak Sub-District, West Sumba Regency, East Nusa Tenggara Province, Indonesia. Village inhabited by ± 10 family heads are still very traditional. The mapping process was carried out on the basis of the request of Tebara village head, Marthen R. Bira in early 2019. The biggest challenge for the writer is that the community in the village is still very traditional in maintaining culture, with 90% of education being elementary school graduates and many still not completing education.

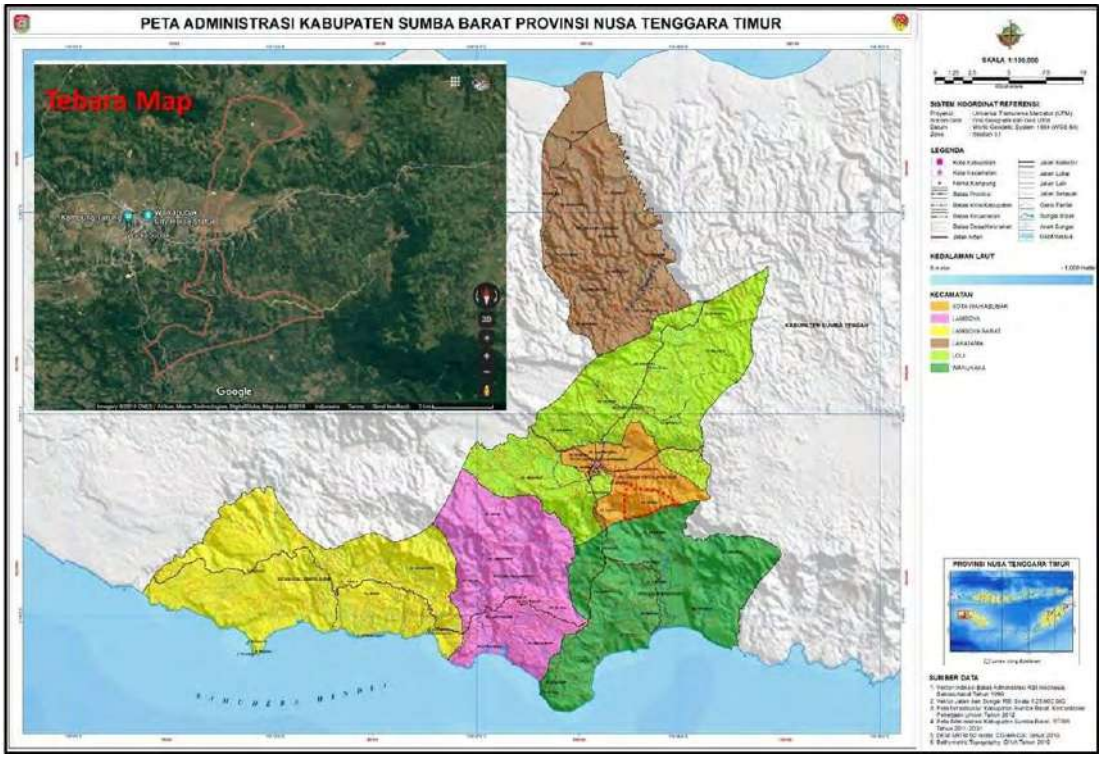


Figure 14 Orientation Map of Prai Ijing Traditional Village

Prai Ijing itself means Ambarella Village. This village adheres to the marapu belief system (Local Religion). Marapu itself means sacred objects that are worshiped by the local community, there are still sacred spaces inside the house, and inside the house. On the inside of the house in the upper part of the attic as a place to store superior seeds and ancestral heirlooms. In the middle of the house there is space separated by male and female gender. The bottom of the house is an animal cage.

The mapping process was carried out on 14-17 July 2019. The author's technique was easily performed because the village location is still accessible to cellphone networks and there are not many trees as a barrier. The author taught how to use the Android-based SW Map application to the village community. Previously, a basic map of Google Earth 2009 was installed on each handphone before the learning process began. The process of mapping and finalization is still ongoing

Figure 15 The training process with the community

The community jointly carried out the exercises and mapped every point of the house, the cemetery, the number of residents, belonged to certain tribes, and village infrastructure such as toilets, water reservoirs, customary graves. Each house has 1 grave which is the most important point in the unit of the Prai Ijing Traditional Village community unit. The village structure is divided into three parts, the bottom, the middle and the top, where the northern part is the first place for this village to stand, the middle and the south.

Figure 16 Digitized Results Map of the Prai Ijing Traditional Village community

From this process there is a learning that participatory mapping can answer cultural-based spatial systems (gender, ritual space, sacred and profane space), water fulfillment spaces and accessibility. As well as being a suggestion for the development of tourist routes when going to visit.

4. Conclusion

Participatory mapping is key in describing spatial information. Planning that starts from the community level is carried out based on community spatial information. The communication process as a CO is also key in mapping activities. Many participatory studies are very long and time-consuming, but with the help of technology and village resources, they can be optimized so that the time efficiency in implementing activities can be completed. Learning from Mensuaia village shows that the map from the participatory process will raise community rights to the area to produce boundaries, land use, history of land ownership, so that participatory mapping activities strongly support civil policy in the effort of one map policy. Lessons from the Prai Ijin Traditional Village show that the map can show the spatial relations, ritual relations and history of the region based on local wisdom.

xASSdADad(Tallo, 2016)

5. References

Amandus Jong Tallo (2018) 'Participatory Village Spatial Planning in Efforts to Save Conservation Participatory Village Spatial Planning in Efforts to Save Conservation Areas in Mantan village , Semitau Sub-district , Kapuas Hulu District', in *WMA-Mathcomtech 2018*. Aceh: IOP Conf. Series: Journal of Physics: Conf. Series 1114. Available at: https://iopscience.iop.org/article/10.1088/1742-6596/1114/1/012050/meta#artAbst.

Brandusescu, A. and Sieber, R. E. (2018) 'The spatial knowledge politics of crisis mapping for community development', *GeoJournal*, 83(3), pp. 509–524. doi: 10.1007/s10708-017-9784-9.

Colchester, M. and Ferrari, F. (2007) *Menjadikan FPIC - Prinsip Persetujuan Tanpa Paksaan atas dasar Informasi Awal - Berjalan : Tantangan dan Peluang bagi Masyarakat Adat*. Edited by M. Colchester. England: Forest Peoples Programme (FPP).

Fisiko (2015) 'Pentingnya peta desa', *Jurnal Bhumi*, 1(1 Mei), pp. 69–73.

Friedmann, J. (1992) *Empowerment : the politics of alternative development*. Cambridge, MA.; Oxford, UK: Blackwell.

Holgate, J. (2015) 'Community organising in the UK: A "new" approach for trade unions?', *Economic and Industrial Democracy*, 36(3), pp. 431–455. doi: 10.1177/0143831X13511275.

Indonesia, P. R. (2014) *UNDANG-UNDANG REPUBLIK INDONESIA NOMOR 6 TAHUN 2014 TENTANG DESA*. Indonesia.

Joko Waluyo, Andi Kiki, A. S. (2015) *Padiatapa untuk Siapa?* Edited by H. Andri Yusrijal, Sukarto, Muhamat Irwanto, Lia Mahlisa, Rasidi, Agus Panipasma, Mujilatul Audah, Aliansyah. Jakarta: Kemitraan bagi Pembaruan Tata Pemerintahan di Indonesia.

Koto, A. G. (2017) 'PELATIHAN DASAR-DASAR PEMETAAN BAGI STAF DESA', in *Prosiding Seminar Nasional Publikasi Hasil-Hasil Penelitian dan Pengabdian Masyarakat "Implementasi Penelitian dan Pengabdian Masyarakat Untuk Peningkatan Kekayaan Intelektual*". Semarang: Universitas Muhammadiyah Semarang, pp. 467–473.

Masschelein, J. and Quaghebeur, K. (2006) 'Participation making a difference? Critical analysis of the participatory claims of change, reversal, and empowerment', *Interchange*, 37(4), pp. 309–331. doi: 10.1007/s10780-006-9006-8.

Murphy, D. (1990) 'Community organization', *Environment and Urbanization*, 2(1), pp. 51–60. doi: 10.1177/095624789000200107.

Nurdin, I. (2017) 'Mewujudkan Desa Maju Reforma Agraria', *Jurnal Bhumi*, 3(1).

Ruhyat Hardansyah (2016) *25 tahun Dinamika Tutupan Hutan Ekoregion Kalimantan*. Edited by I. Y. Noor. Jakarta: Pusat Pengendalian Pembangungan Ekoregion Kalimantan Kementerian Lingkungan Hidup dan Kehutanan. Available at: http://kalimantan.menlhk.go.id/.

Sandra, D. (2000) *Perencanaan Lansekap Desa Wisata di Sekitar Resort Gunung Tujuh Taman Nasinal Kerinci Seblat, Propinsi Jambi*. Institut Pertanian Bogor.

Tallo, A. J. (2016) 'Participatory Mapping Solution Village Development Kerengas in a Sustainable Way', in Dewayany, P., Ir. Yatin Suwarno, M. S., and Drs. Turmudi, M. S. (eds) *PROSIDING SEMINAR NASIONAL GEOMATIKA 2016 'PERAN GEOSPASIAL DALAM MEMBINGKAI NEGARA KESATUAN REPUBLIK INDONESIA'*. Bogor: Badan Informasi Geospasial, pp. 139–148.

Tonn, B. E., Zambrano, P. and Moore, S. (2001) 'Community Networks or Networked Communities?', *Social Science Computer Review*, 19(2), pp. 201–212. doi: 10.1177/089443930101900206.

Umum, K. P. (2007) *UNDANG-UNDANG REPUBLIK INDONESIA NOMOR 26 TAHUN 2007 TENTANG PENATAAN RUANG*. Available at: http://birohukum.pu.go.id/uploads/DPU/2007/UU26-2007-(english-version).pdf.

Watkins, H. M. (2017) 'Beyond sweat equity: Community organising beyond the Third Way', *Urban Studies*, 54(9), pp. 2139–2154. doi: 10.1177/0042098016651552.

Research Paper

Habitat 5.0 – Towards affordable and sustainable housing in the developing world

"Brick-Chain" – a pattern- and blockchain-based approach to build communities

Silja Tillner, Architekten Tillner & Willinger ZT GmbH, Austria
Eva Maria Kuehn, TU Wien, Faculty of Informatics, Austria

Abstract

"Habitat 5.0 – Towards affordable and sustainable housing in the developing world" strives to build communities by following urban design patterns for sustainable settlements and goes beyond the mere production of individual housing structures. It is a blockchain-based approach that leads to "disruptive innovations" in order to achieve "quality good enough"[1] to upgrade informal settlements. The key approach relies on the secure and verifiable transfer of existing, qualified know-how that enables residents to participate in the process. The self-building of houses with ecological materials is safer, cheaper, faster, sustainable, and supports the vision of "Glocalization."

Habitat 5.0 is a need-based approach: The need is the lack of affordable and adequate housing which leads to the surge in informal settlements. The idea is to improve informal housing in situ.

This need is aggravated when disasters strike, as informal settlements are the most vulnerable when heavy rainfall, floods, storms or earthquakes hit unstable land and unsafe structures. Apart from informal housing, many other cheaply built structures are usually affected and destroyed by natural disasters. Therefore, disaster relief housing is another major potential of this approach.

Keywords

Affordable housing, sustainable and secure structures, informal settlements, urban design patterns, blockchain

[1] "Quality good enough" comes from Clayton Christensen of the Harvard Business School, who coined this term and the related concept/theory—based on insights stemming from real world cases—starting in the nineties (*The Innovator's Dilemma*, *Seeing What's Next*, *The Innovator's Solution*, *The Innovator's DNA*, *Competing against Luck*). In this case, it refers to providing adequate, safe and sanitary housing, but avoiding exaggerated levels of quality and excessive provisions to save costs and assure affordability.

1. Introduction

1.1. Urgency of addressing housing crisis & improving informal settlements

Informal settlements are a problem, as they are unecological, unsafe and lack adequate social and technical infrastructure. Through the absence of planning and architectural expertise, land is densely built-up with no public spaces and proper streets. As a result of continuous urbanization, this problem will keep growing.

The UN Special Rapporteur Leilani Farha stated in her 2018 report[2] to the General Assembly: "Currently nearly one-quarter of the world's urban population lives in informal settlements or encampments, most in developing countries but increasingly also in the most affluent countries. Living conditions are shocking and intolerable. In many cities in Africa, more than half of the population lives in informal settlements. In Asia, there are 520 million residents of informal settlements."

The urgency of this problem has been known since a generation. In his iconic book, *Architecture for the Poor*, Hassan Fathy writes that "at least one billion people will die early deaths because of unsanitary, uneconomic and ugly housing" (Fathy 1989). The situation of the world's poor population has worsened dramatically in the last 30 years due to continuous urbanization and growing inequality.

The need for sanitary and safe housing is aggravated when disasters strike, as informal settlements are the most vulnerable when heavy rainfall, floods, storms or earthquakes hit unstable land and unsafe structures. Apart from informal housing, many other cheaply built structures are usually affected and destroyed by natural disasters. Therefore, disaster relief housing is another major target of this approach. The situation is exacerbated by the climate change which leads to more frequent occurrences of natural disasters.

1.2. Problem classification

The following is an attempt towards a classification of the major problems of informal settlements that will be addressed with the Habitat 5.0 approach. Therefore, this is not a complete list of all the numerous problems that occur in these areas devoid of planning, regulations or administration, but a focus on the most urgent ones:

Illegality and exploitation: Often, settlements are built illegally on land not zoned for construction, e.g., unsafe slopes, waste dumps, etc. Other settlements are built illegally on agricultural land with permission of the land owner, who makes a profit through the arrangement. This is detrimental to the environment, as natural resources are diminished, agricultural land is reduced and the built-up surface is increased.

Dangerous hygienic and sanitary conditions: The aforementioned lack of appropriate zoning means inadequate or missing infrastructure, water, sewer, electricity, etc., which causes dangerous hygienic and sanitary conditions. This has negative consequences on the environment due to pollution and illegal waste dumps.

Missing structural safety: Existing informal settlements are increasingly densified either by extensions or additions to already unsafe buildings and therefore further reduce the

[2] "UN Special Rapporteur on the Right to Housing." http://www.unhousingrapp.org/.

structural safety of the original construction, which was never calculated in the first place. Rooftop additions are often only accessible via dangerous stairs.

Vulnerability to disasters: These conditions make these settlements particularly vulnerable to natural disasters. Heavy rainfall causes landslides that wipe unsafely built structures away. In general, the terrain and the morphology of the land underneath are not stable enough to withstand unexpected or extraordinary climatological occurrences.

Endangering women: The absence of infrastructure makes densely built-up settlements without public spaces and safe streets particularly dangerous for women, who have to walk long distances when public transport does not serve the area. Gender mainstreaming goals appear utopian under these conditions.

Lack of public transport: This forces people to commute by car and encourages environmentally damaging forms of transport that are also a big burden for the household budget of low-income families.

Low quality of life: Far away from their workplaces and their social network, people become isolated and cannot participate in city life. This is especially disadvantageous for the children who need access to schools, libraries and recreational facilities.

1.3. The megacity Cairo as a demonstrative example

The megacity Cairo can serve as a case study and illustrate the various forms and building types of informal settlements. 7 percent of Cairo's inhabitants cannot afford to live in an apartment, based on the supply of the official housing market, but have to refer to the informal market with all its negative consequences. This market bases its supply on illegal land or construction, following three different strategies: (1) Farmers transform their land zoned for agricultural use into building sites without providing adequate infrastructure, i.e., public transport and utilities (sewers, water, electricity, etc.). (2) Already densely-built up residential areas are further densified with illegal buildings or additions. (3) Illegal structures are added onto the roofs of historic buildings (mainly on buildings from the late 19th and early 20th century in Downtown Cairo) without structural reinforcement or safe access.

Figure 1: Illegal construction in existing residential neighborhoods[3]

The government and nearly all private developers, in contrast, focus on the development of new towns in the desert (Sims, 2012) on the outskirts of Cairo to accommodate numbers that have more than tripled since the 1970s, far from public transit and current living quarters. New town developments in the desert are negative for the environment, because the desert is a place difficult to inhabit. Previously undeveloped open spaces are built-up and

[3] http://www.mei.edu/content/informal-areas-cairos-silent-urban-revolution

large efforts are needed to provide the desert with appropriate infrastructure, especially water. Moreover, the peripheral locations encourage unecological commuting patterns, reduce the quality of life and have a negative impact on the household economy of the workforce and their families, who are separated from their workplaces and social contacts. That is the reason why many of these new housing developments have failed to be accepted and are struggling with high levels of vacancy.

1.4. The effect of climate change on housing

In his keynote speech at ISOCARP,[4] Jeremy Rifkin focused on climate change: "Real-time climate change is not only affecting the way of life in the industrial world, but threatening the livelihood of millions of people in the developing world. [...] We need to arrest the climate crisis quickly; we need to be completely off the carbon deposits [...] in order to avoid the abyss [...] Three defining technologies will emerge across the civilization and converge to create a general purpose technology platform and infrastructure that fundamentally changes how society manages, powers and moves economic and social life and governance."

The three mentioned technological revolutions are: information and communication technologies, new sources of energy, and new modes of mobility in transportation and logistics. Rifkin encouraged participating planners and architects to take swift action and apply all the innovations of the digital world—especially blockchains. He argued that instead of individual pioneering projects, the entire planning and construction industry should be adapted to the requirements of climate protection. A special focus should thereby be set on the retrofitting of the entire existing building stock. Concluding, he showed the path from globalization to glocalization through decentralization.

1.5. Structure of the paper

The paper is structured as follows: Part 1, 1.1-1.4 focuses on the problem description. Part 2, 2-1-2.2 gives an international background of goals, declarations and efforts so far. Part 3, 3-4 offers potential solutions with the proposed "Habitat 5.0" approach.

2. Background and related work

2.1. International declarations and future commitments give direction

Following the initiative of UN Habitat,[5] states have committed under Goal 11 of the Agenda for Sustainable Development to upgrade all informal settlements and ensure adequate housing for everyone by 2030. The Agenda aims to build upon the inherent capacities of informal settlement communities and recommends supporting and enabling residents to participate in the upgrading processes. Goal 11.1: *By 2030, ensure access for all to adequate, safe and affordable housing and basic service and upgrade slums. Proportion of urban population living in slums, informal settlements, or inadequate housing*.

The UN Habitat Goal 11 serves as a guideline and as an inspiration of our approach.

2.2. "Best practice" so far to support residents in situ

Some positive efforts have been made, but they always rely on individual initiatives by NGOs or socially responsible architects and planners. Selected examples are the work of Alejandro

[4] https://isocarp.org/2018congress
[5] http://habitat3.org

Aravena/Elemental in South America, who created intelligent design solutions for building new and better houses in situ, and the work of Balkrishna Doshi, India's architect for the poor. They both succeeded in activating the residents and engaging them in a participatory way to create and upgrade their homes while at the same time achieving excellent design standards. Aravena realized that in order to significantly ameliorate the world-wide housing crisis of the poor, much higher numbers of quality housing need to be produced and people have to be activated to build themselves. His concept of building only "half a house" took a large step in that direction. Aravena was convinced that when faced with a limited budget, it would be better to build only half a good house and leave the other half for the residents to be completed at a later point themselves. The first half contained all of the necessary infrastructure, the kitchen, the bathroom and the structurally safe shell. The second half would contain additional bedrooms on an upper level or in a carefully calculated gap adjacent to the neighboring building. Afterwards he even offered his designs for free so they could be replicated by housing developers or governmental authorities without a sufficient budget for hiring architects.

Figure 2: Quinta Monroy Concept, Elemental[6]

ELEMENTAL is a Chilean based architecture practice that focuses on architecture work of public interest and social impact. They became well-known through Quinta Monroy, a social housing project on a valuable, centrally located site in Iquique, Chile that had been illegally occupied. After the land had been purchased, the budget was nearly used up. Thanks to an intelligent plan by Elemental, it became possible to rehouse the 97 families on the same site by building only half a house for each family, consisting of the basic infrastructure, which provided residents with a shell they could later add to themselves.

ELEMENTAL's director, Alejandro Aravena, was awarded the Pritzker Prize[7] in 2016 for ELEMENTAL's social and humanistic approach to architecture, which shows how architecture at its best can improve people's lives. Following the honor, he released several of his low-cost "incremental" housing plans free to the public as open source designs to provide the material to government agencies and developers to help tackle the global affordable housing crisis.[8] Although this is a most laudable effort, there are no reports yet of the designs having

[6] http://arquittetando.com.br/wp-content/uploads/2018/03/5.jpg
[7] https://www.pritzkerprize.com/
[8] http://www.elementalchile.cl/en/

been replicated. As the director of the Venice Architecture Biennale in 2016, he focused on projects that engage citizens in poor communities world-wide and on affordable housing for the most disadvantaged.

Figure 3: Settlement in Aranya by architect Doshi, for which he was awarded the Pritzker Prize[9]

The internationally noted champion of housing for Indian's poor, Balkrishna Doshi, was awarded the Pritzker Prize[7] in 2018, in large part for the Aranya low-cost housing project in Indore. It accommodates 80,000 people with houses and courtyards linked by a maze of pathways in the city of Indore. Architect Doshi believes that a large part of Aranya's success lies in the fact that instead of presenting those who would live there—often in a purpose-built house for the first time—with a ready-made design, the development allows residents the space and opportunity to adapt and improve their homes. Beyond aesthetics, Doshi argued that architecture and urban design—done right—can and should be socially transformative for the world's poor.[10]

2.3. Summary

These laudable efforts nonetheless remain hand-tailored, one-time solutions that cannot be easily replicated elsewhere—not even in their own countries, because they were created for specific situations and user groups. In general, these one-time solutions fall short because they cannot become parametric and be broken down into individual components and rearranged in different situations. This means the designs are a complete oeuvre that cannot be taken apart, separated into individual components, organized by theme and rearranged in other circumstances. But they could be used and developed further to fulfill these requirements in the process of developing "Habitat 5.02.

3. Our vision to improve the situation is termed "Habitat 5.0"

The UN Habitat Agenda recommendations serve as a foundation for our strategy entitled "Habitat 5.0," an approach with social aspects comprising the appropriate urban development, design, planning and construction processes. The major goals include: affordable living for everyone; using existing strengths, infrastructures and buildings; inclusion of current technologies; regard for world-wide expertise; consideration of ecological aspects (CO_2 emissions and energy self-sufficiency); flexibility to enable future adaptations by the users; and gender equality. The guiding principles to achieve these goals are:

[9] https://www.architectureindevelopment.org/project.php?id=401#!prettyPhoto

[10] https://www.theguardian.com/global-development/2018/mar/12/low-cost-housing-needs-dignity-indian-architect-balkrishna-doshi

- The recognition of the right to remain in situ, so that residents retain their social connections.
- Access to serviced land.
- The self-construction of homes by inspiring residents to get actively involved in upgrading their neighborhoods and dwellings and providing them qualified know-how for that.
- Usage of economical building materials, preferably from the local region.
- The participation of residents at all stages by integrating their skills and labor capital into upgrading programs.
- A scalable and replicable approach that can be easily adapted to new situations.
- A sustainable business model that supports all these social aspects.

The uniqueness of our approach lies in its potential for further development, adaptation and replication. The repeated use of a "flexible toolkit" creates multiple benefits and makes it economically attractive to a large group of potential beneficiaries.

4. Proposed approach for Habitat 5.0 based on digital transformation, design patterns and blockchain

Habitat 5.0 foresees a close integration of the digital and real worlds. The latter refers to spaces for housing, resources and involved communities. The former refers to the employment of digitalization concepts to disseminate and reuse existing architectural expertise in a practical way, in near-time, in a fair and secure fashion, and free of corruption. The know-how shall be collected and structured in so-called "design patterns" that include designs, required skills, experience reports and useful solutions. The approach relies on an organically growing infrastructure where architecture and planning experts all over the world are motivated to contribute.

Hannah Arendt writes: "Basically we are always educating for a world that is or is becoming out of joint […] To preserve the world against the mortality of its creators and inhabitants it must be constantly set right anew. The problem is simply to educate in such a way that a setting-right remains actually possible, even though it can, of course, never be assured. Our hope always hangs on the new which every generation brings; but precisely because we can base our hope only on this, we destroy everything if we so try to control the new that we, the old, can dictate how it will look" (Arendt, 2000).

Habitat 5.0 aims to address the shortcomings of the previous efforts and take the next step building upon the experiences of Doshi and Aravena. The reasons why this approach makes a difference are the wider range of its applicability and the world-wide network of people who shall become involved. It follows the ethics of sharing knowledge and experiences in a fair and transparent manner and avoiding corruption. The cornerstones are:

- The housing projects would stay in-situ so that the residents can remain within their existing social networks.
- A democratic participatory process enables their equal and fair participation.
- The affordability of the new or upgraded homes shall be guaranteed and gentrification prevented through the participation of the residents who work on the improvements of their community and thereby gain a right to remain there.

- Ecological responsiveness is regarded through the use of local materials and labor.
- Know-how is transferred in a fair way to other countries and communities, authorities, NGOs, experts and laypersons.
- Collective intelligence leads to innovative and unexpected solutions. There will be an open call for interested experts, so that people who want to contribute to this effort with their knowledge and experience as well as potential beneficiaries have a chance to participate.

4.1. Urban design pattern language

"Patterns" are a recognized approach that promotes learning from proven solutions in a highly usable way. Especially in the described setting we do not assume that the involved stakeholders, especially the inhabitants of informal settlements, have the respective knowy how to build their "cities" and not to be "fooled" by corrupt exploiters. This indeed is a core root of the problems described in Section 1.2.

Each successful, welly used public space, regardless of its time of creation, has specific, inherent qualities. These can be abstracted so they obtain a less specific and more general meaning. Christopher Alexander was the pioneer in that respect (Alexander et al., 1977). This knowy how shall be identified and generalized in the form of such parameterizable patterns, leading to a global, open knowledge base of architectural expertise, including expertise about (new) materials and their gray energy. The starting point is, therefore, the identification, selection, collection and provision of patterns for the design of urban spaces. This objective refers to "learning from" a multitude of comparable projects and from tested and proven solutions, including those mentioned in Section 2.2. The patterns provide design modules that allow different combinations and ensure future flexibility and adaptability.

The idea is that the building of public spaces relies on such prey defined design patterns created by professional planners and architects. Such patterns are developed based on proven experiences and quality solutions. They form a kit of parts that laypersons can use without detailed knowledge. On one hand, they allow these laypersons to create functioning and aesthetic solutions by reassembling, enhancing and transforming existing urban design patterns in different ways. On the other hand, they shall leave enough freedom for individual parametrization and creativity. The art is to nevertheless guarantee good and "quality enough"[1] solutions.

The result is a "pattern language" with examples and rules for different applications that we are currently developing based on our experiences in rey using designs in Architecture (Silja Tillner and Sabine Pollak developed a pattern language for selfy build projects (Tillner, Pollak, 2017)) and Informatics (Kuehn, 2016). As the name "language" suggests, it has a highly usable interface that allows even nony experts to query and navigate through the patterns using simple language artifacts. The solutions are presented in an understandable and comprehensive way and are illustrated with practice reports. The language also encourages the giving of feedback so that the quality can be continuously improved.

The pattern language serves to collect and generalize the patterns and their solutions in the form of a "handbook" with a respective set of rules that can be applied in different situations. This means that the pattern language also includes process patterns beyond the mentioned design patterns. Sharing and reusing processes implies a better usage of resources. Professional planners and architects provide knowy how about urban design strategies and methods for the urban spaces, as well as information on sustainable building

materials through patterns. Besides the conscientious and saving use of materials and the reduction of waste, there will be a pedagogical benefit, too. The verification that the patterns are ecological shall alleviate the climate problem. In addition, the patterns will be verified consensually to support gender mainstreaming and the mentioned striving for qualities like fairness, etc. All patterns shall be digitized so that they can be easily disseminated, developed further, combined in various ways, shared and licensed.

Clearly, the coordination of all these activities and processes requires a respective IT platform. We propose a new kind of blockchain termed “Bricky Chain” (see Section 4.2) for this.

4.2. The “Bricku Chain” toolkit

The “Bricky Chain” concept introduces transparent, decentralized and cooperative processes. It is inspired by the principles of blockchain. The notion of a blockchain was introduced in the seminal article about Bitcoin (Nakamoto, 2008), a blockchainy based cryptocurrency. Since then, the idea of a blockchain has been proposed for many different business applications. A blockchain pursues a radically new philosophy beyond current IT approaches. It relies on a “distributed ledger technology” (Kuehn, 2019) without any central “many iny they middle.” Instead, the trust is achieved and the rules for cooperation are agreed upon in a consensual way by equal, distributed “peers.” Data and transactions are replicated to all peers, who independently verify their accuracy. Business processes become automated and thus faster, tampery proof and transparent. The peers do not have to trust each other, but can still enter into secure business relationships.

As the paradigm of a blockchain fits the principles of Habitat 5.0, we propose the usage of a new blockchainy based infrastructure called “Bricky Chain,” which allows the participative, selfy organized collection of patterns and their distribution in a fair and decentralized manner. The digitalization of patterns facilitates further and flexible development, combinations, sharing, community building and licensing models via the Bricky Chain. The proposition is to create a toolkit of consistent quality that consists of proven, generic design elements and plans that can be used firstly by NGOs, local authorities and experts to produce welly functioning layouts of the settlements and, secondly, by the people for building iny place. Residents use a pattern languagey based interface to search for the most suitable solutions and for realy time collaboration with experts. The distribution of the patterny based designs as well as all interactions is accomplished by the “Bricky Chain.” The Bricky Chain infrastructure provides licensable pattern toolkits including the respective support, incentive and donation models. The pattern toolkits themselves will be provided to the end users, who can be NGOs, citizens, etc.

Following the blockchain philosophy, the kit for parts, as well as for the entire infrastructure, shall be open source. The patterns can be adapted and expanded for the different continents to respond to the different climatic conditions and support environmental protection. Examples for further developments contain ecological qualities such as information on the preferred use of local materials and building techniques, the length of transport and the gray energy of the building materials.

As a consequence of applying the Bricky Chain toolkit, a worldy wide network of creative people, practitioners, local authorities, NGOs and end users who support the exchange of knowledge and ideas will continue to grow naturally. The modular nature of the approach allows for flexibility and extensibility. Such a flexible and adaptable toolkit shall offer quick

solutions to local authorities and NGOs, especially for disaster relief housing after cyclical catastrophes.

4.3. Long-term perspectives

In addition to the digitalization and dissemination of expertise in the form of pattern-based toolkits, industrial 3-D printing technology will be used. By combining the design patterns with 3-D printing utilizing high-performance 3-D printers, a “design and build” situation will be supported without the need of experts. The pattern language software would enable end consumers to download a building kit and 3-D print certain parts for the house. Since 3-D printing is still a fairly slow process, the goal is to combine it with local building expertise so that the simpler forms of assemblage can still be performed manually while the more complicated connecting links and complex joints will be 3-D printed. Following an “IKEA” type of assembly, untrained people will be able to use prefabricated corner elements and joints and connect them with wooden beams or other locally available building materials. Each form of implementation shall use the resources at-hand most efficiently and effectively.

On the other hand, the modular and digitized approach provides the end customers, designers and builders with enormous flexibility in terms of design and materials used—enabling the use of locally sourced and environmentally friendly building materials. The main modular building blocks could be universal across the international network. Multiple uses of proven and certified modules would offer substantial cost savings as well as better designs. A potential combination of the 3-D printers with robots offers another level of technical accuracy and efficiency.

5. Evaluation of the approach

5.1. Support of the Habitat III goals

The claims of Habitat 5.0 are aligned with the Habitat III New Urban Agenda. Its main impacts comprise: new forms of know-how and IPR licensing in the form of patterns of architects and planners; new, gender-sensitive processes for collaboration and sharing models; verification of process and design patterns to conform to the Gendered Innovations methods of the EU; collaboratively designed urban spaces that contribute to the health and well-being of people and foster nature-based approaches.

Through the use of predefined yet developable patterns, citizens will be enabled to engage themselves in a meaningful way. The patterns distributed by the Brick-Chain will serve as “tools” that complement the citizens’ lack of expertise, thereby balancing the role of experts and laypersons. This ensures sustainability of the approach because the newly gained skills will be applied by the empowered citizens in the future.

5.2. Contribution to alleviate the problems of informal settlements

The Brick-Chain could contribute in the following ways to alleviate the problems of informal settlements (see section 1.2):

Illegality and exploitation: The transparent process of planning and building and the traceability through the blockchain will prevent illegal land transactions and speculation.

Dangerous hygienic and sanitary conditions, missing structural safety and endangering women: Since these conditions are caused by the absence of responsible planning and illegal constructions, the provision of technically correct design patterns will allow authorities, NGOs and laypeople to create urban design plans with safe streets and public spaces, adequate infrastructure and building plans with sufficient technical equipment.

Vulnerability to disasters: The construction on unstable land in combination with unsafely built structures causes the high levels of risk. These risks will be reduced by the same transparent processes that help to prevent illegality and exploitation.

Lack of public transport: Although the Brick-Chain cannot substitute a public bus service the blockchain technology will support the planning these services as well as stimulate self-organized ride-sharing and shuttles.

Low quality of life: The participation in the design and build process will plant the seeds for a resilient social network. People will get to know their neighbors and more actively participate in city life. The blockchain technology could support learning networks, e.g. the creation of study groups, book-sharing etc.

6. Conclusion

The advantage of the suggested pattern-based approach is to reach beneficiaries on a large scale and therefore make a bigger impact than previous, isolated initiatives by applying "disruptive innovations." The patterns lift the concept of modular design to a higher level: They transfer modular design principles to public urban spaces through parametrizable design and planning, which is cheaper and more effective than tailoring. Patterns enable a replication of know-how and selling of IPRs in an emerging market. Environmental protection patterns will inform the citizens and also ensure sustainable processes in the future thanks to their replicability.

The motto is "quality good enough"[1] to encourage the self-building of houses with appropriate ecological materials—safer, cheaper, faster and sustainable, supporting the greater vision of "Glocalization." The secure, fair and fast distribution of the know-how is guaranteed by the application of a blockchain-based IT platform called "Brick-Chain." Through the flexibility and reusability of this approach, substantial cost-savings compared to traditional, one-time aid efforts are offered. Owing to the geographically dispersed applications of an easy-to-use pattern language, the system can also be applied directly by the end users, providing not only additional cost savings, but also a further education aspect.

The following facets of the approach make it unique from a business and innovation perspective: The long-term perspective is to develop a "business venture with a social aspect, which would be based on a modular approach, leveraging modern, industrial 3-D printing technology and a unique design pattern approach in order to enable the use of local, sustainable materials for the rapid replacement of inadequate housing with new, safe, and sanitary dwellings." The pattern language is an answer to establishing validated and tested modules that encourage laypersons to get creatively involved and can be rearranged and re-used in numerous ways, which is unfeasible with traditional design techniques, and then applied elsewhere. Habitat 5.0 is a flexible model that can be transformed and developed continuously, as the needs of the citizens and the conditions of the cities vary.

The main goal and the ethics of the project are to achieve affordability in "housing for all" in the developing world in a sustainable way, namely to achieve a resilient ecological city with active and engaged citizens who are part of the process and therefore feel responsible for safeguarding the environment. On one hand, this means the application of innovative knowledge and practices related to social inclusion and participatory self-regulating processes. On the other hand, the efficient use of resources, technological innovation and community services guarantee a lasting impact. All development processes shall be understandable and transparent.

7. References

Alexander, Christopher (1979). *The Timeless Way of Building*. Oxford University Press.

Alexander, Christopher; Ishikawa, Sara; Silverstein, Murray (1977). *A Pattern Language: Towns, Buildings, Construction*. Oxford University Press.

Arendt, Hannah (2000). "The Crisis in Education." *Between Past and Future*. Trans Jerome Kohn. London: Penguin Books. http://www.digitalcounterrevolution.co.uk/2016/hannah-arendt-the-crisis-in-education-full-text/.

Fathy, Hassan (1989). *Architecture for the Poor. An Experiment in Rural Egypt*. Cairo: The AUC Press, ISBN 978 977 424 575 6S.

Habraken, N. J.; Boekholt, J. Th.; Thijssen, A. P.; Dinjens, P. J. M. (1976). *Variations: The Systematic Design of Supports*. Cambridge, MA: The MIT Press.

Kuehn, Eva (2019). "A Distributed Ledger Technology Based on Shared Write-Once Objects." *Models, Languages, and Tools for Concurrent and Distributed Programming*. Cham, Switzerland: Springer International Publishing, 136-151. https://link.springer.com/chapter/10.1007%2F978-3-030-21485-2_9.

Kuehn, Eva (2016). "Reusable Coordination Components: Reliable Development of Cooperative Information Systems." *International Journal on Cooperative Information Systems* 25(4): 1-32. https://www.worldscientific.com/doi/abs/10.1142/S0218843017400019.

Martin, Leslie; March, Lionel (1975). *Urban Space and Structures*. Cambridge, UK: Cambridge University Press, Cambridge Urban and Architectural Studies.

Nakamoto, Satoshi (2008). "Bitcoin: A Peer-to-Peer Electronic Cash System." https://bitcoin.org/bitcoin.pdf.

Popper, Karl R. (1945). *The Open Society and Its Enemies: Volume I: The Spell of Plato*. London: George Routledge and Sons, Ltd., 9-10.

Sims, David (2012). *Understanding Cairo: The Logic of a City Out of Control*. Cairo, New York, The AUC Press.

Tillner, Silja; Pollak, Sabine (2017). "Self-build Projects as an Innovative Contribution to the Current Situation on the Housing Market." Technical Report for the Housing Research Department of the City of Vienna.

Web links: Accessed 6th July 2019.

Research Paper

Urban living environment assessment index system based on psychological security

Huiyi Xia，Shanghai Tongji Urban Planning & Design Institute Co., LTD.，China

Nankai Xia，Shanghai Tongji Urban Planning & Design Institute Co., LTD.，China

Liu Liu，Shanghai Tongji Urban Planning & Design Institute Co., LTD.，China

Room 701，Tongji Planning Building，No.38 Guokang Road,

Yangpu District, Shanghai, China

Tel：0086 13916913606

Email:33255371@qq.com

Abstract

With the development of urbanization and the continuous development, construction and renewal of the city, the living environment of human beings has also undergone tremendous changes, such as residential community environment and service facilities, urban roads and street spaces, and urban public service formats. And the layout of the facilities, etc., and these are the real needs of people in urban life, but the characteristics of these needs or their problems will inevitably have a certain impact on the user's psychological feelings, thus affecting people's use needs. Then, studying the ways in which urban residents perceive changes in the living environment and how they perceive changes in psychology and emotions will have practical significance and can effectively assist urban management and builders to optimize the living environment of residents. This is also the long-term. One of the topics of greatest interest to urban researchers since then.

In the theory of demand hierarchy proposed by American psychologist Abraham Maslow, safety is the basic requirement second only to physiological needs. So safety, especially psychological security, has become one of the basic needs of people in the urban environment. People's perception of the psychological security of the urban environment is also one of the most important indicators in urban environmental assessment.

In the past, due to the influence of technical means, the study of urban environmental psychological security often relied on the limited investigation of a small number of respondents. Low-density data is difficult to measure the perceptual results of universality. With the leaping development of the mobile Internet, Internet image data has grown geometrically over time. And with the development of artificial intelligence technology in recent years, image recognition and perception analysis based on machine learning has become possible. The maturity of these technical conditions provides a basis for the study of the urban renewal index evaluation system based on psychological security.

In addition to the existing urban visual street furniture data obtained through urban big data collection combined with artificial intelligence image analysis, this paper also proposes a large number of urban living environment psychological assessment data collection strategies. These data are derived from crowdsourcing, and the collection method is limited by the development of cost and technology. At present,

the psychological security preference of a large number of users on urban street images is collected by forced selection method, and then obtained by statistical data fitting to obtain urban environmental psychology. Security sense training set. In the future, when the conditions are mature, the brainwave feedback data in the virtual reality scene can be used to carry out the machine learning of psychological security, so as to improve the accuracy of the psychological security data.

Keywords

urban environment, psychological feeling, artificial intelligence, method research

1. Problems arising under the policy of wall-up planning in China's demolition shop

Urban planning in China has always been based on government decision-making. Although some factors such as cultural economy and resources are also taken into account in the design process, social and psychological factors are often ignored, resulting in certain differences between government investment and the feelings of the masses after the implementation of the plan.

For example, in response to the new round of overall land planning and wall repair policies in Beijing and Shanghai, Beijing and Shanghai have concentrated on renovating residential shops along the street, Yongkang Road and Changshou Road in Shanghai, as well as various shops in the east-west urban areas of Beijing and Chaoyang in recent years, with the intention of restoring the style and appearance of streets and alleys. In 2017 alone, Beijing has demolished 1496 shops in Xicheng District, covering an area of 13297.4 square meters. As an open block model, Shanghai has also carried out block renovation work, Yuyuan Road, Fuxing Road, Yongkang Road and other commercial along the street have also been demolished. However, a series of social reactions have been praised and demoralized. It's different. Many people feel that the move has damaged the living environment and feelings of the local population, and lost the original vitality of the street.

2. The importance of psychological safety to the community

First, human is a socialized animal, and communication is one of the important links of social psychology. The communication provides the information resources necessary for the physical and mental development of the people, and the people exchange information and establish and maintain contact with each other. Communication is the way of self-concept formation, and is an important means to meet the demand and maintain the psychological balance. As the end user of the street space--in the case of the masses, our little street is not only a convenient means of living, but also a channel of more social interaction and emotional release.

There is a lack of communication between the modern community and the old neighborhood and the neighborhood. Along the street, it is different from the community greening and the community space, and people will consume a certain degree of time (such

as shopping, dining, etc.) along the street, and this kind of space provides some degree of space for the masses.

At the same time, the inconvenience and the change of the environment caused by the demolition and repair of the wall have not improved the public security of the audience in nature, and the lack of the lively neighbourhood commerce has reduced the public's natural supervision of the street to some extent. After the demolition, the traffic of the block is obviously reduced, especially at night, the open street is easy to cause a certain potential safety hazard, and the sense of feeling also makes the person feel insecure.

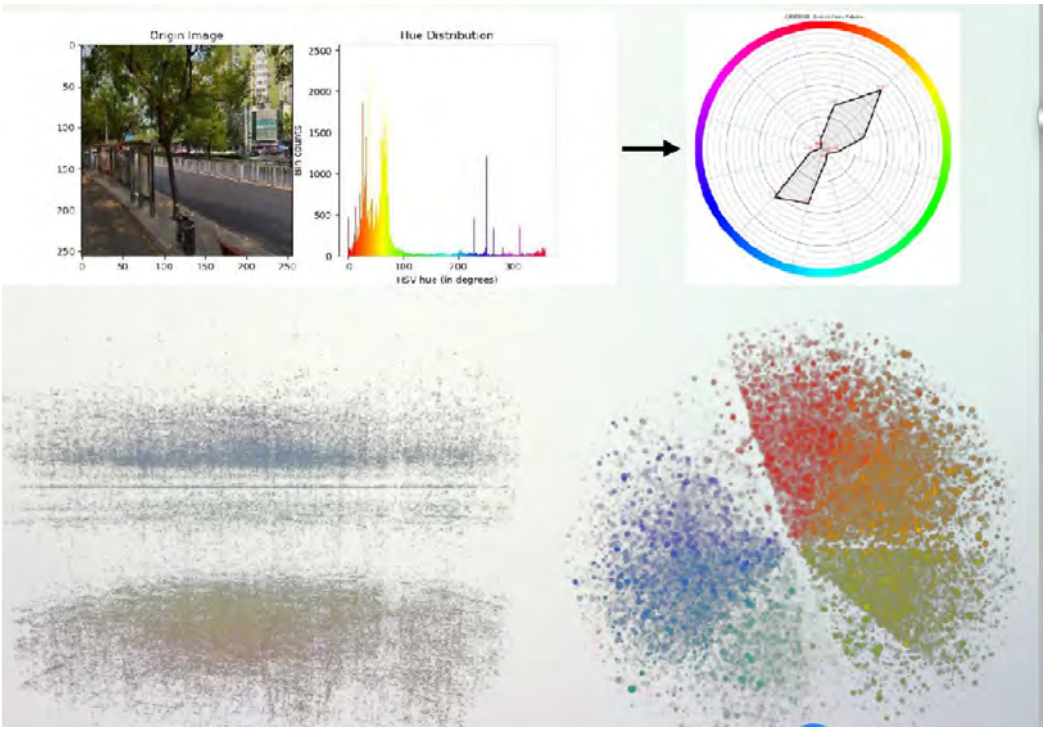
The "gas field" referred to in the traditional "Fengshui" of our country is either popular or the "energy field" is to some extent to describe the distance comfort between the human and the person in life. In the planning standard, the standard of the 5-minute life cycle and the 10-minute life cycle is also mentioned. However, after a large number of street shops have been removed, the existing environment does not provide the residents with the necessary public supporting commercial facilities. That's why a lot of people don't feel the smell of life and culture.

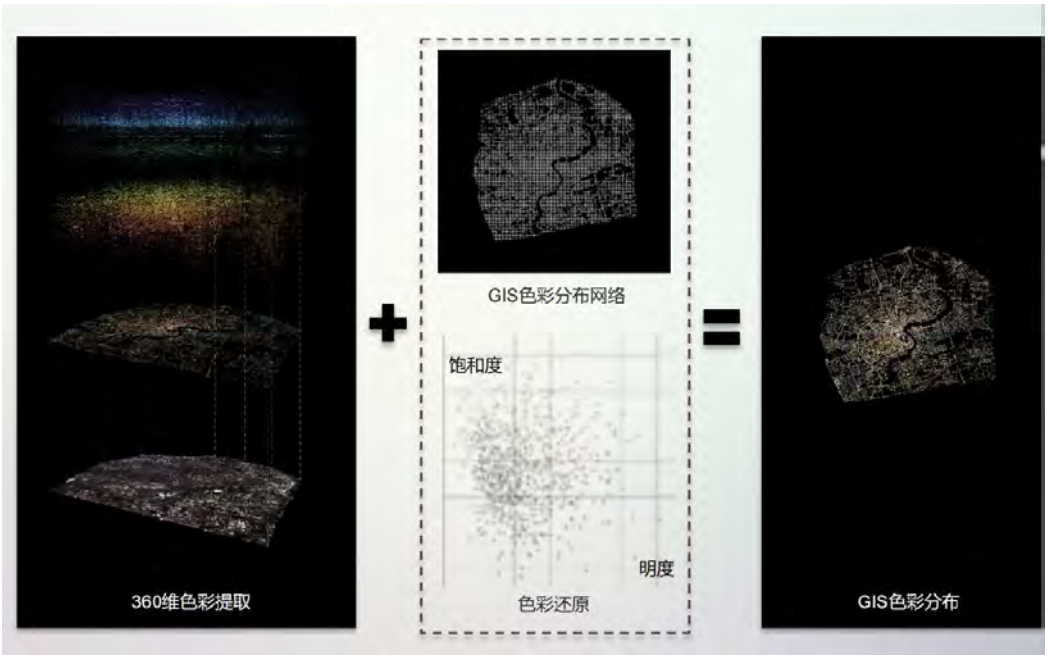
3. Selection criteria and methods of Urban Color in Psychological sense of security comfort in Planning

Our research found that. Urban color perception is one of the main ways for human beings to recognize their own urban environment. Environmental color also has a great impact on human behavior. For example, the choice of soft colors in the living area to give people a warm and safe feeling, for the business district, often with brighter colors to give people a vibrant feeling.

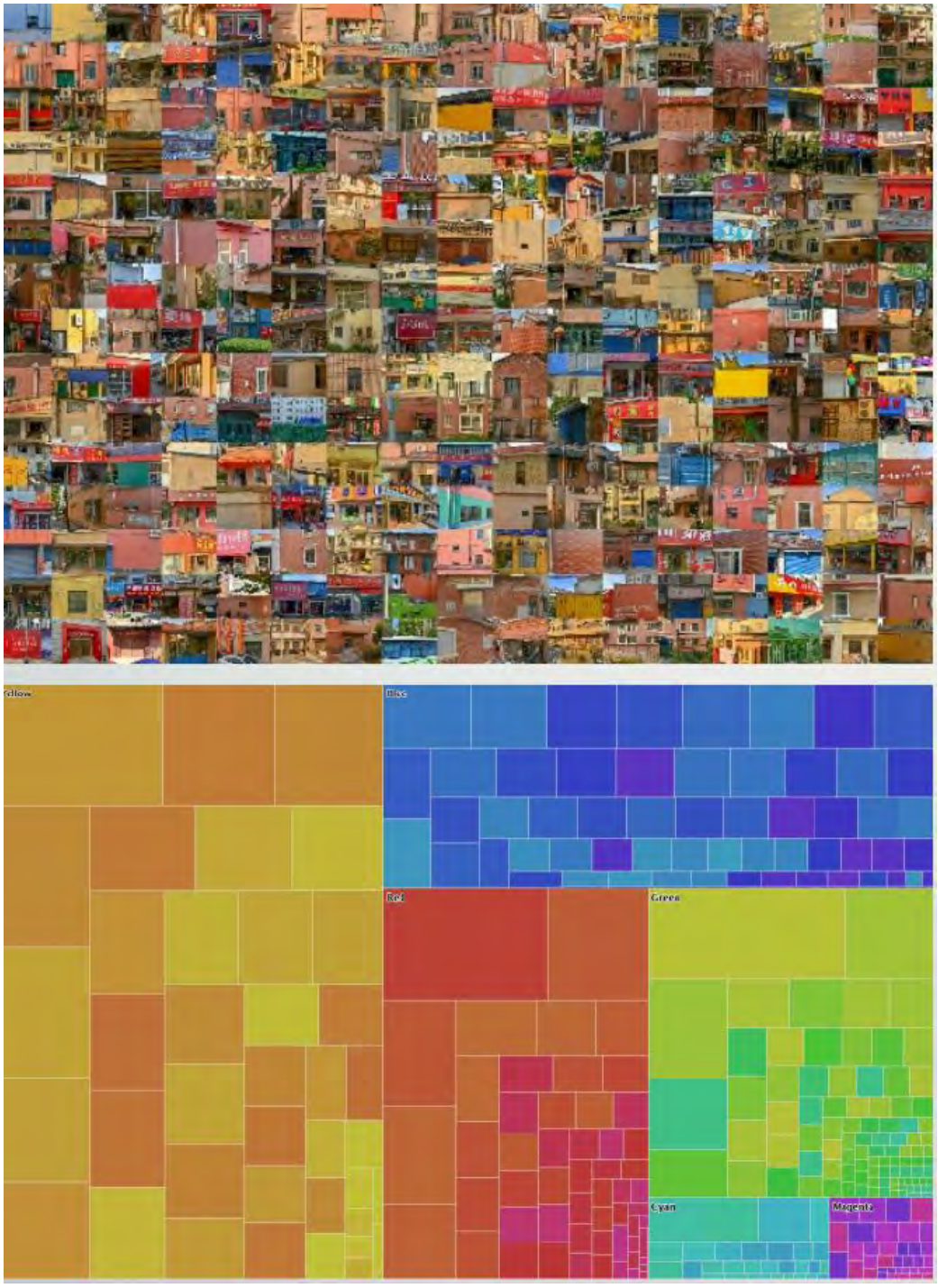
We extract the main architectural colors from the city-related photo data and define their architectural color genes, and use the color reduction principle (SHV) color space and AWB algorithm to process. A 360 degree high definition, 3 D data set was obtained. Analyze the color of the city. (see the extraction and comparison process below for details)

Step 1. get the color

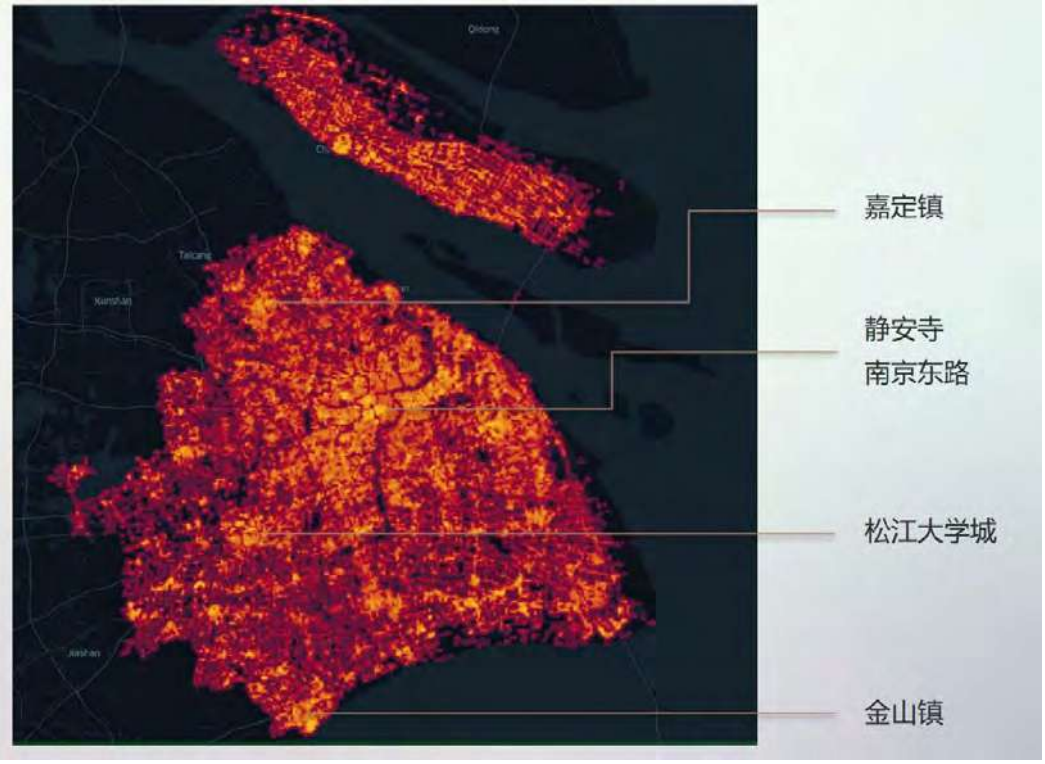




Step 2.compare the colour



Step3. compare the area

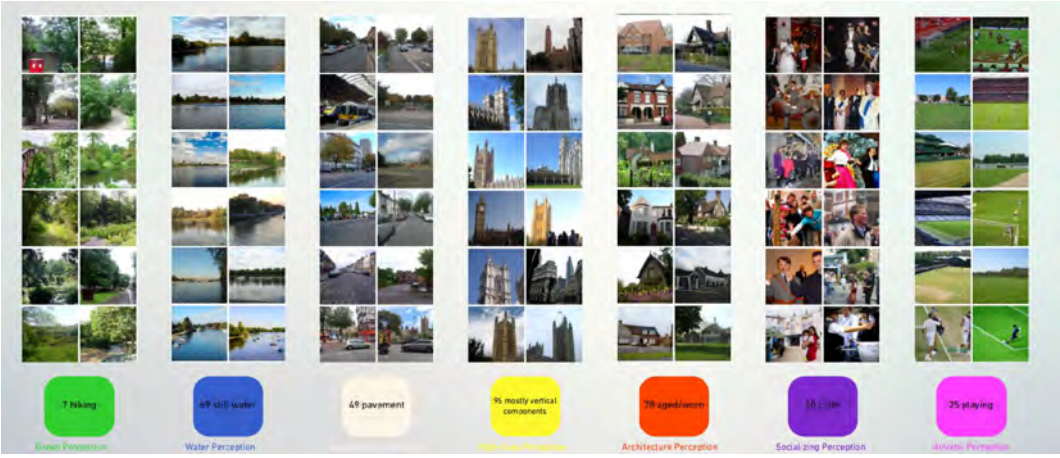


We can see that the colors of the different regions of Shanghai are completely different, and the commercial area and the residential or university, the suburban area is obviously different. However, in other cities, the color change of cities is not obvious in many times in different functional areas.

When we extract these color analysis, the next step is to analyze the human perception of the environment, what is the most comfortable standard. We divide perception into three parts: urban intention, artificial intelligence and new city perception. The image of the city, first from the Massachusetts Institute of Technology in the United States. They put forward the appearance of the city, combined with the five elements of the city (roads, boundaries, areas, nodes, markers) to fully demonstrate the importance and variability of the city. The landscape of the city, in many roles of the city, is also a visible, memorable and gratifying source. Giving urban visual form is a special and quite new design question.

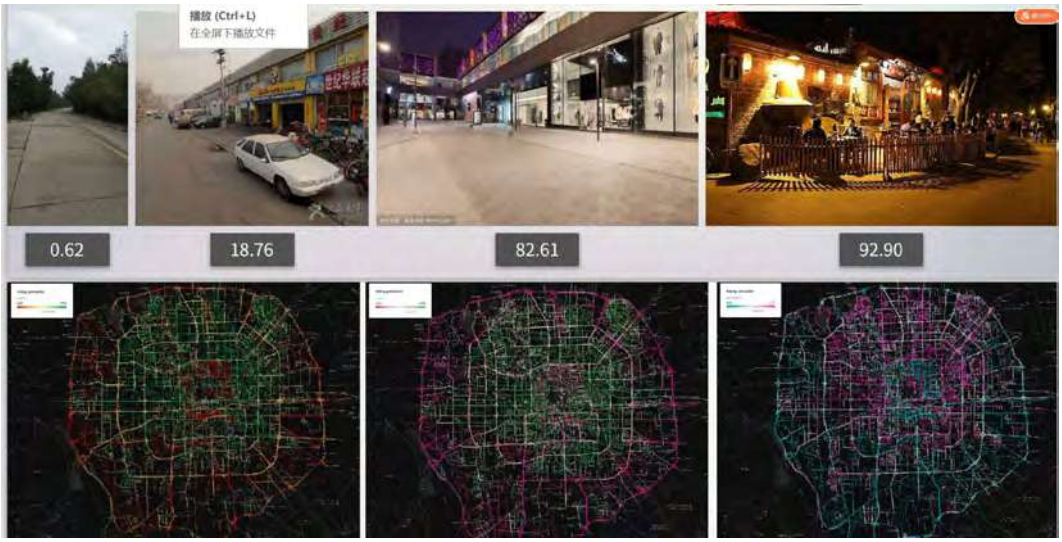
Title

Liu's C-image spatial research method uses GIS to obtain public uploaded photos with a large number of location information combined with artificial intelligence to obtain what is the best or worst public evaluation of the environment. Element extraction and recognition are carried out. Thus, after comparison.



Take greening as an example, although there are mandatory requirements for the proportion of greening in many parts of China, but in fact, after the implementation of the public perception is not good. The reason is that the public perception of the environment deviates from the cognition of the government or related departments. In the process of urban color analysis, we get a part of the perceived evaluation criteria for greening. (as shown in figure, 5 is the highest score for perception)

And for the street renovation perception mentioned at the beginning of the article, we also established a street public cognitive system, which is based on the same principle (see figure below: the street sense of security and comfort rating is the highest on the right).



The above conclusion is that not all policy making or expert assessment of the environment is the most beautiful and comfortable environment in the public perception. And the beautiful and comfortable environment is not the most sense of security environment. Through our only perceptual technology, we can avoid the discomfort of the end-user experience in our planning. It also increases the humanization and rationality of planning and design.

conclusion

Finally, for urban renewal and community transformation to improve their social satisfaction, the real intervention of public participation is also a means to improve satisfaction. In addition to actually obtaining the demands of the masses, it can enhance the individual sense of participation and belonging. Of course, it is also an effective means to guide the conformity psychology of the masses by combining the appropriate media publicity before the implementation.

In a word, in the process of urban transformation in China, the government has to take into account social and psychological factors, in addition to the need to consider the traditional development and positioning, and the function of the community is to provide the people with comfortable and reasonable living and working environment. The unharmonious social psychological contradiction can also bring negative potential influence to the stability and development of the whole society, and how to improve the satisfaction of the masses and to avoid a certain social psychological problem is the important basis of the "improve that level of people's living and the governance of new society" in the 19-big report of the Party.

4. References

Guiqing,yang (2000) City social psychology, Tongji Public House.

Zhangfan, Hu (2018)Environmental psychology, china construction industry Public House.

Guohua, Jin(2014)City Public Safety social psychical research. Shanghai People Public House.

Keven lynch (2001) City Imagine. Hua xia public House.

Community

Liu L,Zhao J,et al.C-IMAGE:city cognitive mapping through geo-tagged photos[J].GeoJournal,2016,81(6)817-861.MLA

Zhou,B.Liu,L.,Oliva,A.,&Torralba,A.(2014,September).Recognizing city identity via attribute analysis of geo-tagged images.In European confision(pp.519-534).Springer,Cham

Case Study / Project

Cities and Digitization

Perspectives and Challenges of the Smart City Technologies on Urban Planning and Design

Junyan YANG, Yi ZHENG, Simon MARVIN

Abstract

Cities have recently witnessed the emergence of connected objected and advanced technologies that are going to have an increasing influence on city planning and design as well as urban studies. Cities are mostly defined by their complexity. Megacities are characterized by millions of daily human flows and activities driven by individual and collective decision-making. From this approach, how can urban environment be improved for people's daily life? And how can healthier and smarter services for citizens and public space users be provided and be translated into urban planning and design applications? Based on the outcomes of the international digital urban design workshop happening in June 2019 (co-organized by Southeast University of China and ISOCARP), the session will put in perspective the future challenges of urban planning and design disciplines under the angle of digitization. Three professors will be invited to present their research on the topic and the outcomes of the digital design week in Nanjing. An interactive discussion with the public will follow then. During the first part of the session, Mr. Yi Zheng will introduce the session topic and present the results of the Nanjing International Digital Urban Design Week. Pr. Junyan Yang (Southeast University of China) will then speak about the relation between digitization, public space and urban design.

The session will highlight the impacts of the digital transition on emerging urban planning and design approaches, and illustrate how our understanding of the city is changing with big data. The question on how to make cities healthier and more sustainable through smart technologies will be raised, taking a few cities and megacities as references and Nanjing as a case study. Several digital urban design samples will be shared to the public in order to inspire its participation in the last part of the session. Pr Simon Marvin (Director of the Urban Institute, University of Sheffield) will give a presentation about robotization of production, smart city services in our urban environment, applied to digitization and AI (Artificial Intelligence) and daily life of people in the city. The question on how the urban environment could be (re-) designed to match with smart objects and applications will be introduced at the end of its presentation.

Pr Michael Tomeldan (University of the Philippines) will present then a general view on urban issues in Southeast Asian megacities, in relation with digitization and its perspectives in the region. The public will be invited to discuss the current transformations of traditional urban lifestyles and potential responses by urban planners, considering the challenges brought by big data and digital technologies.

Research Paper

Measuring Visual Quality of Street Space Based on Deep Learning and Street View Picture :

Pilot in The Lilong Area in Shanghai

Qinglai Zhang, Tongji University; China
Jiatian Bu, Tongji University; China
Yifan Yu, Tongji University; China

Abstract

Built environment indicates of street space quality have been carried out in a profound influence on the image of city， human behavior and public health. A street that is considered as a fundamental element in urban studies. Of the 5 elements of the image of a city, i.e. landmarks, paths, nodes, districts and edges, suggested that the paths are the most dominant elements, the research of which would provide a basis for the clustering and organization of the meanings and associations of the other four elements and the city as a whole. Additionally, taking a quantitative measurement of the visual appearance of street space has proven to be challenging because visual information is inherently ambiguous and semantically impoverished. Recent developed image semantic segmentation techniques and Street View Picture dataset make it possible to eliminate the previous restrictions, Furthermore, bringing forward a research paradigm shift. Lilong, which typically represent for historical street space in Shanghai, are selected for empirical study .This paper attempts to measure subjective qualities of the Lilong environment comprehensively and objectively. By employing Street View Picture, pictorial information is the proxy for street physical appearance, which utilizes the image semantic segmentation techniques (The model used in this study is Deep lab V3 which can achieve a 85.7% pixelwise accuracy when classifying 150 categories of objects) to parse an street scene into scene elements, such as buildings, roads, pavement, trees, cars, pedestrians, and bicycles. Then, the elements corresponding to each street point in the two directions of spatial coordinate are summarized and the average value is calculated. The potential factors were calculated based on 3-dimensional composition calculation of greenery, openness, enclosure and motorization may serve as indicators for inferring. The outcomes were used to evaluate the street types, functionality, quality, time, status, and human activities of a street. The result indicates that visual quality of Lilongs are barely satisfactory, while some regeneration projects in the historical protection block is better. A lot of Lilongs are in shortage of visual green, relative more continuous but with low vertical diversity. In the most recent 6 years, less than 2.74 million square meters Lilongs are not regenerated which are mainly slow building renovation. A series of quantitative analyses demonstrates the ability and great potential of auto-calculation method useful for auditing street environments.

Keywords

Visual quality Quantitative evaluation Street View Picture Deep learning Lilong

1. Introduction

Street space is an important part of urban public space, the quality of street space affects the behavior of users, public health level, the shaping of urban culture. In its report "Streets as Public Spaces Promote Urban Prosperity", UN-Habitat states that streets have an important impact on the social productivity, quality of life and amenities of cities. The past several years have seen a rapid expansion of research on the health implications of street environment features such as aesthetics, traffic， physical disorder, social interaction, and pedestrian safety（Hoehner, C.M. et al,2005;Boehmer, T. K. et al ,2007; Middleton, J. 2018). Admittedly, good street environment can promote social interaction, form friendly neighborhoods, and also affect the healthy behavior of residents, improve the output of individual healthy behavior. Therefore, designing human-oriented street space has become one of the vital environmental improvement strategies for competitive cities. Many countries and regions have proposed street design guidelines to improve the environmental quality of the streets. In China, Shanghai has proposed street design guidelines. The widespread street policies and platforms indicate that people begin to pay more attention to the refined design based on the human-oriented scale.

In the past, the traditional measurement of street space quality adopted two-dimensional plane analysis or small-scale subjective research method, it is difficult to measure the level of urban three-dimensional street space quality on a large scale. With the development of image segmentation technology and street view acquisition technology, the research on street space has obtained a new method breakthrough. In this paper, in order to improve the quality of the street space environment, we introduce Baidu Street View pictures and machine learning techniques to quantitatively evaluate the indicators of street space environment. This paper selects the street view picture of Lilong area in Shanghai as research object, identifying the elements of the street environment and carrying out the evaluation of street space environment, which provides support for the transformation and quality improvement of the street during the urban renewal process.

2. Literature review

2.1. Visual quality of street space

"Space quality" usually refers to people's perception and experience of the space environment, which is highly correlated with the material spatial elements and service level of the built environment, and is an important index to measure street environment in urban design theory. There have been many classical studies on the quality of space. The pioneers, represented by Jacobs(1961) and Lefebvre(1962), reflecton on the functionally dominated modernist urban planning and design, and discuss the spatial characteristics of human-based scale and its social and economic effects. Young Gale(1971), William White(1980), Kevin Lynch(1984) discussed how the characteristics of urban space can better enhance the quality and vitality of the city. These studies have proven physical space and street form are the cornerstones of street activities.

The past several years have witnessed a considerable number of studies have measured the multisensory qualities of street space, including auditory quality (Easteal et al., 2014; Aletta et al., 2016; Herranz-Pascual et al.,2019) and the visual streetscape(Griew et al.,2013; Lun Liu et al.,2017; Jian Kang et al.,2018). In this paper, we concentrate on measuring the visual quality of street space. It objectively depends on physical components of street space. There are plenty of research discussing the spatial elements on street scale， such as greenery, enclosures, openness, connectivity, street wall continuity, density, accessibility, cross-sectional proportion, scale, tidiness and so on (Montgomery,1998; Sallis et al.,2003; Harvey et al.,2015).The spatial elements can bring better perception of visual perception and also play an important role in social interaction.

2.2. Methods for measuring visual quality of street space

Currently, there are many studies on street analysis and evaluation. Studies have been conducted to identify important factors in identifying important factors in the building environment that affect human mobility by assessing respondents' perceptions of the chosen building environment through different types of interviews or face-to-face questionnaires （Appleyard et al.,1972; Sallis et al.,1998）. Ewing and Clemente (2013) made a quantitative evaluation of the five important factors of street perimeter, humanization scale, permeability, cleanliness and imagery by analyzing the respondents' ratings of street images. This kind of qualitative research is still instructive to the current research, but due to the lack of quantitative data and evaluation index in-depth study, it is not conducive to further assist the refined design practice and control.

The development of big data, artificial intelligence and other technologies can help solve the relatively vague and subjective evaluation of urban spatial quality in the past. With the widespread use of open data in urban spatial analysis, street view pictures are becoming an important complement to multi-source urban data. Google, Baidu, Tencent and other Street View image data can allow users to use 360-degree panoramic views to quickly access street space reality information, is suitable for street-scale research(Liu,2015). For example， Google Street view data has been used to the construction of urban three-dimensional models(TORII et al.,2009), the evaluation of street security(NAIK et al.,2014), and the quantitative analysis of street view green visibility(Yu Ye et al.,2018).

With the development of artificial intelligence, through machine learning algorithms in the computer field, using deep convolution neural network architecture to achieve the deep processing of accurate street view pictures, it has become possible to effectively identify various elements of street space. Image semantic segmentation-based models have developed rapidly in recent years, such as FCN networks, SegNet networks, DeepLab, PSPNet ,image recognition accuracy is getting higher and higher, and can be replaced to handle the complex built environments(YAMAGATA et al.,2017). The model used in this study, DeepLab V3 (Chen et al., 2017), can achieve a 85.7% pixelwise accuracy when classifying objects.

3. Method

3.1. Study area and data collection

3.1.1 Study area

Our research is conducted within lilong area in Shanghai central area, which has a history of more than one hundred years. According to official statistics, by the end of 2016, the lilong area covers 7 million m^2 , including Shikumen Lilong, and Guangli Lilong , Garden Lilong (Figure1). As the main residential building in modern Shanghai, lilong spatial layout coincides with the direction of the urban development of modern Shanghai, which reflects the microcosm of the modern Shanghai urban development, and has very important historical humanistic value and historical landscape value. However, with the development of the city, the Lilong area has appeared old houses and crowded living situation, and its facilities are not complete, which results in mismatch between Lilong and modern urban function. In this paper, the streets of the Lilong area are selected as the research object (Figure 2), we try to provide a strategy for the protection and renewal of the city's historical and cultural history through the study of the street quality of Lilong area.

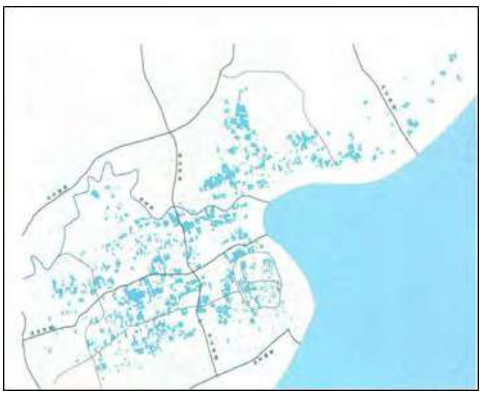


Figure 1 The distribution of Lilong area in Shnghai Source: Zhang Chenjie

Figure 2 The distribution of street in Lilong area

3.1.2 Lilong

As the largest and most widely distributed building type in modern times, lilong has dismantled a considerable part in the transformation of the Old City, but in terms of the current stock, it is still an important part of the historical space of central Shanghai. Lilong is a combination of East and West architectural characteristics of the residential type, its layout takes the form of the early Western town-style housing, the building monolith plane and structure is born out of the traditional Chinese courtyard-style housing.The main types of lilong, mainly include old-style, new-style, park-style, apartment-style, and wide-style.(Figure3) At present, the core Lilong area of Shanghai's central city mainly includes: Laochengxiang area, Xiamen Road -Suzhou River area, Hengshan Road -Revival Road area, Changle Road- Changshu Road area, Huaihai Zhong road- Sinan Road area, West Nanjing Road- North Maoming Road area, Wuyi Road area, the southern part of Old North Station area, Shanyin Road -Dolun road area, and Tilanqiao area (Zhang,2012).(Figure4) In a nutshell, Lilong typically represent the fabric of historical streets and are of significant importance to Shanghai. From the perspective of historical value, there is an urgency for a technical recognition and interpretation of the characteristics of traditional street forms. The restoration, regeneration and transformation

of Lilong spaces are key to historical protection in Shanghai, and need continuous scientific observation.

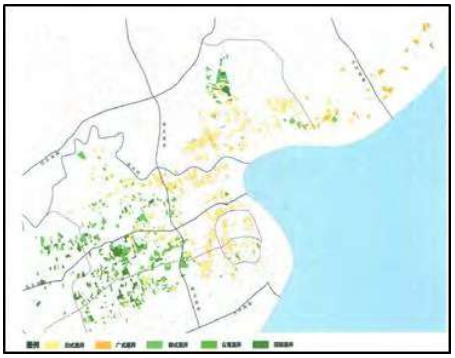


Figure 3 The distribution of different types of Lilong Source: Zhang Chenjie

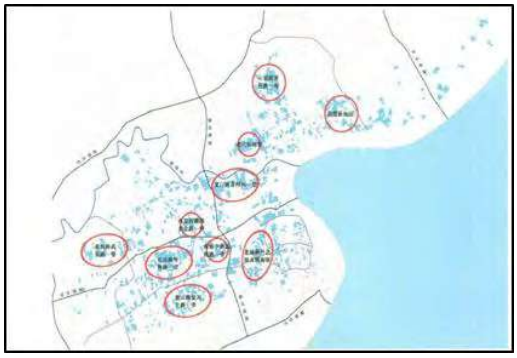


Figure 4 The spatial structure of the distribution Source: Zhang Chenjie

3.1.3 Street View Picture

This paper uses Baidu map street view picture data set to study the quality of street space. Street image data acquisition is obtained through API from Baidu Panorama static map service. The sampling point has an average spacing of 30m and generates the sampling position along the centerline of the road. Each sampling point has longitude and latitude parameters to facilitate the following scrawling process in GIS. In order to prevent the deformation of obtained Street View images, combined with the road centerline data obtained by OSM and the calculation of the sampling point based on the network topology before climbing the data by GIS, the Street View image is guaranteed to be parallel to the long axis direction of the street. And then, we input the angle of the horizontal and vertical direction and the sample point coordinate data to obtain street view picture by using Python and the request Key. (In our this research,: picture size: 1024 * 512; pitch: 0; heading: 0, 180 for two directional SVPs). The study obtained a total of 16,431 sampling points, 32862 street view pictures

3.1.3 Other data

The 2018 Point of interests data was crawled through the network including catering, shopping, and life services. The data format is point data of the shpefile in ArcGIS, which is used to calculate the functional diversity of the street.

3.2. Method

This study makes an objective evaluation of street features by machine learning to extract the characteristics of street scene pictures. A scene of deep full convolution neural network architecture segmentation technology analysis of images through semantic segmentation of picture pixels has been studied(Kendall et al.,2015). Using the Deep Lab V3 model, this paper uses the Deep Lab V3 model to semantically divide the street images of the Shanghai area, identifying 18 elements such as roads, sidewalks, buildings, walls, fences, columns, beacons, signs, vegetation, terrain, sky, pedestrians, bicycles, cars, trucks, trains, buses, motorcycles, etc(Figure5). Then, the elements corresponding to each street point in the two directions of spatial coordinate are summarized and the average value is calculated. The potential factors were calculated based on 3-dimensional composition calculation of greenery, openness, enclosure, motorization, walkability and functional diversity may serve as indicators for inferring. The outcomes were used to evaluate the street types, functionality, quality, time, status, and human activities of a street. The greenery is measured by the proportion of trees

at the sampling point, the openness is measured by the sky ratio, the enclosure is taken by the sum of buildings, columns and trees, and the motorization is used as an indicator of the degree of mobility and the walkability is measured by pedestrian and pedestrian paving. Through the POI data, measure the street functional diversity in the 15m buffer zone of the street centreline.

Thus, several indicators (a temporary six in this research) have been formed to comprehensively evaluate the physical visual quality of street space, the values of which a_i are normalized to the values e_i based on the deviation standardization Eq.(1)

$$e_i = \frac{a_i - \min(a_i)}{\max(a_i) - \min(a_i)} \quad (1)$$

i = greenery, openness, enclosure, motorization, walkability, functional diversity and so on.

Following this, these six normalization values are summarized into one Index $Y_{quality}$ according to Eq. (2), below, which represents the overall physical visual quality of street space. The indicators are simplified into six and the coefficients of each are equally distributed for the convenience of discussion. Accurate coefficients still require further quantitative research based on large-sample surveying and theoretical literature reviews.

$$Y_{quality} = \sum_i \alpha_i e_i \quad (2)$$

α_i are the weighting coefficients, awaiting further detailed research for improvement.

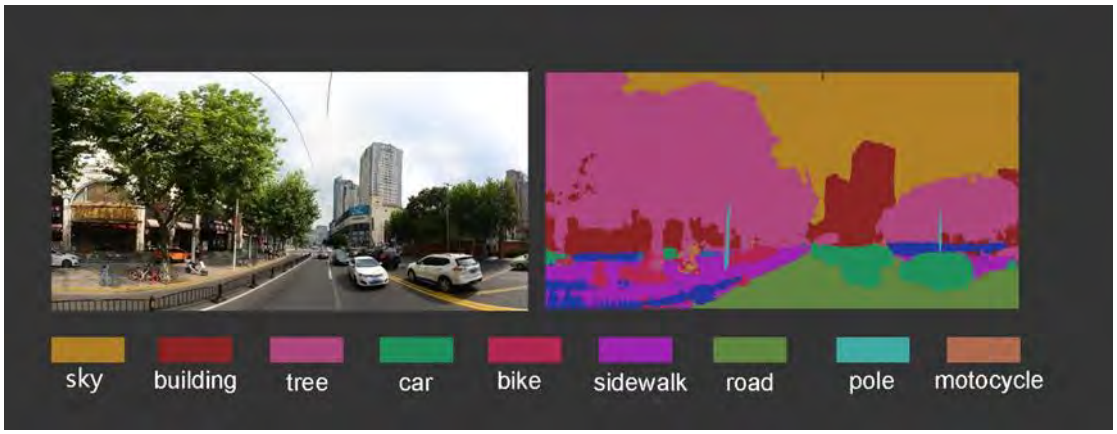


Figure 5 A segmentation demo by Deeplab V3

4. Results

4.1. Identify different street types

This study makes an objective evaluation of street features by machine learning to extract the characteristics of street scene pictures. Calculate the elements of 32,862 images in the study area and determine the main road types in the study area based on the proportion of the various elements. Figure 6 shows the seven most common dimensions of street features in each road type, namely buildings, roads, skies, sidewalks, cars, trees, and walls. For each dimension, the length of the axis represents the average ratio of each feature within the horizontal perspective. For example, green streets generally 50% green rate, 30% of buildings. In different historical periods, the elements of the streets are quite different, and the streets in the old Shikumen area are mainly based on buildings and higher degree of openness, and

the green rate is low. There are some areas that have been updated through the city, with buildings accounting for 40% of the view and about 26% of motorways, and these streets have higher traffic. The garden is more green and the enclosure is high.

The semantic division of the features of the street shows that the various scene features of the street will change due to the change of different road levels, so we can identify different types of roads by identifying the proportion of various elements in the street. With the continuous construction and development of the city, the function and role of Lilong area's streets will change with the changes of urban heterogeneity and urban renewal. Lilong is a gathering area of the history and architecture of the central city of Shanghai. Different time span and different construction types show its unique style of urban style. Updates and protections also need to be treated according to their characteristics .From this point of view, according to the results of the above analysis, according to the composition of the design elements of the street to determine the real function and function of the street, and further the renewal and protection of the streets in Lilong area put forward a more scientific and clear update strategy.

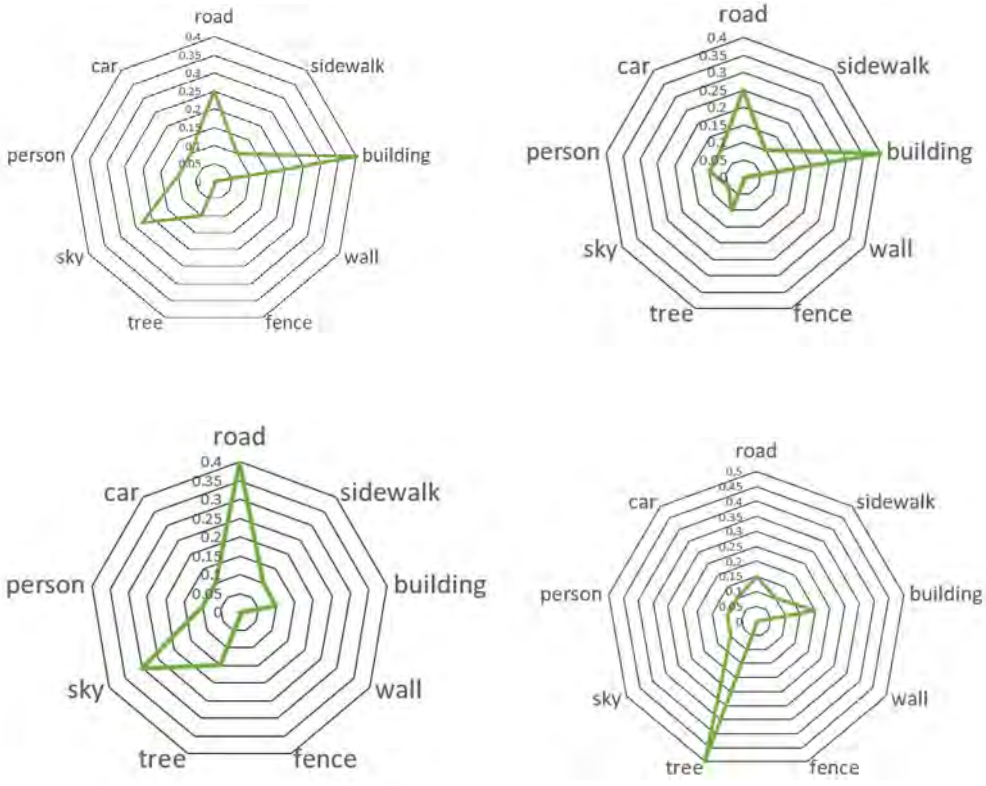


Figure 6 Percentage of different types of street elements

4.2. Spatial distribution of street features

After identifying the proportion of various elements of the street, the evaluation index of street quality is summarized. The average green viewing rate on streets in the Lilong area was 23.4%, which is nearly 5 percentage points higher than the average green viewing rate of 19.8% in Beijing Hutong(Tang et al.,2018) which typically represent for historical street space in Beijing.The average openness of streets was 22.8%, the average enclosure was 56.1 % and the average degree of mobility was 12.8%. The spatial distribution of greening in the study area was uneven, and the degree of greening was quite different in different construction

periods. The street scale in Lilong area is more suitable for human-based scale, and the incidence of automobileises is much higher than that of bicycles. The walking conditions are suitable for walking activities.

4.2.1 The spatial distribution characteristics of street greenery

Due to the influence of urban construction in the historical period, the degree of greenery of the streets is obviously different. The old town area is the early old-style construction area, its greenery degree is the lowest in the Lilong area, the average street greenery rate of 13.2%, far below the greenery level of the whole study area. Though it is a relatively complete area of Shanghai's old city texture, but its level of greenery landscape needs to be greatly improved. Huaihai Zhong road -Sinan Road area, Changle Road Changshu Road area, Hengshan Road - Revival Road, West Nanjing Road- North Maoming Road area is a new style of Lilong, garden and apartment gathering distribution area, its greenery degree is better, some areas of green view as high as 60%. In Xiamen Road, Suzhou River area, the south of the old North Station the southern part of Old North Station area and Tilanqiao area and other areas are wide-style distribution area, have low level of greenery.

4.2.2 The spatial distribution characteristics of street openness

Contrary to the spatial distribution characteristics of street green vision rate, the higher areas of street opening are the Laochengxiang area, Suzhou Road area, the southern part of the Old North Station and Tilanqiao area. The area with lower street opening is Huaihai Middle Road- Sinan Road, Changle Road, Changshu Road, Hengshan Road, Fuxing Middle Road. Although the height of the building is not high, the street is green and the street is directly blocked by trees because of the small scale of the street. The degree of opening is lower, and the street green vision is higher.

4.2.3 The spatial distribution characteristics of street enclosure

The street enclosure characteristics of the street are generally better, and a higher enclosure can form different levels of space. The areas with relatively high degree of street interface are the Laochengxiang area, the Huainhai Middle Road- Sinan Road, the Changle Road- Changshu Road area, and the Hengshan Road- Revival Middle Road area. These areas have dense urban textures, and the ratio of the height of the buildings on both sides of the streets is high. It can reflect the characteristics of the old Shanghai city. The area of the the southern part of the old North Station and the Tilanqiao area is relatively low.

4.2.4 The spatial distribution characteristics of street motorization and walkability

The degree of motorization in the study area increases with the level of the road network, and the degree of motorization is higher. The average car's appearance rate is 8.2% higher than the bicycle's appearance rate of 1.2%. It shows that the way of traveling in Shanghai is still characterized by car. The street scale of the Lilong area is relatively small, giving people a better sense of space and being more suitable for walking. With the process of urban renewal, the development of the city in the past focused on the development of traffic-oriented transportation. The Lilong area is also the main way to consider the car dealership, Ignore the way to walk. In the Laochengxiang area, Tilanqiao area ,the street sidewalks are relatively small and poorly walked. The renewal and construction of the future should focus on people's feelings and need to create a systematic walking space.

4.2.4 The characteristics of street functional diversity

The diversity of street functions in the study area increases with the level of the road network, and the degree of diversity becomes higher. There are differences in the diversity of streets in the Lilong area in different historical periods. The areas with low levels of street function diversity include the Laochengxiang area, the Tilanqiao area, and the Changshu Road-Changle Road area. The areas with high degree of street functional diversity include the Suzhou Road-Xiamen Road area, Huaihai Middle Road- Sinan Road, the Hengshan Road-Revival Middle Road area. With the development of the city, the function of some areas can not adapt to the mode of modern urban development. The development of its single function has led to the reduction of urban vitality. In the process of urban renewal, it is necessary to inject a variety of functions to arouse the original Vitality.

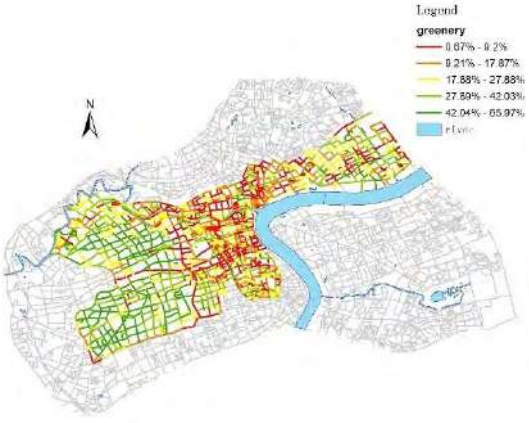


Figure 7 Greenery

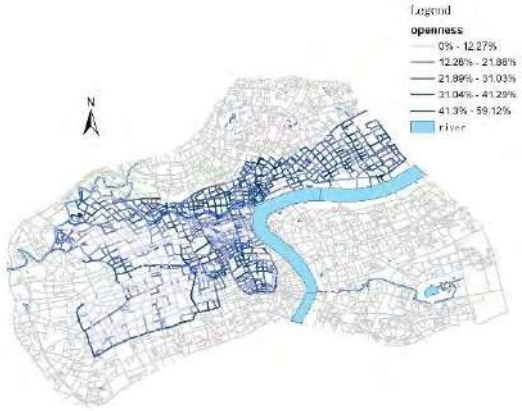


Figure 8 Openness

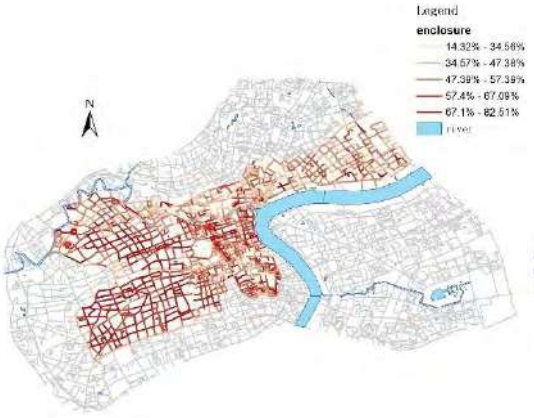


Figure 8 Enclosure

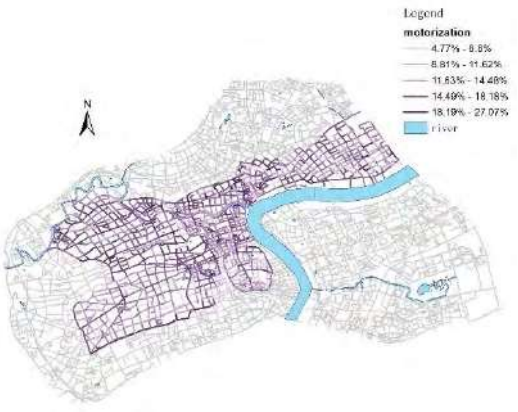


Figure 9 Motoriazation

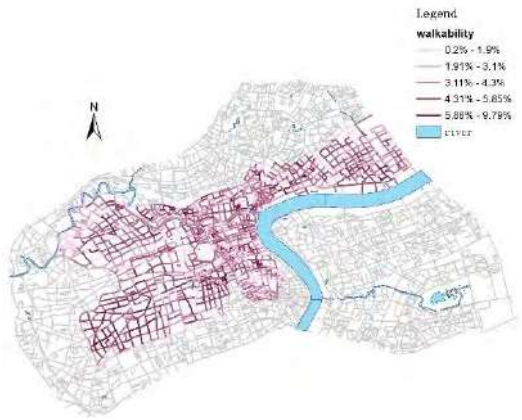


Figure 10 Walkability

Figure 11 Functional diversity

4.3. Visual quality of Lilong

Figure 12 shows the final six-aspect physical visual quality of Lilong index result. The average physical quality index score is 2.35. From the calculation results, We can see that the areas with high street quality and quality scores include Hengshan Road- Revival Middle Road area, Huaihai Zhong road-Sinan Road area, Changle Road- Changshu Road area, and West Nanjing Road - North Maoming Road area. The areas with low street quality scores include Laochengxiang area, Suzhou Road -Xiamen Road area, the southern part of Old North Station area, and Tilanqiao area.

It can be concluded that Lilong on the south side have better skeletons than those on the north, especially Lilong in the historical protection areas. The reason for this phenomenon may be the management factors in the historical period. The blocks with higher scores are mainly distributed in the French Concession, the management is unified and perfect, and the lower scores in the public concessions are not well managed. It is not difficult to observe that some regeneration projects take full consideration of the historical forms , keeping the original architectural features, while some partially change in spatial scale due to the need for modern transportation. In addition, with the continuous development of the city, the street texture of the Lilong area has been affected by motorization, and these areas have a high degree of openness. It can be seen from the various visual space elements that high-quality streets tend to have high greenness, diversity and spatial envelopment (ie, inverse contrast of sky visibility), while street greening can enhance the shelter of the street and strengthen the space. It also reduces the visibility of the sky. It can be seen that in the street renewal and renovation of the case area, improving the street green rate, strengthening the space enclosure and diversity should be the main strategies to improve the space quality.

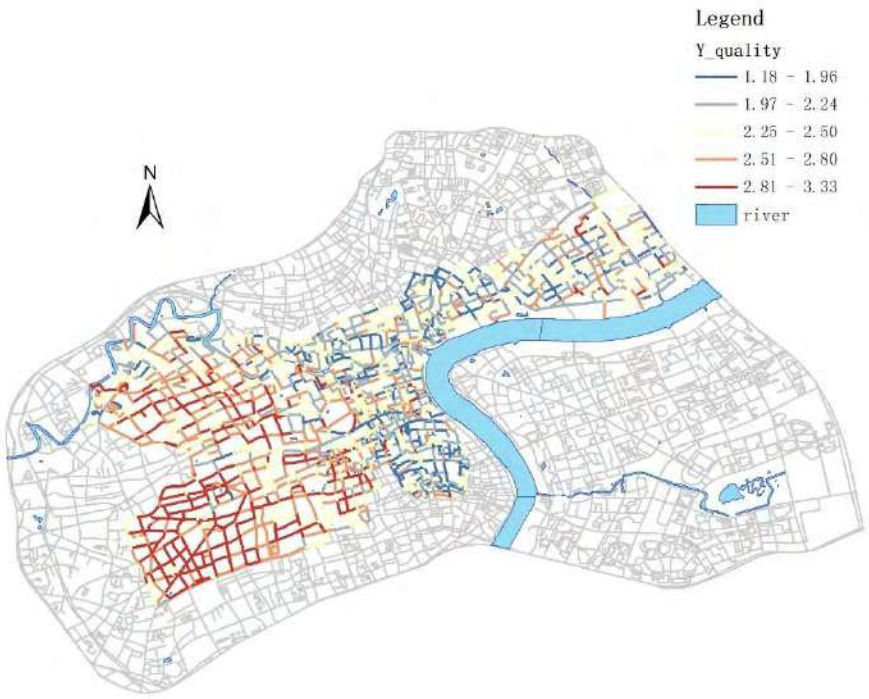


Figure 12 Physical Visual quality of Lilong Index

5. Conclusion

This paper examines the application of space quality evaluation in street urban design environment assessment for the Lilong area in the central area of Shanghai. The empirical research on Lilong shows that although the central city of Shanghai is famous for its culture, history and architectural layout, the quality of the street environment cannot meet the needs of current urban development and needs to be improved. A lot of Lilongs are in shortage of visual green, relative more continuous but with low vertical diversity. In addition, due to the low levels of street function diversity single function ,it has led to the reduction of urban vitality In the most recent 6 years, less than 2.74 million square meters Lilongs are not regenerated which are mainly slow building renovation The current urban design concept lacks the concept of refinement, the difference in street space is small, lack of recognizability and regional characteristics, and the safety, convenience, comfort and visual pleasure of slow-moving activists are not considered enough. The objective elements of this paper quantitatively measure the green visibility, openness, enclosure, motorization and walkability of the street. The research shows that the spatial distribution of greenery in the study area is uneven. The greening degree of the different types of construction in different areas is different. The construction scale of Lilong area is small, so the spatial opening degree and interface enclosing degree are suitable. In addition, many traditional styles and features are challenged by rapid urbanization. The development of vehicle-oriented traffic ignores people's feelings, and future development should focus on meeting the diversity needs of people.

6. References

Aletta, F.; Lepore, F.; Kostara-Konstantinou , E.;, Kang ,J.; Astolfi , A. (2016).An experimental study on the influence of soundscapes on people's behaviour in an open public space Applied Sciences.

Appleyard , Donald; Lintell ,Mark (1972) The Environmental Quality of City Streets: The Residents' Viewpoint[J]. Journal of the American Planning Association.

Boehmer, T. K., C. M. Hoehner, A. D. Deshpande, L. K. Brennan Ramirez and R. C. Brownson (2007). "Perceived and observed neighborhood indicators of obesity among urban adults." Int J Obes (Lond), Vol. 31 No.6.

Chen, L. C. , Papandreou, G. , Schroff, F. , & Adam, H. (2017). Rethinking atrous convolution for semantic image segmentation.

Chenjie, Zhang(2015).Study on the Current Situation of Shanghai Lane Construction Based on Heritage Perspective[J]. Journal of Urban Planning.

Donald Appleyard,Mark Lintell. The Environmental Quality of City Streets: The Residents' Viewpoint[J]. Journal of the American Planning Association,1972,38(2).

Easteal, M., Bannister, S., Kang, J., Aletta, F., Lavia, L., Witchel, H.J. (2014).Urban sound planning in Brighton and Hove. In Proceedings of the Forum Acusticum, Krakow, Poland.

Ewing, R., & Clemente, O. (2013). Measuring urban design: Metrics for livable places. Washington, DC: Island Press.

Gehl J.(1971). Life between buildings: using public space[M]. New York: Island Press.

Griew Pippa,Hillsdon Melvyn,Foster Charlie,Coombes Emma,Jones Andy,Wilkinson Paul.（2013）Developing and testing a street audit tool using Google Street View to measure environmental supportiveness for physical activity.[J]. The international journal of behavioral nutrition and physical activity.

Hoehner, C. M., L. K. Brennan Ramirez, M. B. Elliott, S. L. Handy and R. C. Brownson (2005). "Perceived and objective environmental measures and physical activity among urban adults." Am J Prev Med.

Herranz-Pascual, K.; I. Aspuru, I. Iraurgi; A. Santander, J. L. Eguiguren and I. Garcia (2019). "Going beyond Quietness: Determining the Emotionally Restorative Effect of Acoustic Environments in Urban Open Public Spaces." Int J Environ Res Public Health

Jacobs J. (1961 The life and death of great American cities[M]. New York: Random House.

Jian Kang; Marco Körner; Yuanyuan Wang; Hannes Taubenböck; Xiao Xiang Zhu. (2018)Building instance classification using street view images[J]. ISPRS Journal of Photogrammetry and Remote Sensing.

Jingxian Tang, Ying Long (2018) Measuring visual quality of street space and its temporal variation: Methodology and its application in the Hutong area in Beijing[J]. Landscape and Urban Planning.

Katz.P; Scullyv; Bressi T W.(1994) The new urbanism: toward an architecture of community[M]. New York: McGraw-Hill.

Kendall, A., Badrinarayanan, V., & Cipolla, R. (2015). Bayesian segnet: Model uncertainty in deep convolutional encoder-decoder architectures for scene understanding.

Lefebvre H. (1962).'Notes on the new town', introduction to modernity[M]. London: Verlso.

Lun Liu; Elisabete A. Silva; Chunyang Wu; Hui Wang.(2017) A machine learning-based method for the large-scale evaluation of the qualities of the urban environment[J]. Computers, Environment and Urban Systems.

Liu X, Song Y, Wu K (2015) Understanding urban China with open data[J]. Cities.

Lynch, K.(1984) Good city form[M]. Cambridge: The MIT Press.

Middleton, J. (2016) "The socialities of everyday urban walking and the 'right to the city'." Urban Studies, Vol. 55 No. 2.

Montgomery, John (1998) Making a city: Urbanity, vitality and urban design[J]. Journal of Urban Design.

Naik N, Philipoom J, Raskar R(2014) Streetscore-predicting the perceived safety of one million streetscapes[C]. 2014 IEEE Conference on Computer Vision and Pattern Recognition Workshops.

Whyte,W H. (1980) The social life of small urban spaces[M]. The US: The Conservation Foundation.

Sallis, James F ; Lawrence, D Frank ; Saelens, Brian E ; Kraft, M.Katherine.(2003) Active transportation and physical activity: opportunities for collaboration on transportation and public health research[J]. Transportation Research Part A.

Sallis J F; Johnson M F; Calfas K J; Caparosa S; Nichols J F.(1998) Assessing perceived physical environmental variables that may influence physical activity.[J]. Research quarterly for exercise and sport.

Torii A, Havlena M, Pajdla T. (2009)From Google Street View To 3d City Models[C]. ICCV Workshops.

Harvey, Chester; Lisa, Aultman-Hall; Hurley, Stephanie E.; Austin, Troy.(2015) Effects of skeletal streetscape design on perceived safety[J]. Landscape and Urban Planning.

Yu Ye; Daniel Richards; Yi Lu; Xiaoping Song; Yu Zhuang; Wei Zeng; Teng Zhong(2018) Measuring daily accessed street greenery: A human-scale approach for informing better urban planning practices[J]. Landscape and Urban Planning.

Yamagata Y, Murakami D, Yoshida T. (2017) Urban carbon mapping with spatial bigdata[J]. Energy Procedia.

Case Study / Project

Improving Space Structure of Traditional Resources

-Based Citie`s Transformation in a Background of Supply-Side reform: a Case Study of Yantai City of Shandong Province

Dianhong ZHAO

Abstract

Supply side structural reform aims to adjust the economic structure, promote industrial restructuring and optimization, to achieve the optimal allocation of resources. Eliminating excess capacity and improving effective supply are two important vehicles for maintaining the medium-high economic development under the new normal economy. At present, the resource-dependent cities` transformation in China is not only faced with the threat of traditional 'Urban Disease' , but also faced with the dilemma of 'Resource Curse' . Insufficient system guarantee, serious industry rigidity and inadequate factors innovation have become major bottlenecks in the resource-dependent cities transformation.

This report puts forward to build optimization model of compact spatial structure by regarding spatial restructing of resource-dependent cities as cutting point, and takes Yantai city as an example to explore the optimize model and mode of gold-resource city`s improving space structure. Under the background of supply-side structural reformation, first of all, this article combines the overall analysis thinking of macro view, medium view and micro view to create three ideas of the traditional resource-dependent cities transformation, which are:

1. According to the development grade and endowment conditions, traditional resource-dependent cities turned to take the 'Human-centere' urbanization development idea.

2. Traditional resource-dependent cities should build a complete urbanization financing system and establish a new circulation mode of local balance of payments.

3. Narrowing the welfare gap between residents to realize the 'people of urbanization' and the transformation of development mode.

In addition, focusing on the optimization model of spatial structure of the traditional resource-dependent cities transformation. Firstly, improving spatial structure should respond to the transformation of innovation driven government method, and emphasize physical transformation of socialization idea. For example, inventory optimization, urban renewal, reconstruction of new industrial district, bridging the relationship between the old space and social economic development. The Second optimize spatial structure is to establish inclusive and service-oriented soft space by focusing on the factor of 'people'. The third optimize spatial structure intends to serve in the increase driven by innovation and builds creative and intellectual city. Finally, improving spatial structure refers to the design of system and mechanism, which means to combine the transformation of space, system and mechanism of the optimization model of spatial structure of traditional resource-dependent cities. This way provides a theoretical reference to achieve the optimization model of spatial structure of the traditional resource-dependent cities transformation.

References

1.Peterman W. Erratum: Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities[J]. Cities, 2004, 21(4):364-365.

2.Epure M. E.Wayne Nafziger - ECONOMIC DEVELOPMENT, 5TH Edition, Cambridge University Press, UK, 2012[J]. Journal of Economic Development Environment & People, 2012, 1(2).

Track 6

Changing environment and risks

Planning for resilience

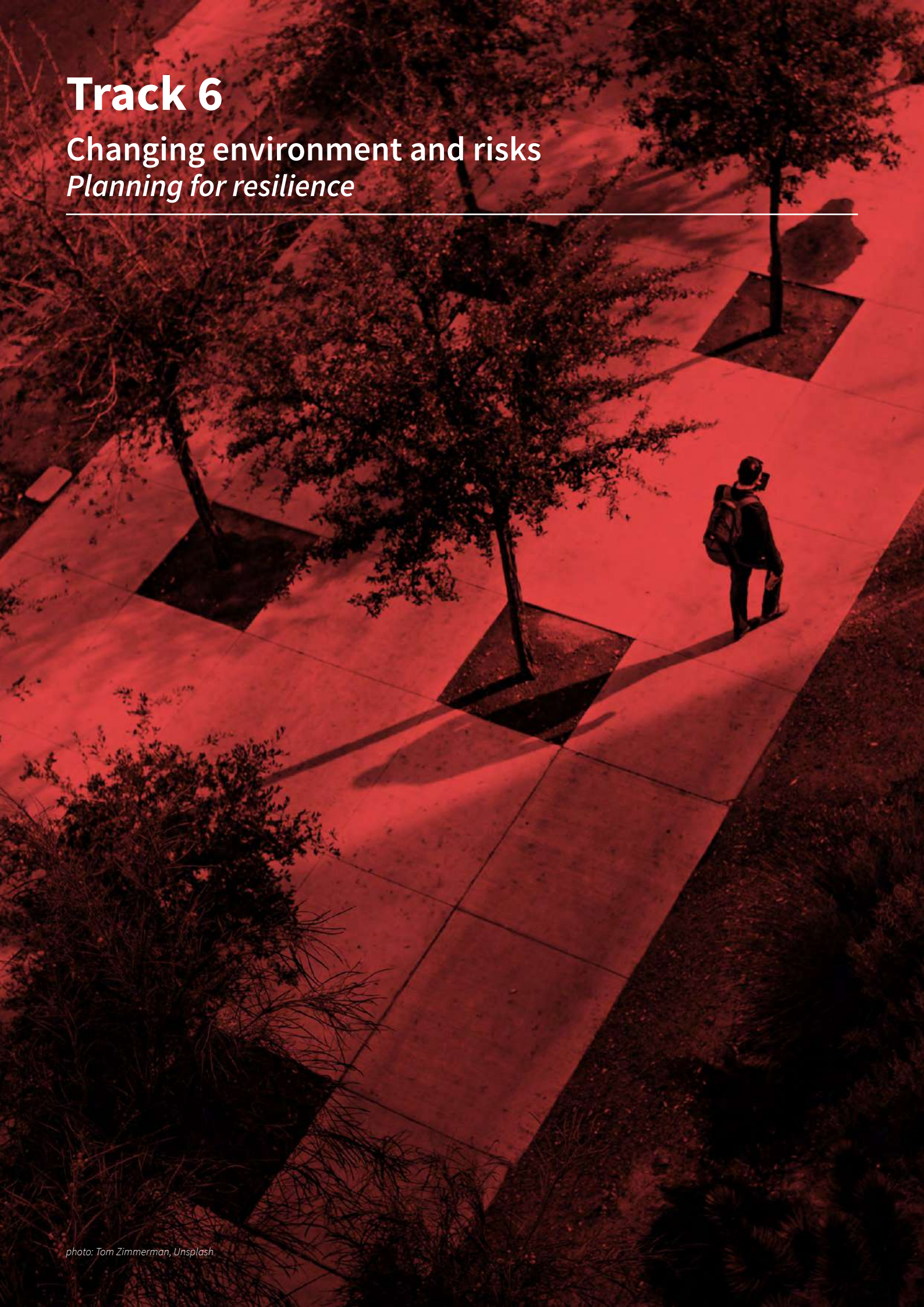


photo: Tom Zimmerman, Unsplash

Case Study / Project

Participatory and Good Governance

The role of stakeholders in increasing the adaptive capacity of the poor to cope the impact of climate change. Case studies: Surakarta and Yogyakarta, Indonesia

Andie ARIF WICAKSONO

Abstract

Poverty and climate change considered a global problem. Meanwhile, adaptation to climate change and poverty reduction are context-specific and vary per case. The urban poor is vulnerable to flooding, especially flash floods because most of them live in flood-prone riverbanks. they are also prone to disasters and diseases outbreak. On the other hand, urban poor also have an important role to address the city's vulnerability to climate change. Some of the urban poor of Yogyakarta who cares about river conservation movement formed the riverside community-based organizations (CBOs). In Yogyakarta and Surakarta, some evidence indicates that the pro-poor approach is used to build the adaptive capacity of the poor. Together with the government's task force for poverty alleviation (TKPKD), these CBOs provided medium for participation on the local level in Yogyakarta. The same also happened in Surakarta. These stakeholders initiated supplemental programs acted as the pro-poor approach on the riverside settlement. It consists of in and ex-situ planning at both policies and management at the local level. The in-situ measures consist of addressing the socio-cultural aspect of poverty, improving coverage, efficiency, and sustainability of basic services, and addressing economic poverty. They also included adequate safety net in education and healthcare system through PKMS-BPMKS in Surakarta and KMS in Yogyakarta, while empowering the poor to protect the environment. However, the ex-situ measures consist of micro (sectorial) policy in construction, such as the relocation of the Riverside housing and the improvement of the physical infrastructures' of the poor. The CBOs responded to the innovative collaboration of these stakeholders by delivering discussions and collective action movements, since it was done through transparency, accountability, responsibility, independence, and democracy. These processes are the implementations of good governance on the local level. The collaboration provides cost incentives on government-owned rental housing buildings and generates active participation among stakeholders. Furthermore, the CBOs initiated the M3K-flood free housing program. Logically, this M3K reduces the heat island effect in the city, consequently reducing the impact of climate change and the vulnerability of the poor to disaster. This in-depth case studies research is parts of the researcher's Ph.D. trajectory and uses the empirical exploratory approach with purposive sampling derived from a list of related participants: local government officers, city leaders, NGO person, local academia, and riverside communities. The primary data is collected using interviews with snowball sampling, while secondary data is collected from policies and reports to understand the approaches and setting of multi-stakeholders' collaboration. The finding indicates that the role of stakeholders is to create a medium through active collaboration. While poses in different situations for each case, this collaboration is important to form the foundation of a pro-poor approach. This approach could enhance the adaptive capacity of the poor to cope with the impact of climate change. Using Yogyakarta and Surakarta as Indonesian case studies, this paper contributes to the knowledge of adaptation strategies in developing countries.

BUI H.T.
PHAN T.M.
BABCOCK J.J.
NGUY T.K

Case Study Paper

55th ISOCARP Congress 2019

Cap-acity and Trade:

Vietnam Oregon Initiative Shared Climate Agenda

Authors:
BUI Thu Hien-Smart i Connector; Vietnam
PHAN Manh Tuấn- Legal Consultant; Vietnam
BABCOCK Julia-National Policy Consensus Center; USA
NGUY Thi Khanh-Green Innovation and Development Centre; Vietnam

Abstract

Climate change is an existential threat to all life on Earth. Humans are at the helm of emission controls and the underlying political mechanisms to avert worst case scenarios. As nations shift their policies and planning around this reality; there is an opportunity to redefine incentives across industries that promote clean energy and lower emissions in building, transportation and land use systems. In turn, workforce training and education across a broad international network can help ensure a just distribution of benefits as incentives kick in and markets transition. The Vietnam Oregon Initiative (VOI) officially launched in 2015 by Oregon's Governor Kate Brown and the Ministry of Foreign Affairs as a formalized partnership to advance mutual benefits through multi-sector exchange and capacity development. The Vietnam Oregon Initiative Climate Agenda (Attachment I) builds on this network to promote public policy solutions that enhance Oregon and Vietnam's market-based transition to clean energy and climate resilience.

Keywords

Climate change, Network Governance and Sustainability

1. Comparative Policy Background and Network Governance

1.1. Oregon and Vietnam Climate Policy and Methodology

Oregon has a legacy of environmental leadership starting with the passage of the first bottle bill in the U.S. in 1971. In 2018, after an updated bill passed doubling the deposit fee paid at time of purchase from 5 to 10 cents, Oregon hit a 90% redemption rate (4). Oregon Senate Bill 100 passed in 1973 marking establishment of the regulatory structure necessary for local and statewide land use planning and protections for farm and forest lands. In the 1990's land use coordination programs were integrated across state agencies to meet 19 state land use goals starting with the imperative of citizen involvement as well as maximizing density on lands within the urban growth boundary backed by data from mandatory studies to assess land use demands (economic opportunity analysis and 20 year population and housing demand studies). In 1993, Portland was the first city in the U.S. to create a local plan for reducing carbon emissions, now known as the Climate Action Plan. In the Plan's 2017 progress report that 83% of the identified 170 actions were on track and in fact translating

to a 21% carbon emission reduction to date. In 2016, Oregon passed the Clean Electricity and Coal Transition Act, a first-of-its-kind law to transition completely off of polluting coal-fired power while doubling the state's commitment to clean electricity -- like solar and wind -- to 50% new, renewable energy by 2040. Further, in 2018, Oregon's Climate Agenda was developed to strengthen the link between climate goals and work force opportunities and economic benefits in the transition to clean energy. The Portland Clean Energy Community Benefits Initiative passed as well in 2019 to invest money from a corporate tax into local projects communities of color who are disproportionately impacted by climate change. In 2020, if HB2020 passed it would have set emission limits to 80% below 1990 levels by 2050 and generated funds to aid in the disproportionate impacts of climate change.

In 2020, Vietnam will officially launch its power development plan and like Oregon work to advance renewable energy infrastructure (to 20% of the power mix by 2030) and transition away from fossil fuels in order to protect ecosystems which support clean water, air and soil. To promote these shifts in investment; ngo's are working at the household scale in rural communities to provide training and cost-effective strategies to increase energy access and efficiency and the knowledge to install and utilize renewable resources of energy. For example by 2030, the Million Green Homes program championed by ngo Green Innovation and Development (GreenID) aims to have one million buildings in Vietnam with solar PV rooftop systems paired with energy efficiency and other green solutions that benefit vulnerable populations and small and medium enterprises.

Building on Vietnam's recent climate initiatives to invest in renewables and transition to a greener economy and the State of Oregon's Climate Agenda emerges a chance to strengthen the Vietnam Oregon Initiative network, learn together and test mutual benefits.

1.2 Methodology

The shared climate agenda is a network governance approach to informal multi-sector partnerships that can nimbly respond to market incentives to leverage political, economic and educational resources. Collaborating through this unique state to country partnership aims to maximize market-based solutions to expand clean energy by broadening access to workforce training, low carbon lifestyles and amenities.

1.3 Vietnam Oregon Initiative Shared Climate Agenda

Promote Climate Change Policy and Build Up Leadership: Establish programs that build up Vietnam's leadership capacity and the scientific basis to implement climate adaptation and mitigation strategies. Work with members of the National Assembly, provincial governments, and line ministries such as the Ministry of Construction, Ministry of Planning and Investment and Ministry of Natural Environment and Ministry of Science and Technology to integrate policies into local planning, administration and investment strategies.

Action Areas

• Public sector training for climate leaders including decision-making and policy development which reduce coal dependency in power generation and align market-based programs to transition to renewable energy sources.

• Engage Vietnam national and local governments to improve economic governance to advance community-based participation and investment in emerging carbon markets and technology that supports renewable energy power generation and storage.

Develop Clean Energy Workforce through Training and Education: Prepare Vietnam's workforce for the transition to a greener economy through training and education programs aligned with clean technologies and less carbon-intensive construction and production models.

Actions Areas
• University partnership development to host technical trainings and workshops for emerging technologies.
• Share renewable energy technology production and application models for large and small-scale installations of solar and wind power.
• Build private sector partnerships to promote knowledge transfer for integration of energy efficiency, green building science, automation and robotics.
• Share smart city applications for building and land use that promote quality of life and reduce environmental impacts on vulnerable populations.
Expand Sustainable Product Development: Improve the performance and quality of businesses in Vietnam and Oregon to compete globally in sustainable product development.
Action Areas
• Expand the application of life cycle assessment and financing tools to promote viable clean technology products and services across multiple sectors including manufacturing, agriculture and forestry.
• Increase market access to energy efficient appliances for residential and commercial use.
• Advance sustainable transportation system models that increase smart, multi-modal transportation options including electric vehicles and bicycle infrastructure.

2. Oregon Case Studies; Emerging Green Markets Tied to Urban Resilience and Rural Working Lands

2.1. Oregon Renewable Energy Policies

Oregon Renewable Energy policies for utilities paired with energy efficiency in Oregon are some of the most aggressive standards for cutting greenhouse gas emissions in the U.S. Since the 1980's (following passage of the Northwest Power Act), energy efficiency was identified as a cost-effective priority for the region. Paired with SB 1149 passed in 1999, Oregon's largest utilities were required to invest in energy efficiency, using utility revenues collected through a public purpose charge. By mandating that utilities supply 50 percent of customer demand with renewable energy by 2040, Oregon created one of the first renewable portfolio standards in the U.S. Unfortunately, Oregon undermined that target by classifying a number of "dirty" energy sources as renewable such as sewage gas and manure digesters and allowing the use of a compliance mechanism to purchase credits with no monitoring oversight (2). Despite these shortcomings, by 2019 more than 55,000 workers in the clean energy sector, 50 times as many as of those employed by fossil fuel industries, and this number is growing 11% annually – faster than Oregon's statewide average. These jobs typically can't be outsourced, are often accessible with a technical degree, and 11,000 of them are located in rural communities.

Oregon has invested significantly in energy efficiency programs, in recognition of the need to promote lower energy bills, protect public health and safety, improve environmental benefits, stimulate sustainable economic development, create new employment opportunities and reduce reliance on imported fuels. Oregon's ngo Energy Trust, stands outs for its return on investments in energy efficiency programs which have shown to provide $3 in cost savings for every $1 in program fees. Since its inception in 2002, Energy Trust has led over 700,000 home and building improvements from improvements in insulation and heating and cooling efficiency. Through this work utility customers have saved over $7.6 billion on utility bills, installed 13,000 renewable energy systems and saved or generated enough energy to fuel a clean energy power plant. $6.3 billion of that funding has been directly added to the economy with 22.8 million tons of carbon dioxide avoided equal to removing 4 million cars from the roads for a year (3).

There is a workforce development component which has proven valuable in retrofitting homes and commercial buildings for energy efficiency. Clean Energy Works (now Enhabit) was a collaborative effort to align energy efficiency outcomes with low-income households who needed the savings most and retooling an underutilized workforce to implement the plan. Clean Energy Works saw the following results:

- Over 20,000 families were served with results of more than 30% energy savings per household
- Energy retrofits were increased by eight times, from less than 200 per year to about 1,600 per year.
- Accessible to 82% of the Oregon population; the program significantly increased capacity to respond to local needs throughout the state.
- There was a high return on investment, over $100 million in economic activity and the creation of 500 new jobs

Governor Kate Brown further elevated Oregon's leadership on energy initiatives when she signed an executive order which required new state-owned buildings to be carbon neutral in 2022; all new buildings to be solar ready by 2022; and new residential buildings to "zero energy ready" starting in 2023.

2.2. Oregon Agriculture Policy

Oregon Agricultural policies are grounded in a state-mandated approach to protecting high-value farm and forest "working lands" through a scientific suitability analysis of soils. Oregon has some of the most productive soils in the world both due to natural (geologic conditions) and now because of strict classification system to keep these soils in use. The State of Oregon requires rigorous testing in order to determine appropriate land use designation to ensure areas contained by urban growth boundaries for high-density development are often on degraded soils and or soils with low agricultural or forestry values (5). Not only does this protect natural carbon sinks (trees, plants and soil), it also promotes density for compact communities increasing access to basic amenities (transit, water, sewer, etc). In Western Oregon alone, scientists predict that Oregon's urban growth boundary and scientific approach to land use has contributed to carbon storage equivalent to a reduction of 1.7 million metric tons of carbon dioxide (CO2) emissions per year (6).

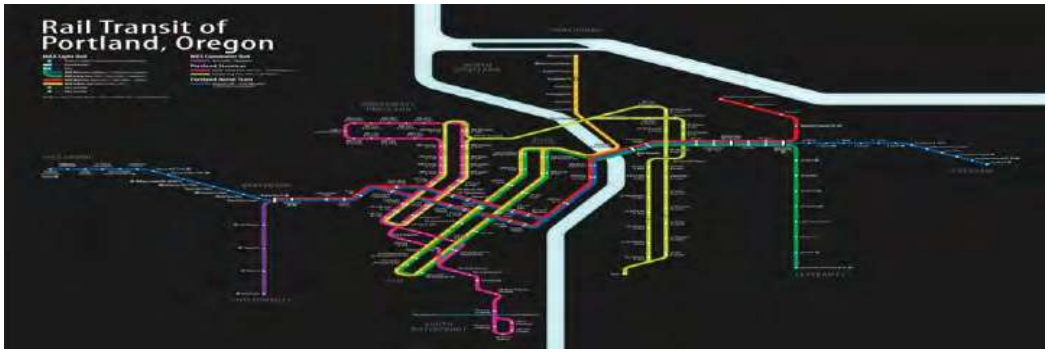
Further, these productive soils contribute to a robust local food economy. "Oregon's location quotient for food production is 2.6, meaning the concentration of agricultural jobs is two and a half times what it is nationwide. This is primarily driven by crops (grains, fruits, vegetables, etc.) and fishing. Oregon's location quotient for food processing is 1.5 meaning the local concentration 50% larger than in the average state." Knowing rural communities especially with resource-dependent economics are especially sensitive to the effects of climate change and increases in fuel prices—expanding the use of soil testing as a basis for local land use controls across the U.S. and Vietnam could rapidly and significantly expand carbon sequestration.

Picture 1 Oregon's Urban Growth Boundary has protected productive soils from being paved over by inefficient development

2.3. Oregon Transportation Policy

Oregon Transportation policies have targeted systemic reductions in fuel emissions resulting in over 1 million tons of carbon emissions reduced since the passage of Keep Oregon Moving (HB2017). Transportation remains the number one contributor to greenhouse gas emissions (about 20%) primarily from trucks and single-passenger vehicles in Oregon despite major investments in clean fuel standards and electric vehicle rebates. Compact communities that increase the density of neighborhoods within the urban growth boundary and require developments to be transit-oriented best support fewer vehicle miles traveled and improve walkability, bikeability and transit ridership rates. The next phase for transportation policy is to curb emissions in urban areas with be congestion pricing to minimize commuting times, traffic delays and idling.

Nationally, studies show that investment in public transit not only contributes to local quality of life; it also supports tens of thousands of manufacturing jobs through its supply cahin. There are over 2,700 manufacturing companies producing parts for public transit systems nationwide. The American Public Transportation Association found that 15,000 jobs are tied to every billion dollars invested in transit capital from construction to upgrading level of service (8).



Picture 2 Map of Portland's efficient light rail system, one of the most developed in the U.S.

3. Vietnam Case Studies; Emerging Green Markets with Value Chain and Green Job Creation.

3.1. Vietnam Land Use and Development Policy

Context: Existing green policies and real estate market development

Picture 3 Solar energy used for aquaculture farm in Phu Lac.

In the last decade, the multi-function buildings are becoming popular in the cities and their growth is proportional to the fast urbanization, especially the outstanding thriving of leading

real estate investment companies including Vingroup, Novaland group, Dat Xanh Company, Vihajico Company, FLC group etc. with the larger-scale real estate projects like Tay Mo smart city, Time city, Ecopark, etc. in the Northern and Sunrise city view, Lakeview city, Aquacity, Palm marina etc. in the Southern. These mixed housing and hospitality projects provoke the increasing demands of energy, water and waste treatment resulted from the blooms of their commercial retails, housing, food centers while the public infrastructure presents the poor capabilities due to the low investment and inadequate planning.

The concept of Green building (GB) embraces the principles of low environmental impact through greater energy efficiency, low energy demand, reduce water usage, improve indoor quality and minimise construction waste [1]. Green buildings with green certificates have been implemented in many countries around the world. The green building certificate has been implemented by 6 countries and the LOTUS green building certificate has been provided by the Vietnam Green Building Council with an increasing number of buildings getting LOTUS certificates so far. Beside of LOTUS certificate, the Vietnam Green Building Council provides the certificate of LEED (Leadership in Energy and Environmental Design) for building projects in Vietnam [2].

In nearly 10 years of development, the number of buildings registered to get LOTUS certificate increased with 50 building projects in 2018 including different types like mixed use, hospitality, retails, residential buildings, office, industrial, school [3;4]. This number still is behind of the growth of buildings provided by the current market. The Green Buildings has been mainly grown in two big cities, Hanoi and Ho Chi Minh City, and currently tend to expand to other cities where the tourism activities and services are growing with high rate. For example, the Novaland group planned to provide to market in 2019 the new big hospitality and building projects in Phan Thiet, Nha Trang, Vung Tau, Bien Hoa etc. [5]

Beside of the initial development of green building certificates like LOTUS, LEED, the renewable energy, especially solar energy, has been strongly promoting by the Vietnamese government in responding to the national contribution commitment of the reduction of greenhouse gas emissions under United Nations Framework Convention on Climate Change 2015. The national legal framework to promote the development of renewable energy has been approved by Prime Minister with Decision 02/2019 / QD-TTg to enable the solar rooftop power solar power, Decision 11/2017 / QD-TTg to enable the mechanisms of investment of solar power plants. The regulation on prices of buying solar energy by regions has been drafting and finalizing to promulgate soon [6]. The promotion of green energy in different industries also supported by two other top legislations including Decision 1393/QĐ-TTg on endorsement of National Green growth strategies and Law of National Environment Protection No 55/2014/QH13 promulgated by National Assembly which implies the significant use of energy efficiency and renewable energy in the economic leverage as the key feature to protect the environment.

This national legislative framework created a breakthrough to boost the development of solar energy market in Vietnam, opening up many potentials for the use of solar power and energy efficiency for buildings and infrastructure utilities in mixed retail and residential projects. The small and medium cities are considering as the emerging markets with smaller scale of real estate which are mostly the hospitality and retail projects.

In reality, even the increasing number of LOTUS/LEED registrations of building projects, the motivation of using the green building certificates in the real estate market is not noticeable in bringing the benefits to the investors. The use of those green certificates faces several challenges such as entailing the upfront cost in the total investment when adopting the green certificates and then increasing the price of units which is always unlikely for the customers, lack of environmental awareness of residential results the absence of pressure to adopt those certificates and regulation enforcement at grassroot level.

Market driver: the inter-connected benefits among green building certificates and value chain and community health.

The wider application of green building certificates for mixed housing and hospitality projects will generate the business opportunities for services and products used in constructing the green buildings such as using the natural materials and designs to minimize the energy use of building, the high-performance electrical devices and smart monitoring devices to optimize the building's energy consumption, the green mobilities for residential buildings in moving to their offices, shops and supermarkets etc. Using the green input resource spurs the opportunities of minimizing the on grid electricity consumption of building amenities and increasing the use of green energy.

In the context of transition of electricity production market with the increasing participation of the private sector with focus on the renewable energy, the electricity price is being strongly adjusted by the Vietnamese government in the direction of market based pricing of power. The meaning of resource efficiency is becoming significant for all of activities and outputs of enterprises. The buildings with green services and facilities with green inputs resources will bring the meaningful benefits to the building owners. The real estate investors could get better public and customer trust through improvement of environmental performance of buildings against certain targets, lower operational costs by conserving input materials and energy efficiency, minimize waste and enhance their compatibility with high standards related to health and safety for buildings. The adoption of green certificates with healthy and safety standards contributes to diminish the risk of liabilities and health insurance claims for residential living in the buildings.

The typical instance of Ecopark, one of biggest mixed retails and residential township, recognizes the significance of eco values and is trying to improve their eco township through doing the valuable actions like as the campaign to zero waste, use eco buses and electric car for internal and external transportation, and digital technology application for township infrastructure management etc. which aims to use the green standards to bring more and more eco values to their residential communities. [7].

It’s time of the maturing opportunities for real estate companies to consider the benefits of high investment costs and low operation costs with friendly environment impacts instead of low investment with damaged environmental impacts. Breaking the financial barriers with the conflict between investment cost and environment values also contributes to this driving development of the green building market.

Potentials of green jobs generated from value chains of real estate market

The obviously current impacts of climate change and air quality in the major cities are clearly showing the signs of degradation and boosting the real estate investors to consider their vision of eco friendly products and services in the market segment of housing, commercial building and hospitality projects to improve their competitiveness. Promoting the development of green buildings and non- fuel infrastructure facilities or seriously considering the green values created in the process of operation will bring the insights for development of green jobs and green technical skills.

Even there are many business opportunities for this green building market but it exists the huge gaps of resources. As emerging markets in the world, the important driving resource is the skillful workforce who contributes as qualified inputs to the services or products of enterprises. In this workforce market, the improvement and enhancement of green skills is critical factor to produce the green buildings with green certificate adoption. The green skills of this market relate to the areas of technical design, engineering, procurement, management, material manufacture and supplies, efficient equipment and appliance manufacture and installation etc.

The value chain of services and products generating from the development of green buildings are significant element that enhancing the development of green labor market in Vietnam. In nearly a decade of green building development, the green skill labor market has still under developed and fragmented then can not play as a driving actor.

The fundamental reason which explain this low development of green workforce comes from the intrinsic issues of education of universities which are still developed behind of market growth and needs [8]. Green knowledge and skills of vocational training programs are scattered in the most of industries.

The second reason comes from the gap of local green technologies which always concentrate in the big companies and in big cities where there is always providing a high incomes and job opportunities for this high labor market. Small and medium local suppliers are almost unskilled and knowledgeable about green technologies due to their inability to invest to those technologies and hire those qualified labors. In addition, small local suppliers are unable to access the green technologies and materials which only reach their low prices once importing the huge bulks.

Finally, the dissemination of green knowledge only aims to improve the awareness of energy saving, reduce energy energy consumption, use high energy efficiency devices, monitor energy consumption but not yet targets to the objective of identify the career direction and education of young generation. The communication programs are focus on short-term implementation and have not really improved the attitude and made consensus among residents and communities. In reality, most of students and their parents could not reach any information and perceive about the green career market when identifying their career education even they could collect those career information through consultancy education centers.

Recommendations to develop green skills for greening real estate development project

Building the green workforce resource to respond to the market demands is not easy and should be approached and implemented by different inclusive pathways. In vertical

direction, they should be enhanced through the comprehensive curriculas from vocational training programs to undergraduate and graduate education programs and frequently update the professional training programs for targeted officials of local governments and company staff. The integration of green values into the education schools needs to be addressed through vague projects for students to improve their awareness and changing their routines. At the grassroot of policy making and implementation, the improvement of abilities of policy makers should be taken frequently with incentives to create their self motivation and innovative ideas. In horizontal direction, the knowledge and skill improvement needs to undertake in cross relevant sectors from material manufacture, engineering and services to banks and financial institutions. The inclusive campaigns with demonstration projects are necessary and bring the impacts and public influences to the residential to improve their awareness of green values for environment protection and change their routines from using the low efficiency to high efficiency appliances and mobilities, from using the polluted products to eco-friendly products (for example phasing out the plastic products in the habits of shopping and food storage).

Picture 4 Ecofarm greenhouse in Tan Thanh commune, Thanh Binh district, Dong Thap province.

3.2. Vietnam Agricultural Policy

Context: Mekong Delta region, the biggest agricultural market in transition process.

Mekong Delta of Vietnam includes 13 provinces (Long An, Tien Giang, Dong Thap, Vinh Long, Tra Vinh, Hau Giang, Soc Trang, Ben Tre, An Giang, Kien Giang, Bac Lieu, Ca Mau, Can Tho) in which their overall agriculture sector plays a role of key driving economic actor of the region. In period of 2016-2018, the total agricultural production value accounts for 34.6% GDP of national agricultural production [1]. The agricultural transition towards to join the global value chain of high quality products is realising as the long-term vision of Vietnam Government which attempts to marginalise the economic gains and attract the great investment for Mekong Delta region. Strategies with actions to promote this agricultural transition are built on the involvement of key actors including the state, enterprises, farmers and scientists for the production, processing, packaging and market consumption [2]. The production steps including the breeding development, cultivation and processing stages (preliminary processing or finished products) are improving through the supports of enterprises and scientists in order to response to the international and local market standards. At the national level, the Prime Minister's Decision 80/QD-TTg on promoting

consumption of agricultural products through signing a wholesale contract has made a big step forward the promotion of agricultural products in the new markets. In addition, land pooling policies for agricultural land enables the farmers in expending their farm and production scale.

The regional agricultural extension policies of the provincial governments in the Mekong Delta region aim to improve the knowledge and knowhow of farmers and enable the provision of materials and accessibility to financial resources when upscaling their business and production.

The edging insight is visible in the Mekong Delta agriculture with the remarkable and very active partnership involvement of the leading research institutes and universities such as Can Tho university, Cuu long Delta Rice research Institute, Institute of Agriculture Science for Southern of Vietnam etc. in all steps from breeding stage to cultivation and harvest through transferring the technologies and knowhow to improve the quality, reduce the use of fertilizers and water.

Besides, Mekong Delta provincial governments are improving step by step the legislative framework and investment environment to engage the private sector and foreign investors into the agriculture transition and the region's agricultural development.

Market driving actor, Agriculture 4.0 is the combination amongst ICT technology and renewable energy and energy efficiency for processing and cultivation to reach the high quality market based agricultural products. [3]

The development and maturity of ICT 4.0 and bio-agricultural technologies from advanced countries such as Israel, Japan etc. and those technologies are expanding in Vietnam's agriculture and especially in the Mekong Delta region. The ICT application plays a significant role as the actor no 5 in driving the agricultural growth. This actor is bringing the efficiency for the agricultural production in responding to the healthy and safety standards like Vietgap, BMP, ASC, BAP etc. and also allows to reach the high yield due to minimize their dependence on the season, climate and nature. The of greenhouse cultivation technology, solar energy and energy efficiency (LED lamps, pumps), and ICT tools of monitoring the quality of water, soil, fertilizers and agricultural waste now is popular in the Mekong Delta provinces. The successful story of organic agricultural farms of Ecofarm represents the new trend in the agriculture sector with significant projects of 84 ha of organic vegetable farm in Kien Luong district of Kien Giang province, and 8000 m2 of organic vegetable farm in Thanh Binh district, Dong Thap province [4]. Other story is the farms of My Dong Agricultural Coop No2, the farmers use smart fertilisers together with other harmless biological product and water level measuring equipments which use the electricity generated from solar energy to monitor the rice plants at each stage of growth [5]. The use of clean energy for the entire system allows the inclusive changes and use of resource efficiency for agriculture through saving manpower, materials, electricity and water.

Regard to the environment conservation, the system of collecting agricultural waste to produce the biogas and re-use in the process of livestock cultivation also studied and implemented in some small farms in Mekong region but still need to improve in term of technology. The biogas production and broad use in the agriculture allows to complete the

closed circle from livestock, fruit and vegetables cultivation and aquacultural production in Mekong region.

There still exist a great potential market for exploring the renewable energy use in the process of packaging and storaging stages to improve the supply of products for the domestic market through prolonging the freshness of the product without use of preservative chemicals.

Mekong Delta region is also the region which is favorite the development of numerous solar energy plants since they reach around 2200 – 2500 hours of sun per year [6]. In this regard, marginalising the land use in the both sectors including agriculture and energy is important to avoid the conflict of land use. Recently several international organizations and companies have begun to study the dual use renewable energy and cultivation both for rice and vegetable crop or aquacultural farm [7-8]. This dual use aims get the two-in-one effect, offgrid electricity for agricultural development with high productivity while curving off the high electricity demand on the national grid.

Potentials of green jobs from value chain of eco agriculture development

The agriculture 4.0 is the new trend and emerging market in Mekong Delta region. This emerging market demands a range of energy services which need to tailor with the different types of agricultural farm. The local leading universities and research institutes mostly are focusing on the edging technologies to support the agriculture activities like the breeding, cultivation and harvest but still not address yet to supplementary services like energy and ICT application.

Meanwhile the abilities of local energy service companies are still restricted. Especially it exists the wide gap of information dissemination of the potential benefits of solar energy use for cultivation and the lack of training programs for farmers. Except the relatively large companies, most of famers still keep their cautious to invest the solar energy for their own farms.

Recommendations of green education for agriculture 4.0 development:

Again, the inclusive pathways to enhance the fundamental education of universities and vocational schools are the key elements to bridge the gap of green skillful labor force in the agriculture market. The local universities and vocational schools need to address to the integration of green technology curriculas and broadly comprehensive training programs which combine the greenhouse technology, energy services and ICT application for agricultural sector in Mekong Delta region. Moreover, the development of community based agriculture education programs and productions with the own and share model of green energy investment (solar and biogas energy) contributes to build up a community based branding of clean agriculture while maintaining a water management and minimizing the agriculture waste for the environment.

Together, the VOI Climate Agenda promotes a package of policy mechanisms and industry practices to build a learning and implementation network across diverse sectors and networks. It will take shared leverage through the Vietnam Oregon Initiative to move political strategies, investments and education towards a more prosperous future.

4. References

References for Oregon Case Studies:

[1] Pew Trusts https://www.pewtrusts.org/research-and-analysis/data-visualizations/2015/hia-map/state/oregon/oregon-vehicle-miles-traveled-legislation

[2] The Oregonian https://expo.oregonlive.com/news/erry-2018/07/3d33303baa4546/study-oregon-gets-a-d-in-renew.html

[3] Energy Trust https://www.energytrust.org/about/

[4] State of Oregon https://www.oregon.gov/olcc/docs/bottle_bill/bottle_bill_faqs.pdf

[5] State of Oregon https://www.oregon.gov/lcd/FF/Pages/Soils-Assessment.aspx

[6] USDA https://naldc.nal.usda.gov/download/3143/PDF

[7] Forbes https://www.forbes.com/sites/energyinnovation/2019/01/22/oregons-clean-energy-jobs-bill-an-economic-engine-and-a-decarbonization-catalyst/#14f9dd73512d

[8] T4America https://t4america.org/maps-tools/transit-supply-chain/

References for Vietnam Case Studies:

Land Use and Development Policy

[1] A review on Green Building in Vietnam, Queensland University of Technology, 2 George St, Brisban, QLD 4000, Australia – Author Hong Trang Nguyen, Matthew Gray, {https://www.sciencedirect.com/science/article/pii/S1877705816004173}

[2] Vietnam Green Building updates – {https://vgbc.vn/en/vietnam-green-building-list/}

[3] Vietnam Green building rating system – {https://vgbc.vn/en/lotus-en/rating-systems/}

[4] White Paper "Is there a future for Green Buildings in Vietnam?" produced by Solidiance, August 2013 {https://solidiance.com/insights/building/white-papers/is-there-a-future-for-green-buildings-in-vietnam}

[5] Project lists of Novaland Group https://www.novaland.com.vn/en-US/projects/hospitality/resort-and-hotels

Agricultural Policy

[1] Urban economy: how to develop Mekong Delta agriculture by sustainable and healthy way http://kinhtedothi.vn/lam-the-nao-de-phat-trien-nong-nghiep-dong-bang-song-cuu-long-ben-vung-an-toan-345797.html

[2] Tạp chí khoa học 2004:1: thực trạng và giải pháp cho sự liên kết "bốn nhà" trong sản xuất và tiêu thụ nôn nghiệp Đồng bằng song cửu long {Integrating "Four factors" (State – household –Entrepreneur – Scientist) is one of the major solutions that contribute effectively in the process of producing and consuming agri- produce in Mékong Delta at present}

[3] Website information: Cuu Long agriculture, accessibility to agriculture 4.0 – {http://nongduoccuulong.com/n/kha-nang-tiep-can-nong-nghiep-4-0-o-viet-nam.html}

[4] Ecofarm - https://forbesvietnam.com.vn/doanh-nhan/ecofarm-phat-trien-dua-vao-nong-dan-5848.html; http://www.ecofarm.vn

[5] Mekong farmers make organic switch to improve business - https://en.vietnamplus.vn/mekong-farmers-make-organic-switch-to-improve-business/152483.vnp

[6] Bản đồ năng lượng bức xạ Việt nam {https://techway.vn/ban-do-nang-luong-buc-xa-viet-nam/}; Map of Solar resource and potential in Vietnam {http://solarhub.vn/wp-content/uploads/2016/11/Maps-of-Solar-Resource-and-Potential-in-Vietnam-REPORT-FOR-PUBLISHING.pdf}

[7] Study "Dual use approaches for solar energy and food production, international experience and potentials for Vietnam" published by Rosa Luxemburg Stiftum and Green ID dated November 2018.

[8] Solar energy for agriculture development in Phu Lac http://vree.vn/tin-tuc-cong-ty/he-thong-dien-mat-troi-hoa-luoi-ket-hop-phat-trien-nong-nghiep-tai-phu-lac

[9] Other references: *WB " chuyển đổi nông nghiệp Việt Nam: tăng giá trị, giảm đầu vào; ADB* - Biofuels in the Greater Mekong Subregion: Energy Sufficiency, Food Security, and Environmental Management.

Research Paper

RESEARCH ON STRATEGIES OF LOW-IMPACT URBAN DESIGN IN CHINA

Take Beijing waterfront urban design evaluation as an example

Cong CAO[1,2], Suning XU[1,2]

[1] School of Architecture, Harbin Institute of Technology, China

[2] Key Laboratory of Cold Region Urban and Rural Human Settlement Environment Science and Technology, Ministry of Industry and Information Technology, China

Abstract

This paper aims to provide theoretical method support and practical experience for creating environment friendly urban space by low-impact urban design methods, and discussed on two aspects of theory and practice.

Firstly, the definition of low-impact urban design in the context of Chinese cities is expounded by combing the development stage of urban design environment view and analysing the development needs of Chinese cities. Then, it discusses the framework content and evolution process of low-impact urban design in China, and puts forward the view that low-impact development elements and low-impact design control elements are mutually dependent and mutually reinforcing. Next, the objects and related characteristics of low-impact urban design are explained from multiple perspectives, as object system, object composition and basic characteristics. Relevant strategy formulation is the focus of this paper. First, it is necessary to establish a low-impact urban design system in coordination with legal planning, so as to help implement the low-impact design concept with the seriousness and execution of legal planning. Secondly, the framework of low-impact urban design control elements including 5 different layers is established, which can effectively evaluate and optimize the impact of design results on the city. Thirdly, the value evaluation mechanism of dynamic cycle is proposed, which is helpful to the implementation of low-impact urban design and the restoration of design intention. Finally, the paper takes Beijing waterfront urban design evaluation as an example to apply the low impact evaluation model proposed in this paper, and satisfactory results were obtained.

Keywords

Low-impact urban design, urban design, strategy, China

In recent years, global climate change had brought severe test to the living environment development, the city both responsible for climate change, but also slow down the crisis. China is one of the world's most active countries on the exploration and construction of low-impact urban design. Low-impact construction represents China's commitments to international community about energy-saving and carbon emission reduction, also in line with the national strategy of ecological civilization construction and urban development

trend in the future. In the context of such research, the innovation need for method and theory of Low-impact urban design was even more necessary and urgent.

Low-impact urban design described in this study is based on the ecological urban design strategies, to address the complexity and uncertainty issues, which generated in the process of construction and development of Chinese cities. And build the pattern framework with sustainable characteristics based on the view of flexibility and adaptability, which does not adhere to the traditional urban design processes or programming, instead combining flexibility with sustainable design actions to be applied to different urban spaces.

1. The definition of low-impact urban design

1.1. The evolution of environmental view of urban design

The definition of "environment" here refers to the totality of various natural and social factors surrounding the space of people and which can directly or indirectly affect human life and development. While "environmental view" refers to the sum of people's views and concepts on the environment itself. Stern & Dietz divides environmental values into three levels as self-centred values, human-centred values and ecology-centred values. There is a progressive relationship among the three different levels, the ecology-centred values are the most advanced and most in line with the development concept of low-impact urban design. In the course of its development, the environmental view on space, nature and human value of urban design are constantly changing, and different views have been generated along with this process. Based on the principle of time division, the evolution process of environmental value of urban design is summarized below. (Figure 1)

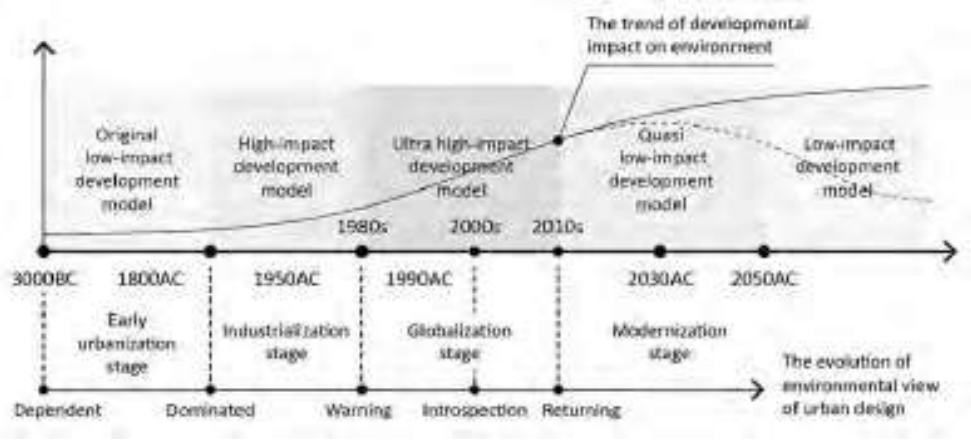


Figure 1 The evolution process of environmental value of urban design

It can be seen from the figure that the environmental view of urban design has gone through four stages: original low-impact development model, high-impact development model, ultrahigh-impact development model and quasi low-impact development model. In the early urbanization stage, the city adopted a simple and primitive low-impact development mode, which was under the control of social productivity. Subsequently, the rapid development of industrialization led to the high-impact urban development mode. At this stage, the environmental view was mainly manifested as the dominant use of natural environment and resources. At this time, the theoretical circle had begun to sound warnings about the adverse impact of urban development on the natural environment. After the city into the

stage of globalization, as a result of the social productive forces rapid ascension, urban development impact on natural environment reached unprecedented heights, the emergence of a large number of urban problems prompted scholars and urban managers a reflection, exploration eco-friendly concept of urban development and urban design theory is urgently needed. At the beginning of the 20th century, the urban development mode represented by low-impact development has been recognized globally. Specifically, the impact curve of urban development on the natural environment has been moderated and decreased, providing a good expectation for the ultimate realization of low-impact urban development mode.

1.2. The definition of low-impact urban design in China

In the past 30 years, China has experienced an unprecedented process of rapid urbanization, realizing the development achievements of developed countries that took nearly a century to achieve. On the one hand, rapid urbanization has greatly improved China's social economy and people's living standards. On the other hand, the high-impact development mode represented by serious irreversible damage to the natural environment is also constantly interrogating the conscience of urban managers. Therefore, in recent years, the low-impact urban design concept represented by green urban design and eco-oriented urban design has been widely recognized and applied in China, and has accumulated considerable theoretical and practical experience.

Low-impact urban design is a new urban design concept with green urban development theory as the background, natural ecological system as the support, human behaviour as the leading, spatial form design as the means, advanced technology as the support, implementation and evaluation as the guarantee, and spatiotemporal continuation as the purpose.

Specifically, low-impact urban design is under the background of global climate change, and to the environment, energy, ecology and other related disciplines theory as a guide, in-depth study of urban space environment and the internal interaction between urban construction activities, and in view of the urban form evolution and low impact development issues, the relationship between dimensional specified in the theoretical basis and practical level of strategies, methods and evaluation system. So as to promote the formation of ideal low-impact urban development mode, and creates a social practice process of urban space environment in harmony with the climate environment protection, ecological system growth and high-quality public life.

2. The connotation interpretation of low-impact urban design

2.1. The framework of low-impact urban design

"The interaction between human and environment" has always been the focus of urban design and the practical basis of low-impact urban design. The so-called "environment" refers to the overall space of people and various natural and social factors that can directly and indirectly affect human life and development. As a realistic system and basic framework of citizen life, urban physical space environment should include artificial environment, natural environment and the interaction between the two parts.

Low-impact urban design is based on the understanding that urban space environment can support and guide human behaviour. "Natural environment -- human activities – artificial environment" has also become the main line of methodological framework to exert the values of low-impact urban design. It should be noted that since city is a complex giant system, the structural mitigation effect of urban design on the impact of urban construction on the natural environment is often difficult to be quantified and ignored as an indirect path. But in fact, urban design can achieve the goal of comprehensively reducing the impact of urban development on the natural ecology from the perspective of reducing the overall space energy consumption demand, improving the overall space ecological quality, and promoting the human activities efficiency.

Therefore, follow the main line, low impact urban design research should further to the relationship among human, artificial and natural elements under the background of climate change. (Figure 2) As well as its mechanism of integrated influence on urban system.

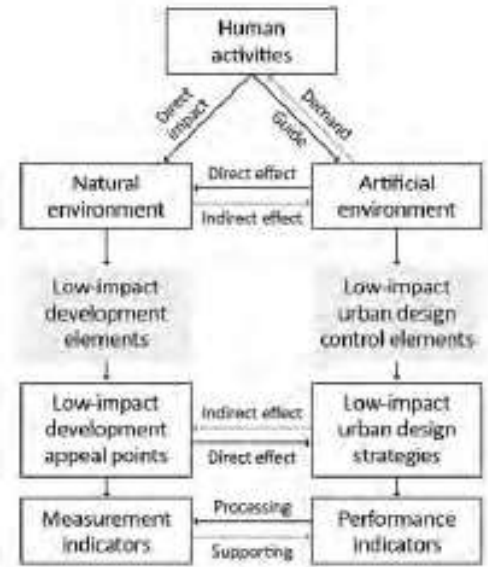


Figure 2 The evolution process of environmental value of urban design

2.2. The objectives of low-impact urban design

The establishment of the objective framework of low-impact urban design plays an important guiding role in the practice process and is the internal power throughout the whole process of urban design. The following will be discussed on the strategic level of the goal composition.

The strategic level goal of low-impact urban design is to help mitigate climate change and promote sustainable development of human settlements. Sub-goals are decomposed into three aspects:

(1) Promote the development of low-impact economic structure: urban design can combine new economic structure, logic of green development, ecological security pattern, energy-saving building technology, clean and efficient energy to create opportunities for new growth points of low-impact economy.

(2) Promote the formation of low-impact social order: urban design can create an environment and opportunities for residents to change their lifestyle through form design

and public participation, so as to facilitate the formation of a low-impact economy-oriented consumer society.

(3) Promote the coexistence of human and nature: urban design can protect natural resources and environment by exploring the development of settlements with the lowest energy intensive lifestyle.

2.3. The basic characteristics of low-impact urban design

Low-impact urban design is built on the basis of ecological civilization. Its essence is to integrate various natural elements and urban system components into the overall environmental system, and discuss how to achieve the liveability of urban environment and the efficiency of urban operation under different resource endowment conditions. Its basic characteristics mainly include four aspects as following.

(1) Systematic features Low-impact urban design advocates to re-examine the traditional linear planning mode, pay equal attention to the material and non-material attributes of the environment, and grasp the overall relationship of the system from the mutual connection of various components. The integral control of urban design on spatial form is not a simple superposition of various low-impact design elements. Instead, it aims to improve the operation efficiency of urban systems, reduce urban internal consumption and environmental damage, and ultimately achieve the symbiosis between human and nature.

(2) Operational features Low impact urban design has stronger target orientation and operability, and the related concepts are easier to be implemented and put into place. It has high operability that can be copied and promoted. The concept of "low impact" is permeated into various spatial scales and operational levels to test the effectiveness of the design results. Specific performance for the stage development expectations, measurable technical indicators, verifiable evaluation system.

(**3) High efficiency features** Low energy consumption, low pollution, low emissions and high performance, high efficiency and high benefit are the characteristics and direction of urban development in China, the Chinese academy of sciences points out in its China's sustainable development strategy report. To some extent, low-impact urban design is essentially a kind of "high-efficiency urban design", which follows the principle of minimum loss and minimum impact, improves the urban physical environment through natural regulation, pays attention to the climate protection effect of the ecosystem, and reduces the negative impact of human activities on the environment as much as possible. In short, one of the important features of low-impact urban design is to attach importance to the rationality of resource utilization, and to obtain the maximum economic, social and environmental benefits with the minimum input.

(4) Circularity features Circularity is the internal mechanism of natural ecosystem with strong vitality. Low-impact urban design should also combine the "circulation law" of the ecosystem to establish the feedback mechanism and material exchange mode between urban space and environment, so as to reduce the impact of construction activities on the natural environment to the smallest extent possible. It includes reduction of resource input, reuse of process maintenance and recycling of resource output. It can be seen that the focus of low-impact urban design should shift from functional design to resource-oriented design to reduce the adverse impact of urban activities on the natural environment and improve the self-sufficiency of the city.

3. The strategies of low-impact urban design

3.1. Compilation process in line with the statutory planning system

In the relationship between low-impact urban design and statutory urban planning, urban planning focuses on studying the functional combination of urban land use, comprehensively coordinating the development of economy, society and engineering technology, and seeking the comprehensive balance of social, economic and environmental benefits. The research field of low-impact urban design focuses on the interaction effect between urban natural environment and artificial environment, mainly to solve the disturbance of urban physical space and human activities on the natural environment, and its core content is to use the theoretical methods of related disciplines to create an efficient and high-quality urban environmental space.

Low impact urban design because of its lack of legal status, cannot be directly used to guide the implementation and planning management work, but as a research method and analysis process can also be throughout the whole process of urban planning. (Figure 3) It is coordinated with all levels of planning in time axis and space scale, which provides a model foundation for constructing a collaborative platform. Judging from the revision process of urban and rural planning laws and regulations in China and the implementation of local regulations, it is difficult to solve the demand of urban design legal status and regulatory effectiveness in a short term by means of legislative approach. Therefore, it is a reasonable choice to translate low-impact urban design achievements into legal planning system by means of "planning translation". By compiling multi-level urban design results to comply with the statutory planning system. The core control elements in the design results are reflected in the planning provisions, restrictive descriptions, prescriptive or guiding indicators at the certain level and taken as the basic conditions for the preparation of the sub-level, so as to strengthen the guiding and regulating role of urban design in the city construction project.

3.2. Establish low-impact urban design control elements framework

The element is the essential factor that makes up the thing, also is the basic unit that makes up the system. Combining with the low-impact urban design factors affect the mechanism of decomposition is analysed and related reference, this paper presents the "low-impact urban design control elements 5 layers framework" composed of the ecological impact layer, space impact layer, demand impact layer, economic impact layer and the aesthetic impact layer. It should be noted that the control elements of low-impact urban design are the selection and reconstruction of traditional urban design elements from the perspective of promoting urban operation efficiency in the context of climate change. Irrelevant or weakly correlated elements are not considered in this paper. (Figure 4)

(1) Ecological impact layer The impact of urban construction and human activities on the natural environment and natural resources was emphasized, and more attention was paid to the content of low impact on the macro-ecological security system and the original structural characteristics.

(2) Space impact layer This layer focuses on the physical form and spatial quality of urban physical space, and how to reduce the impact on urban operation state under the premise of developing corresponding contents, including urban infrastructure sub-layer, road traffic network sub-layer, urban block and open space sub-layer.

(3) Demand impact layer As the decision-maker and executor of urban construction behaviour, human is the ultimate decisive force of low-impact development. How to realize the vision of low-impact urban design under the premise of meeting the usage demand and spiritual demand of the citizen is the focus of this layer.

(4) Economic impact layer Economic development is one of the fundamental missions of cities, and low-impact urban design also needs to pay attention to this aspect. It includes the adjustment of urban economic structure, the improvement of comprehensive land value and the improvement of urban operation efficiency, and the supply of resources and services.

(5) Aesthetic impact layer The aesthetic demand of city is an inevitable product of urban development to a specific stage. As a new urban development concept, low-impact urban design inevitably contains the content of aesthetic thinking, which also proves from the side that the spiritual appeal of urban activity participants is one of the fundamental driving forces of urban evolution.

Figure 3 Coordination mechanism between low-impact urban design with statutory planning

Figure 4 Low-impact urban design control elements framework

Specifically, in order to ensure the integrity and effectiveness of the proposed framework structure, it should have the following characteristics.

(1) Hierarchy The framework of low-impact assessment elements deconstructs the influencing elements according to the progressive collection of elements, and each layer is composed of its own sub-elements to form a hierarchical element system framework.

(2) Structural Refers to the system independent of each other in proportion to a certain structure, and to a large extent determine the nature of the system. The levels of low-impact elements are complete and independent. After superimposed, the links among subsystems are emphasized to form a tower-like element correlation structure together with human activities, which determines the comprehensive performance of low-impact urban design as a whole.

(3) Heterogeneity Refers to the different status and function of the same element in different subsystems. Each level of the low-impact evaluation system has its own emphasis on the impact of the city, and the evaluation period is also different. The layered setting is convenient to discuss the effect and potential of each level more clearly, and also helpful to provide reference basis for the design organization, management and maintenance.

3.3. Dynamic evaluation mechanism of low-impact urban design

City itself come from the continuous accumulation of urban design implementation. The results of implementation at this time must be updated at a future point by the ongoing impact of human activities. However, the results accumulated through the passage of time will gradually accumulate into the urban design gene of the city, which will lead the iteration of the city development for a long time. In addition, the mutual attraction and consciousness between people and cities can be established by this gene, and eventually become part of the public values of the city.

The practice of low-impact urban design in China has long been focused on design but neglected implementation. This static urban design system is unable to timely and effectively foresee and adjust the unreasonable aspects in the design results due to the characteristics that its action factors are difficult to be separated. After its implementation and operation in the physical space, it will be modified postemptively and passively, resulting in multiple wastes of planning resources, construction resources and development time.

The logic of circular evaluation of low-impact urban design refers to by the whole cycle process is decomposed into preparation sub circulation as decision-making, implementation, evaluation, adjustment. Then the connotation behaviour of each sub circulation is logically disassembled, and the implementation effect of the sub-cycle is continuously evaluated and monitored. The obtained results are injected into the starting point of each sub-cycle to determine whether there is an update or adjustment demand, so as to realize the dynamic optimization goal of the whole process of low-impact urban design results. (Figure 5)

Figure 5 Dynamic evaluation mechanism of low-impact urban design

From a neutral perspective, resource effectiveness, internal and external effectiveness and ecological effectiveness are the evaluation conditions of the implementation vision of low-impact urban design. In addition, it tries to reach a relative consensus under the background of multi-value subjects of the government, the market and the people, so as to guide and adjust the action plan and connotation of urban design, generate sensible spatial results, and conclude the "reincarnation way" of low-impact urban design through deduction.

4. Exploration on low-impact urban design application

4.1. Introduction of Beijing waterfront space

As a world-famous ancient cultural capital, Beijing has a history of over 3,000 years, the water conservancy construction in Beijing is closely related to urban construction. And its waterfront urban design research is also an important part of the implementation of Beijing's overall low-impact urban design, which has a high research value.

Beijing water system was constructed in the Jin Dynasty and then completed in the Yuan Dynasty. After the utilization and development of Ming and Qing dynasties, a complete system and complete function water network was formed. Since the founding of the People's Republic of China, the urban functions of Beijing water system has gradually degraded in the context of large-scale city expansion. A large number of water system has lost their original functions of grain transport, irrigation and defence, and even the royal river channels supplying water for imperial gardens were not entitled to special status any more. Many natural river channels and ponds were straightened with curves cut off, and thus formed into artificial drainage river channels during this period. (Figure 6, 7)

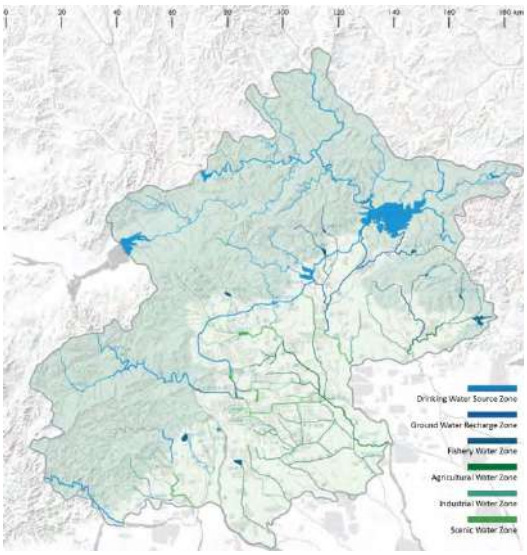


Figure 6 Water function layout plan of Beijing waterfront space

Figure 7 Satellite data of Beijing central city waterfront network

It can be seen that the development course of Beijing water system in recent years is not in line with the concept of low-impact urban development. Excessive intervention of artificial behaviour has greatly damaged and weakened the original form and natural properties of urban water body, which remains to be solved. Therefore, the research on low-impact urban design of Beijing waterfront area is helpful to restore the natural properties and functions of water bodies to some extent, alleviate various problems caused by urban construction activities, and improve the ecological elasticity of space and the value of natural supply.

4.2. Evaluation of Beijing waterfront space

The core objective of Beijing waterfront space urban design is, based on the relationship of city and river, to analyse how water impacts ecological environment, urban space and public life in the circular and metabolic process. The project will be developed from the following research perspectives and evaluation framework with synthetic weight. (Table 1)

(1) Landscape pattern perspective Geographical position and topography precipitation in Beijing is characterized by uneven space-time distribution, and dry and wet seasonal alternation. Given hydrological features and distribution of hydraulic facilities, an ecological design principle of regulating the dry and wet season is provided to guide the low-impact oriented waterfront space design.

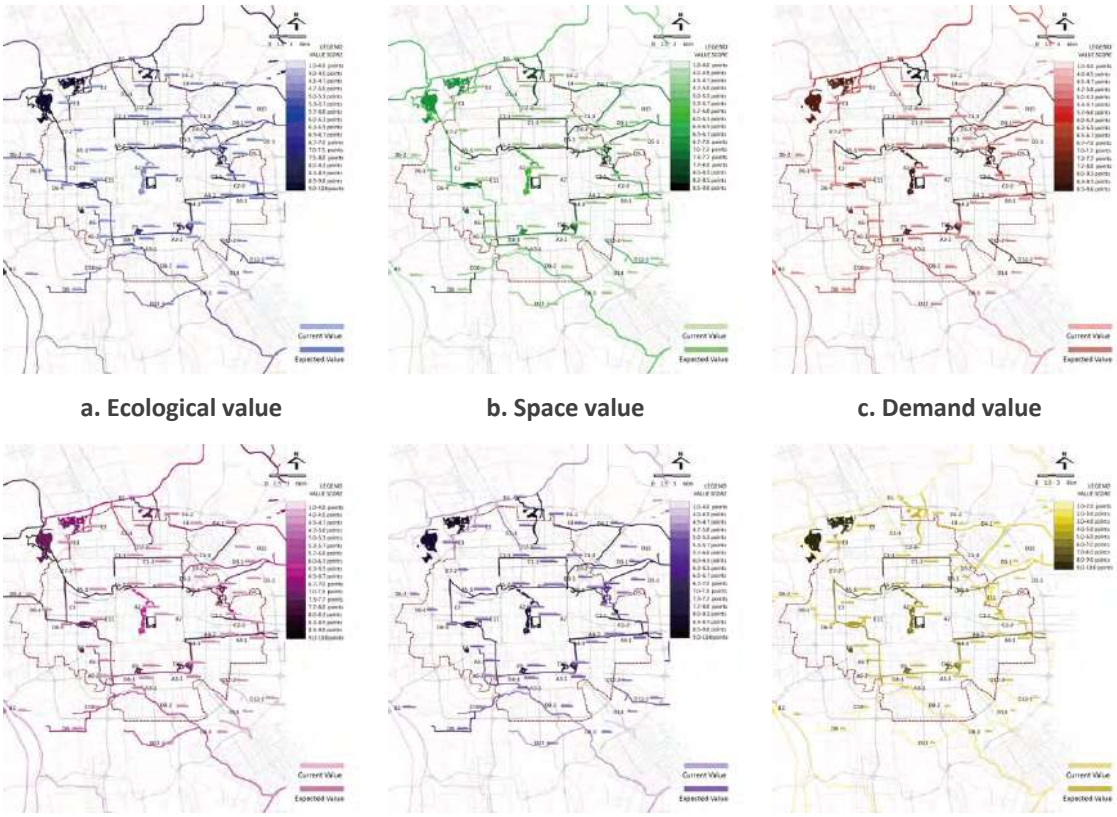
(2) Behavioural requirements perspective Due to the water supply security as the main function of the water network in Beijing, there is little room for public activities within the river channels. According to people's utilization requirements of the waterfront space in different seasons, space for urban water utilization and public activity is integrated, and regulation suggestions are proposed in order to improve environmental quality of waterfront space.

(3) Administrative implementation perspective According to impacts of city evolution on the water system distribution in modern times, multi-department coordination and management mechanism and pertinent design guideline are proposed based on the duty of each relevant urban administrative and institutional body.

Table 1 Evaluation elements and synthetic weight of Beijing waterfront urban design

FIRST CLASS	SECOND CLASS	SYNTHETIC WEIGHT	INDEX LEVEL	WEIGHT
ECOLOGICAL IMPACT LAYER	WATER	0.388	WATER QUALITY	0.118
			WATER QUANTITY	0.417
			GROUNDWATER	0.395
	GREEN	0.510	CATEGORY	0.059
			RATIO OF GREEN SPACE	0.981
			CORRIDOR WIDTH	0.505
			DEGREE OF FRAGMENTATION	0.124
			RATIO OF WATER TO GREEN	0.120
	CREATURE	0.120	DIVERSITY	0.580
			HABITAT	0.429
SPACE IMPACT LAYER	INTERFACE	0.498	WATER QUALITY	0.120
			BUILDING FACADE	0.130
			BUILDING SCALE	0.135
			WATER FRONT	0.280
			OPEN SPACE	0.337
	WATER FRONT	0.282	STYLE OF WATER	0.331
			GRADIENT OF WATER FRONT	0.136
			MATERIAL OF WATER FRONT	0.531
	TRANSPORTATION	0.286	EXTERNAL TRANSPORT	0.460
			INTERNAL TRANSPORT	0.427
			WATER TRANSPORT	0.141
DEMAND IMPACT LAYER	USAGE NEEDS	0.547	ACCESSIBILITY	0.220
			INVOLVEMENT	0.160
			BEARING CAPACITY	0.298
			RICHNESS	0.181
			CONVENIENCE	0.180
	EMOTIONAL NEEDS	0.450	SENSE OF SECURITY	0.250
			BELONGING	0.388
			PRIVACY	0.180
			SENSE OF PLACE	0.270
	HISTORY VALUE	0.120	HISTORY	0.120
ECONOMIC IMPACT LAYER	SUPPLY	0.343	INDUSTRY WATER SUPPLY	0.300
			DOMESTIC WATER	0.436
			AGRICULTURE WATER	0.318
	SERVICE	0.288	STORE FLOODWATER	0.427
			RUNOFF	0.571
	ADDITION	0.370	LAND PRICE	0.170
			BUILDING DENSITY	0.346
			COLLOCATED FUNCTION	0.380
			LABOR	0.115
AESTHETIC IMPACT LAYER	CULTURE	0.580	GEOGRAPHICAL FEATURE	0.384
			HISTORICAL MEMORY	0.288
			SYMBOL	0.137
	NIGHTSCAPE	0.120	SYSTEMATIC	0.461
			IDENTIFICATION	0.550
	LANDSCAPE	0.318	OPTIC CENTER	0.399
			COLOR MATCHING	0.246
			FACILITY CHARACTERISTIC	0.300

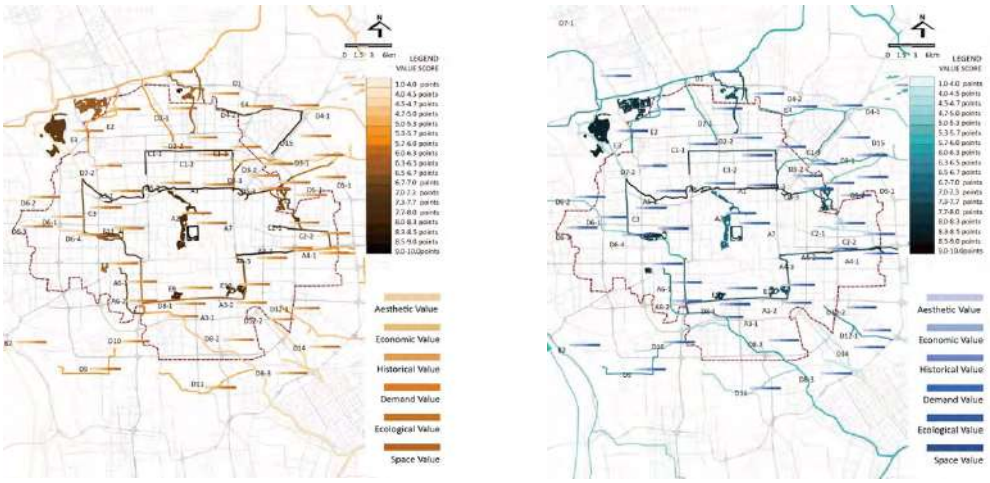
Combine the related survey data with the low-impact design vision, at the same time, based on the evaluation layer system and weight factors listed in table 1. The ecological value, space value, demand value, economic value, aesthetic value, historical value of Beijing waterfront space urban design has carried on the quantitative analysis, the result is shown in figure 8 and figure 9. The information shown in the figure relatively objectively shows the current situation, characteristics, needs and other content characteristics of Beijing waterfront space, and can effectively guide the following low-impact urban design work.



a. Ecological value b. Space value c. Demand value

d. Economic value e. Aesthetic value f. Historical value

Figure 8 Evaluation of sub-layer of Beijing waterfront space



a. Current comprehensive value b. Expected comprehensive value

Figure 9 Current and expected comprehensive value of Beijing waterfront space

5. Conclusion

In the development process of low-impact urban design, the interactive extension of ideas, entities, time and people makes the city in constant evolution, showing colourful vitality in a flexible way. Admittedly, this direction is still in the exploratory stage in China, and a set of universal experience and methods have not been summarized yet. Although the multi-dimensional integration concept and mode framework described in this paper does not become a common value orientation and criterion in the field of low-impact urban design, it can also be regarded as a positive attempt.

6. References

Wang Jianguo; Wang Xingping (2011) “Green city design and low-carbon city planning -- the trend of new urbanization”, Urban Planning, Vol. 35 (February).

Lu Jiwei (2015) “The development trend of urban design in the new era ”, Shanghai Urban Planning, Vol. 1 (January).

Xu Suning (2015) “To improve the quality of urban construction by comprehensive urban design”, Southern Architecture, No. 5 (May).

Cui Kai (2018) “Dimensions and perspectives of urban design”, Journal of Architecture, No. 4 (April).

Zhu Rongyuan (2014) “Three thoughts on urban design”, Urban Planning, Vol. 38 (S2).

Matthew Carmona (2005) Dimensions of urban design, Nanjing, China, Jiangsu science and technology press.

Xu Suning (2014) “Urban design as an art”, Urban Planning, No. 2 (February).

Sun Zhao (2012) Research on eco-city design, Wuhan, China, Huazhong university of science and technology press.

Song Yongchang; You Wenhui (2000) Urban ecology, Guangzhou, China, East China normal university press.

Moughtin J C (2004) Green Dimensions, Beijing, China, China building industry press.

Case Study / Project

Building Unique Cities:
an Imperative for Sustainability and Liveability in the Global South

Olga CHEPELIANSKAIA

Abstract

Cities face an unprecedented urbanization pressure, which led cities of the Global South to building infrastructure hurriedly, compromising on their natural ecosystems, cultural distinctiveness, human scale, wellbeing and liveability. As a result, many cities in developing countries are characÂ¬terized by overcrowded, poor quality and insufficient infrastructure services, low-quality building stock and a uniform cityscape. Negative consequences related to building uniform go far beyond a cultural loss and severely compromise urban sustainability, economic vibrancy and quality of life: - Urban development often happens at the expense of natural ecosystems rather than in line with them. The standardised way of designing blocks coupled with unplanned city expansions have led to massive encroachments over water bodies and green areas, water pollution, and even flattening of hillsides. Loss of unique natural ecosystems makes cities simultaneously prone to floods, heat waves, droughts and scarcity of natural resources. - Standardised materials and construction styles have high carbon footprints owing to higher embodied and operational energies.

Modern buildings deteriorate relatively quickly, shortening the lifecycle for new building stocks. This leads to even more energy consumption and carbon emissions resulting in increasing climate vulnerabilities. - Lack of unique visual identity affects the city's economic competitiveness through lost tourism opportunities and a loss of quality of life, liveability and wellbeing that results from depriving citizens of sufficient green and blue areas, and weakening their sense of belonging. Building unique cities is an imperative to achieve sustainability and resilience. And it can be done in two interconnected ways: - First, it is critically important to revive the existing natural and built heritage. Heritage buildings using vernacular materials and styles are a repository of knowledge that reflects how cities have traditionally responded to their local context.

Bangkok had developed around numerous canals and vernacular stilt houses protected dwellings from floods. Low-rise highly dense clusters in Jaisalmer minimised heat gain while internal courtyards allowed cooling airflows. Similarly, natural heritage plays a critical role in sustainability, climate resilience and provides unique landscapes. - Second, it is equally important to build unique today. Contemporary urban developments have much to learn from the growth patterns of heritage cities, their connection with nature, culture, society and context. New kinds of sustainable building stock need to be developed bringing together localized vernacular approaches and technological innovations. Multiple stand-alone or small scale innovative solutions already exist: Earthships in New Mexico, Laurie Baker's brick houses in Kerala or the town of Ksar Tafilelt in Algeria for example.

Upscaling these solutions however remains a challenge to discuss. The proposed session will take a shape of a working group and build upon the work initiated by the program Sustainable Cities through Heritage Revival (SEHER Asia) and UNICITI - an international think tank consultancy - with knowledge support of the Cities Alliance, the Indian National Trust for

Art and Cultural Heritage (INTACH), the Future Institute as well as selected individual world renowned architects and urban practitioners.

The session will be divided into three parts:

1. A keynote presentation (20 minutes) will highlight the importance of rapidly coming up with a new way of building Asian cities today and share directions for solutions identified so far;
2. A moderated working session (45 minutes) will follow, gathering participants around one or two round tables depending on their number. The objective is to learn from each other and identify break-through alternative approaches to urban development;
3.Conclusions (15 minutes) and possible ways of continuing this joint work will be discussed and summarised in a statement to share at the concluding plenary or to circulate electronically to ISOCARP members.

Research Paper

Transdisciplinary planning approaches towards resilience

Elizelle Juanee CILLIERS, North-West University, South Africa

Abstract

Urban functions are no longer separated spatially or socially, and the contest between diverse land-uses is reaching a peak due to growing populations and increasing urbanization that inflates the pressure on already strained resources within the urban fabric. The trend of depletion of green spaces is an increasing global phenomenon, intensifying the growing carbon footprint, impairing water quality and compromising health and overall quality of life, ultimately leading to cities that are far removed from the safe, clean, and livable environments, as envisioned in planning theory. Green spaces are often viewed as a "luxury good", despite the comprehensive literature on the extensive benefits of such spaces to their host cities and communities. Misconceptions relating to the notion of green spaces are reflected in the undervaluation of these spaces, under-prioritization in the budgeting process and ultimate negligence in terms of broader spatial planning approaches. The lack of function and ownership further exacerbate the social- and economic value of these green spaces, especially within the South African context, apparent by the disproval of the compensation hypothesis and rejection of the proximity principle. Much effort will be needed to change perceptions and sensitize decision-makers to understand green spaces as a "public good" and "economic asset". Resilience thinking could pose solutions in this regard, drawing on transdisciplinary planning approaches to manage change and steer Spatial Planning towards the era of transurbanism. It would however, require the emancipation of the disciplinary identity of Spatial Planning as crucial driver towards resilience, departing from theoretical and methodological frames of supplementary disciplines, as well as the indigenous knowledge and living experiences of communities, to co-produce urban innovations. Conveying strategic and lateral thinking, contemporary Planners would need to become generative leaders, with socio-emotional intelligence, to generate innovation and co-create solutions for strained social contexts, for depleting scare resources, for managing change of contemporary urban landscapes.

Keywords

Trans-disciplinary planning, green spaces, resilience

1. The contemporary urban landscape

The world population of today is growing by an average of 162,600 persons per day. Almost every spatial planning-orientated paper references the increasing world population in arguing the complexity of the planning profession to create a sustainable future. The planning profession has evolved from a designing art, to a social science (Zhang, 2006:12), to a management and applied science (Zhang, 2006:12; Cilliers & Cilliers, 2016). Contemporary

Spatial Planning is now confronted with "the management of change", to resolve conflicting political and social demands on space, while protecting the earth's generative capacity (Campbell, 1996:296; Cilliers & Cilliers, 2016). Spatial change is at a peak within the urban landscape, as 4.2 billion of the world's 7.6 billion people (55%) currently reside in cities (UN DESA, 2018). Projections show that urbanisation, the gradual shift from rural to urban areas, combined with the overall growth of the world's population could add another 2.5 billion people to urban areas by 2050 (reaching 68% urbanisation), and reaching full global urbanisation in the following decades, intensifying the challenges of the contemporary urban landscape.

The four urban functions of working, living, leisure and transport which Le Corbusier (1929) once so elegantly deployed in his model of the city can no longer be separated from each other either spatially or socially (Mulder, 2002). The contemporary urban landscape deploys a picture where formal data (land-use, functions and zonings) are now distorted by informal data (activities and interaction) that precedes planning structures, as illustrated in Figure 1.

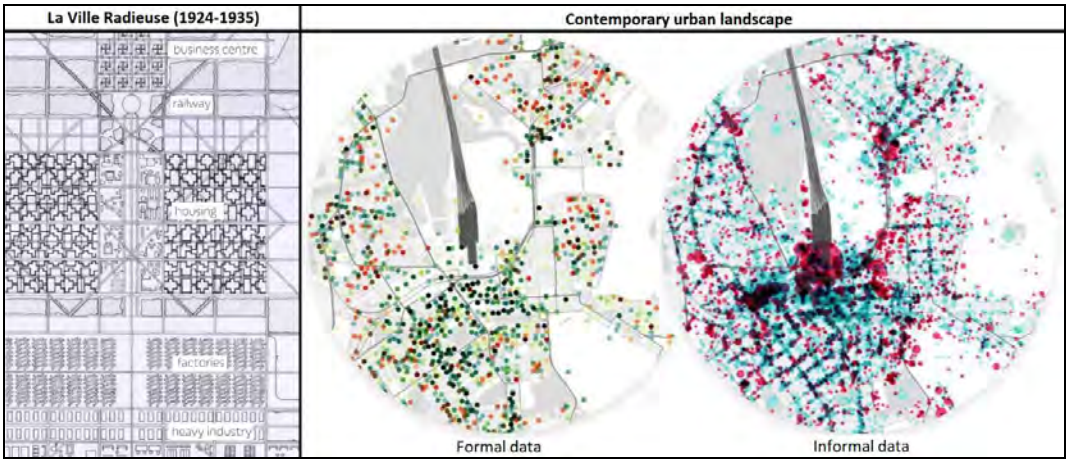


Figure 1: From La Ville Radieuse to the contemporary urban landscape
Source: Based on Le Corbusier (1929) and Danin (2019)

In Africa, the expected rate of urbanisation poses a further concern in light of potential negative environmental impacts (Kestermont et al., 2011) that could lead to unprecedented changes, especially within a soon to be urbanised landscape, where informality and sustainability collide. Africa is in a unique position to embrace informality as a contributing factor to the realisation of broader sustainable development objectives, as argued by Lategan (2017) in reference to South Africa's informal backyard rental sector and its contribution to structuring sustainable urban landscapes. But, for Africa to lead this discourse on informality and sustainability, the African space economy should be reconsidered from a Spatial Planning perspective (Okeke, Cilliers and Schoeman, 2018), to facilitate ways to host growing populations, accommodate urbanisation and changing urban landscapes and social dynamics, while recognising land as a scarce resource, and as a force of global importance in the quest towards sustainable development (Sustainable Cities Institute, 2012; Cilliers & Cilliers, 2015).

2. Land as a scarce resource of the contemporary urban landscape

Land was once plenteous and resources were abundant. With the predictions of full global urbanisation within the next half century (McArthy, 2016), urgent action is needed to recognise land as a scarce resource of the contemporary urban landscape. Spatial planning has a key role to play in this regard, shaping the contemporary urban landscape in line with the universal ambition for sustainability, embedded in the global sustainable development goals (United Nations, 2017). In the search for "inclusive, safe, resilient and sustainable cities and human settlements" (United Nations, 2017), the interrelated role of the environment as catalyst to realises the objectives of sustainability (Anderson & Elmqvist, 2012) is becoming more prominent. There is now an expanded scientific understanding that green spaces are substantially beneficial to urban communities and cities (Llausas & Roe, 2012; Thomas & Littlewood, 2010; Wright, 2011), and that ecological principles are a sine qua non for sustainable cities (Forman, 2013, Lui et al., 2007; Stigsdotter, 2008; Cilliers & Cilliers, 2015).

However, despite theoretical and methodological frameworks in support of green spaces within the urban landscape, the reality suggests of a depletion of urban green spaces across the globe. Statistics illustrate, amongst others, a depletion of green spaces in 25 European cities (European Environmental Agency, 200), in 274 metropolitan areas in the United States of America (McDonald et al., 2010) and to an even greater extent in Africa (Cilliers et al., 2013; Kestermont et al., 2011). In South Africa, for example, green spaces occupy less than 10% of urban land (McConnachie et al., 2008). The lack of green spaces in high-density urban landscapes are in most cases a result of their susceptibility to urban development pressures (More et al., 1988:141; Luttik, 2000) and the under prioritisation of green spaces in the decision-making process (Bertaud, 2010). As a result, cities are being further removed from the safe, clean, and livable environments, envisioned in planning theory (Van den Berg et al., 2007).

Data from the Global Carbon Project (2018) illustrate that land-use changes, especially the depletion of green spaces and deforestation, comprised 11% of total emissions produced in 2017. Land as a scarce resource is thus becoming a force of global importance, as changes in land-use contribute to the growing carbon footprint (Global Carbon Project, 2018). Spatial Planning could influence both the release and uptake of carbon, by considering industry planning and emission of fossil fuels, emissions from land-use changes, protection of carbon sinks such as the oceans and land, and recognising planning as either catalyst, or inhibitor, of changes in atmospheric concentrations of CO2 (Global Carbon Project, 2018), as indicated in Figure 2.

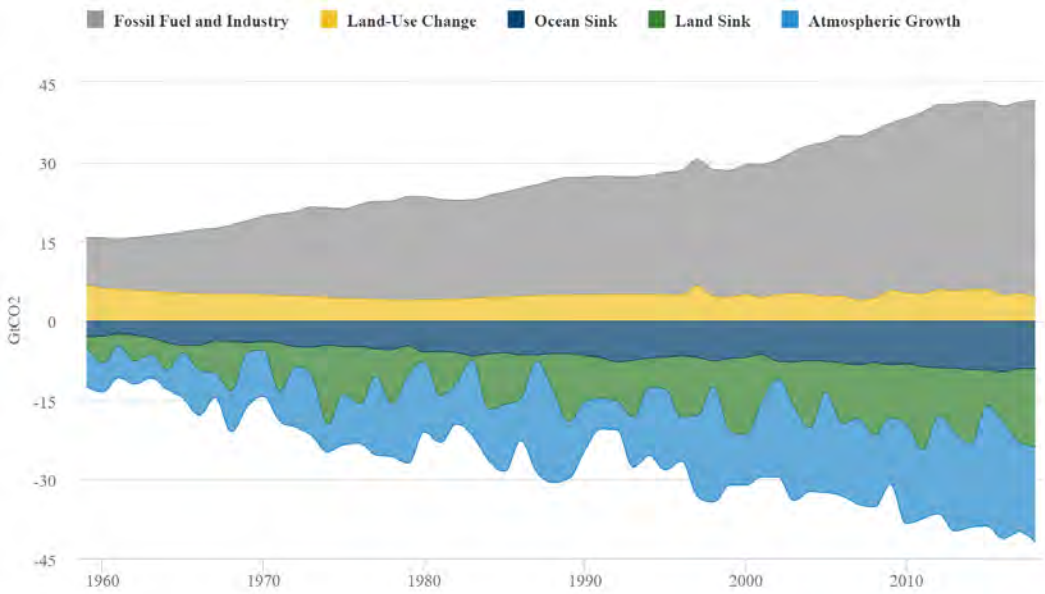


Figure 2: Annual global carbon budget of sources and sinks from 1959-2017
Source: Global Carbon Project (2018)

Cities have become a central nexus in the relationship between people and nature (Elmqvist, 2014), where the provision of green spaces results in a range of supplementary ecosystem services supporting humanity, including provisioning, regulating, supporting and cultural services (Cornelius, 2016:86; Cilliers et al., 2018), but concurrently, where the lack of green spaces, trigger other negative impacts, known as ecosystem disservices (Shackleton et al., 2016). These impacts relate to, but are not limited to, the intensified urban heat-island effect, increased energy consumption (Akbari, 2005), impaired water quality (James, 2002) and ultimately compromised human health and comfort (Centre for Disease Control and Prevention, 2006; EPA, 2019, Timmermans et al., 2017).

In the African urban landscape these impacts are magnified due to proportionally higher pressure on land use and loss of biodiversity per unit of wealth produced, compared to Europe (Cilliers et al., 2013). The prioritisation of green spaces in this context is also more complex, as strained social contexts often overshadow community needs. In many cases development-decisions precedes environmental concerns (Cilliers & Cilliers, 2016; Thysse, 2017), in support of growing societies. Despite comprehensive evidence from literature and best practices pertaining to the value of green spaces as 'public goods', articulated in terms of ecological-, social-, and economic values (Cilliers & Cilliers, 2016), green spaces are often considered a 'luxury good' in the African context and not a necessity or a sine qua non for sustainability (Cilliers and Cilliers, 2015; du Toit et al., 2018).

As a result, the "more pressing needs", such as eradicating poverty, providing basic services and addressing the growing housing backlog (Cilliers & Cilliers, 2015; Soares et al., 2011; Cilliers & Cilliers, 2016) take precedence in municipal and national budgets, only further constraining the planning and provision of green spaces in areas where it is often most needed (Cilliers & Cilliers, 2016; Huston, 2016). The reluctance to budget and plan for green spaces should, however, not be confused with the community need in search of such spaces. Previous findings by Cilliers et al. (2013) demonstrated how the valuation of green spaces

fluctuate against different socio-economic gradients, as poorer communities put a higher demand on provisioning services (food, lawn, medicinal, shade), while more affluent communities put a higher demand on cultural ecosystem services (aesthetics and ornamentals). More recent research suggests of a growing need for green spaces amongst local communities within the South African context (Lategan & Cilliers, 2014).

The need of such green spaces are however, due to misconceptions and the lack of budgets and planning, not being met in practice. Research by Lategan and Cilliers (2014) considered the value of public green spaces and the informal backyard rental sector of Bridgton and Bongolethu (Oudtshoorn, South Africa) and concluded that green spaces in these areas are not providing any specific service to the communities and therefore, despite the need expressed for green spaces, not used by most individuals. The compensation hypothesis, which departed from the understanding that communities with limited access to private green space will seek compensation elsewhere, was disproved in the Bridgton and Bongolethu case study (N=708), further supporting the impact of impractical spaces. Such spaces do not provide a service to communities and do not entice users, who do not have access to ample domestic green space, to seek compensation in these public spaces (Lategan & Cilliers, 2017; Maat & De Vries, 2006; Lin et al., 2015).

The majority of local research suggest that green spaces in South Africa are not on par with international standards in terms of quality and function, strengthening the false perception that these spaces are not valuable or valued (Cilliers & Cilliers, 2016). It is further posited that the lack of quality and function related to these green spaces explains for most part, why these green spaces do not increase property values in accordance with the internationally accepted green proximity principle which states that residential property prices increase as proximity to green space increases. This results and disproval of the green proximity principle, was derived from a local case study conducted in Potchefstroom (JB Marks Municipality, South Africa) where statistical analysis of variance (ANOVA) was applied to the property values of five residential areas to determine the significant difference between the means of properties located at different distances from an urban green space (Cilliers & Cilliers, 2017). The collective results of the Potchefstroom Case study (N=188) illustrated a statistical difference between zones located further from the green space ($p=0.76$), thus rejecting the null hypothesis and disproving the proximity principle. Ecosystem disservices associated with crime in green spaces (Konijnendijk et al., 2013: 22) and the perception of green spaces as crime hotspots (Perry et al., 2010), were identified as possible contributing factors why residential properties located adjacent to green spaces exhibited a lower price per square meter than properties located further away. Cilliers and Cilliers (2016) identified a lack of function and ownership connected to green spaces, as contributing factor for negligence and failure of green spaces in local context.

In an attempt to steer the national vision towards realising the importance of green spaces within the urban landscape, the South African Cities Network (SACN) appointed Cilliers and Cilliers (2016) as authors of the publication “Planning for Green Infrastructure: Options for South African Cities”

This research introduced the notion of green infrastructure (GI) as a long-term strategic approach to plan green spaces as a network of supportive infrastructure. It contributed to the discourse on the valuation of public green spaces from different social and cultural gradients, as well as the discourse on user-values and valuation from a local perspective. It

called for the integration of green infrastructure as part of mainstream Spatial Planning, recognising that much effort will be needed to change perceptions about the necessity of green spaces in both urban and rural landscapes in South Africa. To sensitise decision-makers to grasp the value and role of green spaces as a 'public good' and 'economic asset', more practical guidance is needed (Cilliers et al. 2018) with a proactive and deliberate response to address contemporary challenges (Folke, 2006).

It mandates a shift towards resilience thinking in planning (Schoeman, 2017), where Spatial Planning response to the increasing economic, social and spatial vulnerabilities in cities, and halt the rapid depletion of natural resources and environmental degradation (Harrison et al., 2014). It implies planning structures and systems that will allow communities to endure change (Spacey, 2016) and for methods to explore the dynamics of the city and spatial systems in different ways (Schoeman, 2018). It calls upon a systems approach to planning contemporary urban landscapes, inclusive of learning and innovation (Schoeman, 2018). Such structures and systems demand transdisciplinary planning.

3. Transdisciplinary planning towards resilience

Transdisciplinary planning goes beyond the ''primacy of science'' (laypersons inputs in scientific research) as well as the ''primacy of practice'' (provision of classical decision support), establishing a third epistemic way (Wiek 2007; Jahn 2008; Bergmann et al. 2005) where experience-based guidelines find mutual grounds between all stakeholders (Cash et al. 2003). Transdisciplinary planning brings academic knowledge and non-academic knowledge, as illustrated in Figure 3.

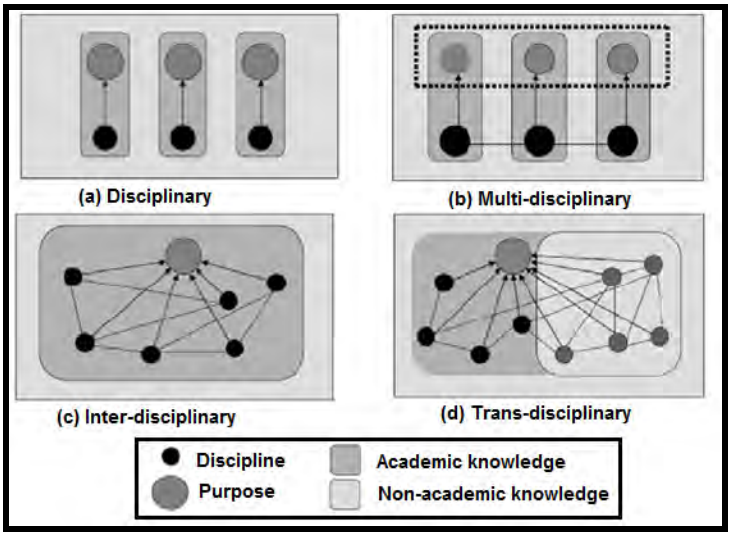


Figure 3: Scope of disciplinary approaches in promoting the interface between disciplines Source: Fry et al (2007)

Transdisciplinary planning could strengthen the spatial meaning of resilience in the contemporary urban landscape, by capturing metabolic flows (production, supply and consumption chains), social dynamics (demographics, human capital and inequality), governance networks (institutional structures and organisation) and the built environment (ecosystem services in the urban landscape) (Harrison et al., 2014, Schoeman, 2018).

Transdisciplinary planning provides a platform to explore the socially and spatially integrated dynamics of the urban landscape in different ways, as it calls upon a 'planning with' approach as referred to by Cilliers and Victor (2018). Such approach is grounded in anthropological understandings of space and cities as 'meshworks' (Ingold, 2016:10), which simultaneously draw on literature and concepts in spatial planning, in an attempt to make the argument for a 'planning with' approach 'policy relevant' (Spiegel, et al., 1999:182-186).

A 'planning with' approach draw on the expertise of transdisciplinary stakeholders, including the indigenous knowledge and lived experiences of local communities as agents of urban change. It contributes to realising the potential of integrative planning as it challenging professionals, scientists, authorities, policy-makers and local communities to take collective ownership of the direct environment (Cilliers & Victor, 2018). It will align with trans-urbanism approaches that redefine urban life and introduces new politics of the urban landscape (Thrift, 2013), in relying on multiple stakeholders to collectively reorganise the urban landscape as a living structure, informed by the urban landscape itself (Mulder, 2002).

Such a transdisciplinary 'planning with' approach could place public green spaces as the common denominator for aligning informality and sustainability, when green spaces are perceived as a 'public good' and an 'economic asset' that can benefit both communities and their environment through the ecosystem services they provide. The valuation, and prioritization of green spaces in this sense, would not only advance supporting ecosystem services such as enhanced biodiversity (Cilliers et al., 2013), habitat provision (Stiles, 2006), and the provision of refuge to species that are disappearing from urban areas (Hodgkison & Hero, 2007) but also regulating ecosystem services such as reduced atmospheric carbon dioxide (Cilliers et al., 2010) enhanced air quality (Bolund & Hunhammer, 1999), countering heat island effects (Akbari et al., 2001), limiting noise pollution (Bolund & Hunhammar, 1999) , but would also result in multiple cultural ecosystem services (social benefits) such as physical (Kuo, 2003, Roger, 2003) and psychological restoration evident from the mediational analyses by Van den Berg et al. (2007), as well as increased levels of physical activity (Owen et al., 2004), stress relief (Hansmann et al., 2007), happiness (Chiesura, 2004) and better neighbour relationships (Roger, 2003). It would further entail cultural ecosystem services with economic benefits relating to increased tourism (Wooley et al., 2003), enhanced local investment in the area (Cabe Space, 2009), increased property values (Luttik, 2000) and overall improvements in quality of life (Schultz and King, 2001; Smith et al., 2002).

Spatial Planning will still be confronted with the management of change, but the emphasis will shift from land-use, towards managing interaction between space, activities, and values (Danin, 2019). Interaction planning might soon become the new axiom (Danin, 2019) of the contemporary urban landscape as transdisciplinary research feeds into values to inform smart spatial data towards informed decision-making and good governance.

Finally, in agreement with Pinson (2004), disciplinary identity should remain as a precondition of transdisciplinary collaboration. Thus, while other mature sciences may, and should, contribute to the urban dialog, Spatial Planning should emancipate itself from these theoretical and methodological frames to further construct its own identity (Pinson, 2004) as a global scarce skill and national priority, to give spatial meaning to supplementary disciplines. Conveying such strategic and lateral thinking, Planners would need to become generative leaders. Moving away from adaptive leadership that is motivated by challenges or problems (Senge, 1990) and moving towards generative leadership, that recognizes and

taps into collective intelligence and energy to generate effective solutions (Klimek et al., 2008:2). Such leaders have courage and an acute level of socio-emotional intelligence to identify the core issues to be addressed, and to frame these issues in a manner that will motivate a variety of stakeholders to engage in creating urban innovations (Bushe, 2019).

Such Planners would be able to co-produce innovation to address the great questions of our time: How to embedded resilience thinking in managing change of contemporary urban landscapes by also asking the questions of resilience for whom, resilience from what to what, and resilience when, where and why (Meerow & Newell, 2017). How to transform and decolonize planning in Africa to be inclusive. How to find sustainability within informality? Academia stand central to developing socio-emotional intelligence as a soft skill for contemporary and future planners and generative leaders. that would require a greater emphasis on experiential learning, a methodology within social constructivism, to learn through experience, and "learn through reflection on doing" (Felicia, 2011) embracing also a "safe to fail" approach in urban planning and design (Ahern et al., 2014). It is through such inquiry-based approaches that we can collectively become co-producers of knowledge (Tengo et al., 2014) and agents of future change, needed to collectively, build the city.

"We have one half century left to get urbanisation right".
The time for generative Planners to rise, is now.

4. References

1. Akbari, H. 2005. Energy Saving Potentials and Air Quality Benefits of Urban Heat Island Mitigation (19 pp, 251K). Lawrence Berkeley National Laboratory.
2. Akbari, H., Pomerantz, M. & Taha, H. 2001. Cool surfaces and shade trees to reduce energy use and improve air quality in urban areas. Solar Energy, Vol. 70(3): 295-310.
3. Anderson, P., Elmqvist, T., 2012. Urban Ecological and Social-Ecological Research in the City of Cape Town: Insights Emerging from an Urban Ecology CityLab. Ecology & Society 17(4): 269-273.
4. Bergmann, M., Brohmann, B., Hoffmann, E., Loibl, M.C., Rehaag, R., Schramm, E. & Voß, J-P. 2005. Quality criteria of transdisciplinary research. A guide for the formative evaluation of research projects. ISOE-Studientexte, No 13, Frankfurt am Main, Germany
5. Bertaud, A. 2010. The study of urban spatial structures. Available at http://alain-bertaud.com. Date of access: 20 January 2018.
6. Bolund, P. & Hunhammar, S. 1999. Ecosystem services in urban areas. Ecological Economics, Vol. 29(2): 293-301.
7. Brand Finance. 2015. Lego Overtakes Ferrari as the World's Most Powerful Brand. Brand Finance. 17 February 2015. Retrieved 20 January 2019.
8. Burgess, R. 2000. The compact city debate: A global perspective. In M. Jenks & R. Burgess (Eds.), Compact cities: Sustainable urban forms for developing countries (pp. 9–24). London: E., & F. N. Spon.
9. Bushe, G. 2019. We need generative leadership in a VUCA world. HR Magazine, 9 Jan 2019. Available at: https://www.hrmagazine.co.uk/article-details/we-need-generative-leadership-in-a-vuca-world#.XErgjeRvYbM.linkedin. Date retrieved: 25 January 2019.
10. Cabe Space. 2005. Paying for parks: Eight models for funding urban green space. London, 2005. Available at: www.cabe.org.uk/files/Paying-for-parks-full-report.pdf. Accessed on: 20 April 2018.
11. Cash, D.W., Clark, W.C., Alcock, F., Dickson, N.M., Eckley, N. & Gurston, D.H. 2003. Knowledge systems for sustainable development. Proc National Academic Sciences USA, Vol. 100: 8086–8091

12. Center for Disease Control and Prevention. 2006. Extreme Heat: A Prevention Guide to Promote Your Personal Health and Safety.
13. Chiesura, A. 2004. The role of urban parks for the sustainable city. Landscape and Urban Planning, Vol. 68: 129-138.
14. Cillieres, E.J 2009. The Urban Development Boundary as a Planning Tool for Sustainable Urban Form: The South African Situation. International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering, Vol. 3(6): 942-947. World Academy of Science, Engineering and Technology. DOI: scholar.waset.org/1999.10/12075 http://waset.org/publications/12075/the-urban-development-boundary-as-a-planning-tool-for-sustainable-urban-form-the-south-african-situation
15. Cilliers, E.J 2009. Bridging the Green-Value-Gap: A South African Approach. International Journal of Social and Human Sciences, 3 (2009): 615-620, ISSN 2070-3740 and World Academy of Science, Engineering and Technology International Journal of Environmental, Chemical, Ecological, Geological & Geophysical Engineering, Vol. 3(6): 182-187.
16. Cilliers, E.J. & Cilliers, S.S. 2015. From green to gold: A South African example of valuing urban green spaces in some residential areas in Potchefstroom. Town and Regional Planning, Vol. *67:* 1–12.
17. Cilliers, E.J. & Cilliers. S.S 2016. Planning for Green Infrastructure: Options for South African Cities. South African Cities Network, Johannesburg. Aug 2016. ISBN: 978-0-620-72315-2, 56p. http://www.sacities.net/wp-content/uploads/2016/PDF/SAcities_GreenerCities_Web.pdf 6 citations. http://www.sacities.net/planning-for-green-infrastructure-options-for-south-african-cities Publisher: South African Cities Network ©, August 2016).
18. Cilliers, E.J. & Schoeman, C.B. 2008. Urban Development Boundary as a Planning Tool for Sustainable Urban Form. WIT Transactions on Ecology and the Environment, Vol. 117: 85-94. ISSN 1743-3541 (on-line). DOI: 10.2495/SC080091
19. Cilliers, E.J. 2019. Reflecting on Green Infrastructure and Spatial Planning in Africa: The Complexities, Perceptions, and Way Forward. Sustainability, Vol. 11(2). ISSN: 2071-1050. https://www.mdpi.com/journal/sustainability
20. Cilliers, E.J. & Victor, H. 2018. Considering Spatial Planning for the Poor: The argument of "planning with". Town and Regional Planning, Vol. 72: 29-41. University of the Free State. ISSN: 1012-280X. http://dx.doi.org/10.18820/2415-0495/trp72i1.3
21. Schoeman, C.B. 2018. Theoretical perspectives on resilience and sustainability in transportation and spatial planning. International Journal of Development Planning, Vol. 13(2): 25 – 225.
22. Cilliers, E.J., Cilliers, S.S. & Lategan, L.G. 2018. Nature-based solutions in urban planning and design in developing countries: a South-African case study of a public open space. Through Local Eyes: Place-based approaches to emerging architectural, urban design and planning challenges in Africa and the Global South, Addis Ababa, 29-31 October 2018. https://www.conferenceaddis2018.org/ https://docs.wixstatic.com/ugd/f922b2_34a64e3415614d6ab504781dce6013aa.pdf
23. Cilliers, E.J., Cilliers, S.S., 2015. From green to gold: A South African example of valuing urban green spaces in some residential areas in Potchefstroom. Town Planning Review, 67: 1-12. ISBN: 1012-280
24. Cilliers, E.J., Diemont, E., Stobbelaar, D.J. & Timmermans, W. 2010. Sustainable Green Urban Planning: The Green Credit Tool. Journal of Place Management and Development, Vol. 3(1):57-66. ISSN: 1753-8335. Emerald Insight. http://www.emeraldinsight.com/doi/abs/10.1108/17538331011030275
25. Cilliers, E.J., Timmermans, W., Van den Goorbergh, F. & Slijkhuis, J.S.A. 2015. Green Place-making in Practice: From Temporary Spaces to Permanent Places. Journal of Urban Design, Vol. 20(3): 349–366. Taylor & Francis Online. http://www.tandfonline.com/doi/abs/10.1080/13574809.2015.1031213?journalCode=cjud20

26. Cilliers, S.S., Cilliers, E.J., Lubbe, C.E., & Siebert, S.J. 2013. Ecosystem services of urban green spaces in African countries—perspectives and challenges. Urban Ecosystems, Vol. 16(4): 681-702. ISBN: 1573-1642. Springer Publishers. DOI 10.1007/s11252-012-0254-3.
27. Cornelius, A. 2016. Health clinic gardens in North - West Province, South Africa , as complex social - ecological systems Health clinic gardens in North-West Province , South Africa , as complex social-ecological systems Magister Scientiae in.
28. Cornelius, G.S.; Viviers, J.; Cilliers, E.J.; Niesing, C. 2017. Considering complexities in unique African planning approaches: Abstracting the role of African Urban Residents. *WIT Trans. Ecol. Environ.* Vol. *223:* 415–426.
29. Danin, V. 2019. How Urban planning is turning into interaction planning. Future Urban Profession. Article series on all things urban. Available at: http://popupcity.net/52789 Date of access: 4 February 2019.
30. Dobbs, C., Escobedo, F.J. & Zipperer, W.C. 2011. A framework for developing urban forest ecosystem services and goods indicators. *Landscape and Urban Planning,* Vol. *99:* 196–206.
31. Ellis, S.M. & Steyn, H.S. 2013. Practical significance (effect sizes) versus or in combination with statistical significance (*p*-values). *Manag. Dyn.* Vol. *12:* 51–53.
32. EPA (United States Environmental Protection Agency). 2019. Heat Island Impacts. Heat Island Reduction Program. Available at: https://www.epa.gov/heat-islands/heat-island-impacts Date of access: 4 February 2019.
33. European Environment Agency (EEA). 2002. Toward an urban atlas: Assessment of spatial data on 25 European cities and urban areas. Environmental Issue Rep. 30, EEA: Copenhagen.
34. Felicia, P. 2011. Handbook of Research on Improving Learning and Motivation. p. 1003. ISBN 1609604962.
35. Folke, C. 2006. Resilience: the emergence of a perspective for social-ecological system analyses. Global Environmental Change, Vol. 16(3): 253-267.
36. Forman, T.T. 2013. Ecological resilience as a foundation for urban design and sustainability', in Pickett, S.T.A., Cadenasso. M.L., & McGrath, B. (eds.), Resilience in ecology and urban design, Dordrecht Heidelberg New York London: Springer, New York
37. Fry, G., Tress, B. & Tress, G. 2007. Integrative landscape research: facts and challenges. Key topics in Landscape Ecology. Cambridge University Press, New York.
38. Global Carbon Project. 2018. Carbon budget and trends 2018. Available at: www.globalcarbonproject.org/carbonbudget Date of access: 28 January 2019.
39. Hansmann, R., Hug, S.M & Seeland, K. 2007. Restoration and stress relief through physical activities in forests and parks. Urban Forestry & Urban Greening, Vol. 6: 213-225.
40. Harrison, P., Bobbins, K., Culwick, C., Humby, T.L., La Mantia, C., Todes, A. & Weakley, D. 2014. Urban Resilience Thinking for Municipalities. University of the Witwatersrand, Gauteng City-Region Observatory. Available at: http://wiredspace.wits.ac.za/bitstream/handle/10539/16490/URreport_1901MR.pdf?sequence=3&isAllowed=y Date of access: 4 February 2019.
41. Hodgkison, S. & Hero, J.M. 2007. The efficacy of small-scale conservation efforts, as assessed on Australian golf courses. Biological Conservation, Vol. 135(4): 576-586.
42. Huston, G.D. 2016. Evaluating Local Green Infrastructure Training and Education Approaches within Urban Planning Curricula. Research for the Partial Fulfilment of the Degree B.Art et Scien (Planning); North-West University: South Africa, 2016.
43. Ingold, T. 2016. On human correspondence. Journal of the Royal Anthropological Institute, (N.S.): 23:9-27.
44. Jacobs, N.S. 2016. *The Regeneration of Klerksdorp's CBD: A Greening Approach. Research for the Partial Fulfilment of the Degree B.Art et Scien (Planning)*; North-West University: South Africa, 2016.
45. Jahn, T. 2008. Transdisciplinarity in the practice of research. *In* Bergmann M, Schramm E (eds) Transdisziplina¨re Forschung: Integrative Forschungsprozesse verstehen und bewerten. Campus Verlag, Frankfurt/Main, Germany, pp 21–37

46. James, P., Tzoulas, K., Adams, M.D., Annett, P., Barber, A. & Box, J. 2009. Towards an integrated understanding of green space in the European built environment. *Urban For. Urban Green.* Vol. *8:*65–75.
47. James, W. 2002. Green roads: research into permeable pavers. Stormwater Vol. 3(2): 48-40.
48. Jenks, M., Burton, E., & Williams, K. 1996. The compact city: A sustainable urban form? London: E., & F. N. Spon.
49. Kestermont, B., Frendo, L., & Zaccaï, E. 2011. Indicators of the impacts of development on environment: A comparison of Africa and Europe. Ecological Indicators, Vol. 11: 848–856.
50. Klimek, K. J., E. Ritzenhein, and K. D. Sullivan. 2008. Generative leadership: Shaping new futures for today's schools. Thousand Oaks, CA: Corwin Press.
51. Konijnendijk, C.C., Annerstedt, M., Nielsen, A.B. & Maruthaveeran, S. 2013. Benefits of Urban Parks: A systematic review. A Report for IFPRA, Copenhagen & Alnarp, January 2013.
52. Korsgaard, L. & Schou, J.S. 2010. Economic valuation of aquatic ecosystem services in developing countries. Water Policy, Vol. 12: 20-31.
53. Kuo, F.E. 2003. The role of arboriculture in a healthy social ecology. Journal of Arboriculture, Vol. 29(3): 148-155.
54. Kuruneri-Chitepo, C.; Shackleton, C.M. 2011. The distribution, abundance and composition of street trees in selected towns of the Eastern Cape, South Africa. *Urban For. Urban Green*. Vol. *10:*247–254.
55. Lategan, L.G. & Cilliers, E.J. 2014. The value of public green spaces and the effects of South Africa's informal backyard rental sector. WIT Transactions on Ecology and the Environment, Vol. 191: 427-438. ISSN 1743-3541 (on-line). DOI: 10.2495/SC140361
56. Lategan, L.G. & Cilliers, E.J. 2017. Considering urban green space and informal backyard rentals in South Africa: Disproving the compensation hypothesis. Town and Regional Planning, Vol. 69: 1-11. ISSN: 1012-280X http://hdl.handle.net/11660/5737
57. Lategan, L.G. 2016. Informality and sustainability: reflecting on South Africa's informal backyard rental sector from a planning perspective. Doctoral Thesis submitted for completion of the degree PhD Urban and Regional Planning, North-West University, Potchefstroom Campus.
58. Lategan, L.G.; Cilliers, E.J. Considering urban green space and informal backyard rentals in South Africa: Disproving the compensation hypothesis. *Town Reg. Plan.* 2016, *69*, 1–18.
59. Le Corbusier. 1929. The City of Tomorrow and its Planning. London: John Rodker.
60. Lin, B.; Meyers, J.; Barnett, G. 2015. Understanding the potential loss and inequities of green space distribution with urban densification. *Urban For. Urban Green.* Vol. *14:* 952–958.
61. Liu, Z., Mao, F., Zhou, W., Li, Q., Haung, J. & Zhu, X. 2007. *Accessibility Assessment of Urban Green Space: A Quantitative Perspective*; School of Architecture, Tsinghua University: Beijing, China.
62. Liu, Z., Mao, F., Zhou, W., Li, Q., Haung, J., Zhu, X., 2007. Accessibility assessment of urban green space: a quantitative perspective. School of Architecture, Tsinghua University. Beijing.
63. Llausàs, A., Roe, M., 2012. Green Infrastructure planning: Cross-national analysis between the North East of England (UK) and Catalonia (Spain). European Planning Studies 20(4): 641-663.
64. Luttik, J. 2000. The value of trees, water and open space as reflected by house prices in the Netherlands. Landscape Urban Planning, Vol. 48(3): 161-167
65. Lutzenhisher, M. & Netusil, N.A. 2001. Effect of Open Spaces on a Home's Sale Price. Contemporary Economic Policy, Vol. 19: 291-298.
66. Maat, K.; de Vries, P. 2006. The influence of the residential environment on greenspace travel: Testing the compensation hypothesis. *Environ. Plan. A* Vol. *38:* 2111–2127.
67. MaConnachie, M.M., Shackleton, C.M. & McGregor, G.K. 2008. The extent of public green space and alien plant species in 10 small towns of the Sub-Tropical Thicket Biome, South Africa. Urban Forestry and Urban Greening, Vol. 7: 1-13.

68. McDonald, R.I., Forman, R.T.T. & Kareiva, P. 2010. Open space loss and land inequality in United States' cities, 1990-2000.PLoSONE, Vol. 5(3), e9509. doi:10.1371/journal.pone.0009509
69. More, A.T., Stevens, T. & Allen, P.G. 1988. Valuation of Urban Parks. Landscape and Urban Planning, Vol. 15: 139-152.
70. Mulder, A. 2002. TransUrbanism: Arjun Appadurai, Arjen Mulder, Knowbotic Research, Lars Spuybroek, Scott Lash, Rafael Lozano-Hemmer, Andreas Ruby, Edward Soja, Rem Koolhaas, Brett Steele, Roemer Van Toorn, Mark Wigley. V2_ publishing.
71. Niemelä, J., Saarela, S.R., Söderman, T., Kopperoinen, L., Yli-Pelkonen, V., Väre. S. & Kotze, D.J. 2010. Using the ecosystem approach for better planning and conservation of urban green spaces: a Finland case study. Biodiversity Conservation, Vol. 19: 3225-3243
72. Okeke, D.C., Cilliers, E.J., & Schoeman, C.B. 2018. Neo-mercantilism as development ideology - a conceptual approach to rethink the space economy in Africa. African Studies, Vol 77: 23-52. ISSN 0002-0184. http://www.tandfonline.com/doi/full/10.1080/00020184.2017.1390912.
73. Olazabal, M., Chelleri, L., Waters, J.J. & Kunath, A. 2012. Urban resilience: towards an integrated approach. 1st International Conference on Urban Sustainability & Resilience, London, United Kingdom, ISSN 2051-1361.
74. Owen, N., Humpel, N., Leslie, E., Bauman, A & Sallis, J.F. 2004. Understanding environmental influences on walking: Review and research agenda. American Journal of Preventive Medicine, Vol. 27: 67-76.
75. Perry, E.D., Moodley, V. & Bob, U. 2010. Open Spaces, Nature and Perceptions of Safety in South Africa: A Case Study of Reservoir Hills, Durban. School of Environmental Science, University of KwaZulu-Natal. 17p.
76. Pinson, D. 2004. Urban Planning: An 'Undisciplined' Discipline? Futures, Elsevier, Transdisciplinarity, Vol. 36(4): 503-513.
77. Roger, S.U. 2003. On health benefits of gardens in hospitals: Plants for People, Texas: Centre for health systems and design.
78. Schoeman, C.B. 2017. Theoretical perspectives on resilience and sustainability in transportation and spatial planning. International Journal of Sustainable Development Planning, Vol. 13(2): 215–225.
79. Senge, P. 1990. The Fifth Discipline: The Art and Practice of the Learning Organization. New York: Doubleday/Currency.
80. Shultz, S.D. & King, D.A. 2001. The Use of Census Data for Hedonic Price Estimates of OpenSpace Amenities and Land Use. Journal of Real Estate Finance and Economics, Vol. 22: 239-252.
81. Soares, A.L., Rego, F.C., McPherson, E.G., Simpson, J.R., Peper, P.J. & Xiao, Q. 2011. Benefits and costs of street trees in Lisbon, Portugal. *Urban Forestry & Urban Greening*, Vol. *10*(2): 69-78.
82. Spacey, J. 2016. Sustainability versus resilience. Simplicable. Available at: https://simplicable.com/new/sustainability-vs-resilience Date of access: 4 February 2019.
83. Spiegel, A. D., Watson, V. & Wilkinson, P. 1999. Speaking truth to power? Some problems using ethnographic methods to influence the formulation of housing policy in South Africa. (In Cheater, A., ed. The anthropology of power: empowerment and disempowerment in changing structures. London: Routledge. p. 175-190).
84. SPLUMA. 2016. Spatial Planning and Land Use Management Act. Government Notice 559 in Government Gazette 36730 dated 5 August 2013. Commencement date: 1 July 2015 [Proc. No. 26, Gazette No. 38828 dated 27 May 2015]
85. Stigsdotter, U.A. 2008. *Urban Green Spaces: Promoting Health through City Planning*; Swedish University of Agricultural Sciences: Uppsala, Sweden, 2008; 17p.
86. Stiles, R. 2006. Urban spaces – enhancing the attractive-ness and quality of the urban environment. WP3 Joint Strategy. University of Technology, Vienna, December 2006.

87. Sustainable Cities Institute. 2012. Land use. The National League of Cities. Available at http://www.sustainablecitiesinstitute.org/Documents/SCI/Topic_Overviews/Land%20Use%20-%20Full%20OverviewNew_NLC.pdf (Date of access: 22 March 2016).
88. Thomas, K., Littlewood, S. 2010. From green belts to green infrastructure? The evolution of a new concept in the emerging soft governance of spatial strategies. Planning, Practice & Research, 25(2): 203-222.
89. Thrift, N. 2013. Transurbanism. Urban Geography, Vol 25(8): 724-734.
90. Thysse, A. 2017. Whose Role is It Anyway: Considering Project Management and Green Infrastructure Planning. Research for the Partial Fulfilment of the Degree B.Art et Scien (Planning); North-West University: South Africa, 2017
91. Timmermans, W., Jacobs, C., Van Hattum, T., Lategan, L.G. & Cilliers, E.J. 2017. Ecosystem-based climate change adaptation for Essenvelt, Middelbug, The Netherlands. Town and Regional Planning, Vol. 71: 24-35. University of the Free State. ISSN: 2415-0495. DOI: http://journals.ufs.ac.za/index.php/trp/article/view/3323
92. UN DESA. 2018. Sustainable Development Knowledge Platform. World Urbanisation prospects. United Nation DESA population division. Available at: https://population.un.org/wup/ Date retrieved: 20 January 2019.
93. United Nations. 2017. Progress towards the Sustainable Development Goals. Report to the Secretary-General. E/2017/66. Available at: http://www.un.org/ga/search/view_doc.asp?symbol=E/2017/66&Lang=E Date of access: 5 Jul 2017.
94. Van den Berg, A.E., Hartig, T. & Staats, H. 2007. Preference for Nature in Urbanised Societies: Stress, Restoration, and the Persuit of Sustainability. Journal of Social Issues, Vol. 63(1): 79-96.
95. Van Leeuwen, E., Nijkamp, P. & de Norohna Vaz, T. 2010. The multi-functional use of urban green space. *International Journal of Agric. Sustainability,* Vol. *8*: 1–13.
96. WCED. 1987. Special Working Session. "World Commission on Environment and Development." Our common future (1987).
97. Wiek, A. 2007. Challenges of transdisciplinary research as interactive knowledge generation—experiences from transdisciplinary case study research. GAIA Ecological Perspective on Science Society, Vol. 16:52–57
98. Woolley, H., Swanwick, C. & Dunnet, N. 2003. On nature, role and value of green space in towns and cities: an overview. 2003. www.atypom-link.com/ALEX/doi/abs/10.2148/benv.29.2.94.54467.
99. Wright, H. 2011. Understanding green infrastructure: the development of a contested concept in England. Local Environment, 16(10): 1003-109.

Research Paper

Mind the gap

Stakeholders perspective on resilience building in the City of Rotterdam

Theresa Audrey O. ESTEBAN, Erasmus University Rotterdam, Graduate School of Social Science and the Humanities; The Philippines

Abstract

In 2016 the City of Rotterdam joined the 100 Resilient Cities of The Rockefeller Foundation. The 100 Resilient Cities is an initiative emphasizing the need for cities to build resilience. Rotterdam was one of the first to heed the call of the 100 Resilient Cities highlighting the city's position as a frontrunner in addressing climate adaptive urban planning projects and innovative means in dealing with flood risks and vulnerabilities. Learning from the great North Sea flood of 1953 disaster experience, the Netherlands ensured strong preventive measures making the country safe from flooding. The City of Rotterdam benefits from these strong preventive measures as this safeguards the city and the biggest and most important port in Europe from any disaster. However, these strong preventive measure have also muted the concept of resilience on the stakeholders. This is also further weighed down by the many different initiatives present in the city. The paper seeks to investigate the institutional and non-institutional actors perspective on resilience and the environmental threats in the City of Rotterdam. The research assumes that knowledge and experience on Rotterdam's environmental vulnerabilities and threats lead to better collaboration between and among stakeholders in making the city resilient. This knowledge and experience also leads to the mutual adaptation of roles between the government and other stakeholders of the city such as the citizens, businesses, academe, civil society organizations among others. The research explores questions related to stakeholders perception on risk and vulnerability of the city to disasters, disaster awareness and concern, and their definition of resilience and a resilient city.

Keywords

Resilience, Resilient city, Collective engagement, Flood risk, Netherlands

1. Introduction

One of the most significant flooding disaster that occurred in the Netherlands is the 1953 North Sea Flood. The flood which hit the South of Holland on 01 February 1953 'breached approximately 180 kms of coastal-defense dikes' (Watson and Finkl, 1990: 740). This inundated 160,000 hectares of polderland and left a total of 1,835 dead (Watson and Finkl, 1990: 740). The North Sea Flood disaster impacted the way the Dutch managed flood risk, stressing that the great flood of 1953 should never happen again.

Five years after the Great North Sea Flood the Dutch carried out the Delta Plan prioritizing the implementation of the Deltaworks project which is composed of a network of dams, sluices,

storm surge barriers throughout the multi-river delta created by the Rhine, Meuse and Scheldt located in the South of Holland. The project entailed the strengthening of dikes in Holandsche Ijssel and construction of advance engineering design and technology for the coastal and flood defense such as the Maestlankering storm surge barrier. The project called for raising existing dikes, storm closure of main tidal estuaries and inlets, except the waterway link between Rotterdam and Antwerp to give access to both ports as such dikes in those areas were strengthened (Watson and Finkl, 1990; Wesselink, 2007). This extensive and elaborate flood defense system have successfully safeguarded the country and cities like Rotterdam from any impending flood risk.

However, in 1993 and 1995 the feeling of safety and security was challenged when an extreme high river discharge in the Meuse and Rhine rivers happened (Lu and Stead, 2013; Wesselink, 2007). This has prompted the Dutch to rethink their relationship with water by proposing a more adaptive strategy, Room for the River, to allow more space for water. The threat of changing climatic condition have increased the vulnerability of delta cities to rising sea levels and extreme water discharge in rivers to the sea. The City of Rotterdam has been active in addressing these issues through the various plans, programs and projects around the city. The review of planning and policy documents from 2004 to 2010 conducted by Lu and Stead (2013) showed impacts of climate-related flood risks and vulnerabilities existed since the mid-2000s. The study related this to the concept of resilience in Rotterdam's spatial planning and policy-making where they found that in the city the notion of resilience is considered by local planners as a term of enhancing the city's image, and promoting development in places outside the protective dikes and as a synonym for adaptation (Lu and Stead, 2013). The term resilience then covers different ideas among policy-makers and technocrats alike and remains an abstract concept for many stakeholders.

In 2013 the Rockefeller Foundation launched the 100 Resilient City initiative to help more cities build resilience to physical, social and economic challenges that are a growing part of the 21st century (The Rockefeller Foundation, 2017). Cities under this initiative are provided access to resilience-building tools and services supplied by a carefully selected platform partners from the private, public, academic, and non-profit sectors. The City of Rotterdam was one of the first to apply to the program and in 2016 released its Resilience Strategy targeting a 100% climate proof city by 2025. The Strategy likewise drew attention to engagement and collaboration of the stakeholders in meeting its action plans. While this initiative is not the first to spearhead resilience programming in the city it is the only initiative that highlight Rotterdam as a "resilient city". Many stakeholders however remain oblivious to the meaning of "resilience".

In this light, this paper assumes that knowledge and experience on Rotterdam's environmental vulnerabilities and threats lead to better collaboration between and among stakeholders in making the city resilient. This knowledge and experience also leads to the mutual adaptation of roles between the government and other stakeholders of the city such as the citizens, businesses, academe, civil society organizations among others. The paper focuses on awareness as an important thematic area being investigated by the author in her dissertation research. It explores questions related to stakeholders perception on the city's risk and vulnerability to disasters, awareness, concern and response to disasters, and their definition of resilience and a resilient city.

Following this introduction, the paper proceeds with a review of the definition of resilience and the varying conception of resilience. Then the concept of collective engagement urban

resilience framework as a conceptual tool explaining the complexity of resilience building in the urban context will be introduced. The framework likewise identifies two approaches in urban resilience and the main actors involved which is imperative in the methodology of the empirical study. Thereafter primary data gathered from the face-to-face interviews of the various stakeholders of the City of Rotterdam will be discussed. Finally, the research findings and discussions will be outlined including its implication to future research.

2. Different perspectives of resilience

Originally a concept used in ecology, resilience was first defined by C.S. Holling as a "measure of the persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling, 1973: 14). He later redefined this as the magnitude of the disturbance that can be absorbed before a system changes its structure by changing the variables and processes that control behavior (Holling, et al., 1997; Mayunga, 1995; Berry, 2013). In this second definition, resilience is understood as the capacity of a system to absorb disturbance and maintain its equilibrium. This ecological perspective of resilience means that the system has an ability to cope with disturbances and return to its functioning state. It assumes that a system undergoes multiple levels of equilibrium but still retain its structure and function (Gunderson, 2010; Mehmood, 2015; Wagner, et al., 2014; Sharifi and Yamagata, 2016; Holling, 1973; Folke, 2006). Holling asserted that resilience should be interpreted as having multiple-equilibria rather than seen as a single-equilibrium (Holling, et al., 1997; Sharifi and Yamagata, 2016). While Elmqvist (2014) offered to extend the resilience concept by stating that resilience is not just recovering from a single disturbance but also refers to the capacity of a system to adapt and transform.

Apart from the earlier mentioned ecological perspective of resilience there are different perspectives on the term resilience. Engineering resilience which interprets resilience to having a single-equilibrium where a system bounces back to its pre-disaster phase after a disaster (Gunderson and Holling, 2002; Andavarapu and Arefi, 2016). This implies that 'equilibrium' or stability only refers to reverting to the pre-disaster phase through recovery (Gall, 2013). Engineering resilience assumes that disturbances or disasters are predictable and forecasting methods are reliable sources of information (Sharifi and Yamagata, 2016).

The socio-ecological resilience perspective recognizes that systems have multiple equilibria facilitating the systems' ability to absorb and adapt to disturbances. This resilience perspective interprets resilience as having multi-equilibrium where the system has the capacity to reorganize and transform to another state (equilibrium) after a disturbance. Socio-ecological resilience is also known as adaptive resilience which stemmed from recognizing cities as complex and dynamic socio-ecological systems (Sharifi and Yamagata, 2016). Two other perspectives on resilience following the multi-equilibrium interpretation are social resilience and community resilience. Social resilience is the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, and environmental change (Adger, 2000). Most of the work on social resilience were based on prevention, preparation and response to natural disasters and the management of natural resources (Keck and Sakdapolrak, 2013; Takeuchi et al., 2014; Mehmood, 2015). While community resilience refers to the ability of the community to bounce back using its own resources. This terminology is often used in disaster management work specifically in rebuilding and reconstruction.

The resilience concept assumes the dynamic and complex adaptive systems across temporal and spatial scales (Folke, 2006). It is a multidisciplinary concept that explores persistence, recovery, and the adaptive transformative capacities of interlinked social and ecological systems and subsystems Elmqvist (2014: 5). The different perspectives of resilience magnify its multidisciplinary and complex nature.

3. Transformation, adaptability and resilience building

The terms adaptability and transformation are key in creating resilient cities. Adaptability refers to the ability of the stakeholders to influence resilience (Folke, et al., 2010). It is the 'collective capacity of the human actors in the socio-ecological system to manage resilience' (Walker, et al., 2004: 7). Transformation, on the other hand, is the ability of the system to shift from its current normal state to another development or improved state (Sharifi and Yamagata, 2016). Transformation is necessary in building resilience through spatial and temporal scales. Transformation, similar to adaptation, requires an understanding of the roles each stakeholders contribute to the city's overall function. It is the result of the improvements done during the adaptation process

The city is a complex, multidimensional socio-ecological system that continuously undergo changes. Disasters such as flooding elicit these changes and adds on to a city's already complex behavior. The city's collective engagement to address these changes at various levels and scales determines its ability to become resilient. One key element in building resilience are the stakeholders, particularly their capacity, awareness, and understanding of resilience in order for them to collectively take part in building resilience. But in order for stakeholders to participate in building resilience there is a need to expand their knowledge and awareness. This knowledge does not only focus on how to build resilience but also why it is needed. The awareness and concern on risks and vulnerabilities of the city are important to bring this into focus.

There are two sides in approaching urban resilience, one the approach taken by the government and the other by the citizens. These two approaches interlace into what collective engagement is all about. That is "a collaborative process participated in by multiple stakeholders to arrive at a solution or decision to increase urban resilience through both formal and informal means" (Esteban, 2018). This means that both approaches of the government and the citizens should be on the same level. Obviously the technical, technological, and scientific interpretations cannot be equal between the government and the citizens but there should be a leveled understanding on what resilience is. Understanding resilience and building urban resilience requires public concern and awareness.

The collective engagement urban resilience framework (Figure 1) incorporated the two approaches into a conceptual framework that emphasizes that the government and the citizen (self-organization) approach to urban resilience can be two different ways. Both still go through the same four dimensions of collective engagement - concern, action, efficacy and security - in order to reach resilience. This can be assessed in terms of the collaborative capacities of the institutional actors (government) and the non-institutional actors (citizens and citizen groups). It meets in the middle when both actors increase their capacities and collaboration to achieve their common goal of building resilience (mutual adaptation of roles).

The framework looks at the two approaches and in so doing understand the different perspectives on resilience and how both lead to the common denominator which is concern for their city. In the succeeding section, the methodology for the empirical study will be outlined.

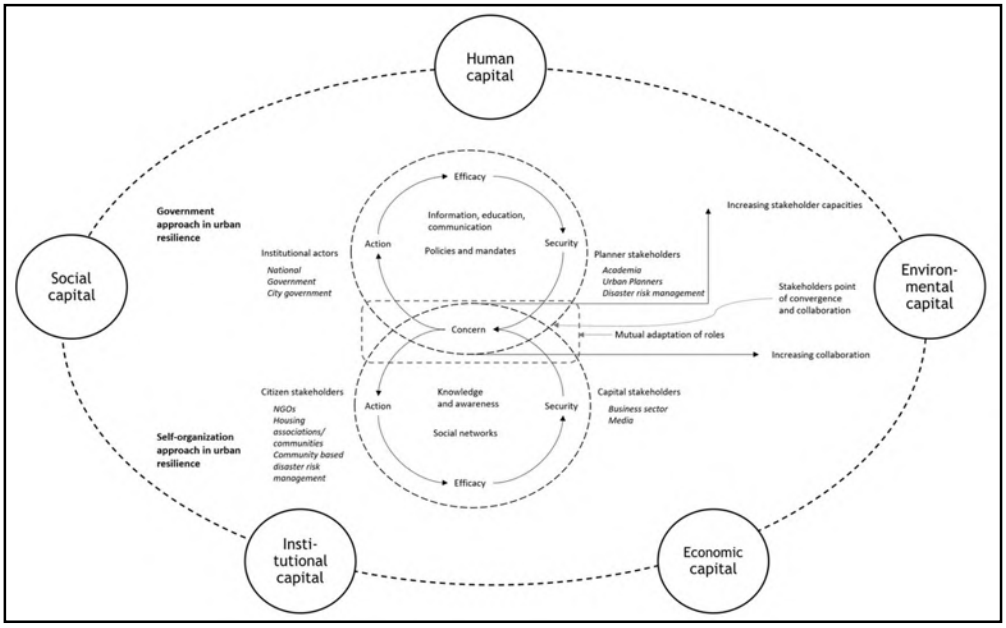


Figure 1 Collective engagement urban resilience framework (Source: Author, 2018)

3.1. Methodology

This paper is based on the initial findings of the author's fieldwork under the thematic areas awareness, key threats and resilience for the dissertation project 'Collective engagement: from disaster-prone city to disaster-resilient city'. These thematic areas are three of the ten thematic areas in the semi-structured interview guide used in the fieldwork done from November 2018 to February 2019.

Using the concept of the collective engagement urban resilience framework, the paper focused on the stakeholders involved in the government and the self-organization approach to urban resilience. The government stakeholders identified for the study are the institutional actors (government workers and the water board) and the planners (academics). Under the self-organization approach stakeholders identified are citizens (non-government organizations, community council, housing associations, private citizens) and the capital stakeholders (architectural firm and the port authority). Key informant interviews were conducted using a semi-structured interview guide containing open-ended questions on perception on risks and vulnerabilities in the city, awareness and concern of the general population on flood risks, and definition of resilience and resilient city.

3.2. Sampling Methodology

The key informant interviews targeted key knowledgeable persons in city development and planning, and disaster risk management in the City of Rotterdam. An initial list of 10 persons were identified (5 institutional, 1 planner, 2 citizens, and 2 capital stakeholders) using the snowball sampling each responded were asked to recommend one to two persons to be

interviewed until a target of at least 13 respondents were reached. In total 19 interviews were done for the case study (9 institutional, 2 planners, 6 citizens and 2 capital stakeholders).

3.3. Processing

The qualitative data gathered through the interviews were transcribed, collated, reviewed and processed using the Atlasti software. Based on the main line of inquiry: (1) awareness and concern on flood risks, (2) perception of risk and vulnerabilities, and (3) definition and perception of resilience, the qualitative data were allocated general codes, i.e. disaster experience, awareness, resilience with subsequent sub-codes at it emerged in the review. Memoing was done as insights arose.

4. Primary key findings

The results of the key informants interview were categorized into the three main line of inquiries: (1) awareness and concern on flood risks, (2) perception of risk and vulnerabilities, and (3) definition and perception of resilience. Memoing was done as insights rose from the interviews.

4.1. Awareness and concern to flood risks

There is a general perception among the interviewees on the low level of awareness of the stakeholders in Rotterdam on flood risks and vulnerabilities. Most of the interviewees asserted that people feel safe and secure in terms of flooding. One interviewee even pointed out the low level of awareness in the country because "disasters always happen somewhere else, you see it on tv but not in your neighborhood" (Citizen stakeholder, male), while another wondered on the awareness of people that they live below sea level (Citizen stakeholder, female).

The big issue in the Netherlands is that people are unaware of the threats . . . in the Netherlands we have no disasters, we have no floods, so people are not aware but in fact we are very vulnerable. (Planner stakeholder, male)

I wonder how many people really feel that they live below sea level because we didn't have any disasters. The only disaster we have is our bank account because we have to pay for that every year we receive an amount and we have to pay it. (Citizen stakeholder, female)

Most of the interviewees attribute the low level of awareness and concern on the risks due to the high safety and preventive measures of the Netherlands (Planner stakeholder, male (2); Institutional stakeholder, male (6); Institutional stakeholder, female (3); Citizen stakeholder, female; Citizen stakeholder, male (2); Capital stakeholder, male (2)). Many of the interviewees often quoted the probability '1 in 10,000 years' of a flood disaster in the country which gives security to the general population (Planner stakeholder, male (2); Capital stakeholder, male; Citizen stakeholder, male; Institutional stakeholder, male). One asserted that the 1953 flooding disaster happened so long ago that,

The new generation is used to the fact that it is arranged that okay nothing bad happened so far [ ] when the Delta program was built they felt safe. So this whole new generation they never had anything to do with it. You see what I mean? So it's not in their psyche, it's not in their minds that they should be afraid of anything. (Planner stakeholder, male)

Some of the interviewees say that there is a level of awareness among the people but it varies (Planner stakeholder, male; Institutional stakeholder, male; Citizen stakeholder, male; Capital

stakeholder). An interviewee asserted that the Dutch are aware because they learn it from school and everybody knows about the Delta Works (Planner stakeholder, male). Interviewees mentioned that people have an idea on threats because they can see it on the television but the idea of this happening in the future is not present nor do they know what to do about it (Institutional stakeholder, female (2); Citizen stakeholder, male (2); Capital stakeholder, male; Institutional stakeholder, male).

I think most Dutch are aware because they learn it in school, and of course everybody knows about the Delta Works and the Maesland barrier, but I think most people don't know about that website where you know how the elevation of your residence whether you are below sea level. So I think they are not aware of the urgency and also not so much on the threats. (Planner stakeholder, male)

Interviewees pointed out that a certain level of awareness is present for people who live in areas where it usually gets flooded and/or where most people have a higher level of education and income (Institutional stakeholder, female (3); Planner stakeholder, male (2); Institutional stakeholder, male (3); Citizen stakeholder, male; Capital stakeholder, male). Many of the interviewees identified the Nordereiland as the only place where most people are aware of flooding and know what to do when there is a flood (Institutional stakeholder, female (3); Planner stakeholder, male; Institutional stakeholder, male (2); Citizen stakeholder, male (3)). The location of the residents of Rotterdam also has to do with the socio-economic and educational status. Interviewees from the institutional actors mentioned that people living in the north have a higher education and higher income compared to the south. In these cases interviewees view that there are other concerns that stakeholders feel are more important than thinking about flooding (Institutional stakeholder, female (2); Planner stakeholder, male; Citizen stakeholder, male (2); Citizen stakeholder, female; Capital stakeholder, male).

So I would say in terms of awareness I would say there is a difference. But maybe also secondly if your main concern is how to make it through the month, then maybe that is actually what you are really aimed at and not so much actually about the other stuff. (Capital stakeholder, male).

4.2. Perceived key threats

The perceived threats of the interviewees vary from environmental threats to social threats. Environmental threats can be classified as having too much water and too little water. Interviewees who fall under the categories of institutional actors and planners stakeholders identified flooding coming from four directions of water 'from the river, from the sea, from rain and groundwater'. There is also a problem on too little water especially during the summer periods. Too little water according to the interviewees affects the wooden piles where most old houses are built on since it rots. Interviewees also mentioned that too little water also affects the strength of the polders.

It's the flooding because I always say water comes from four [sides] here. You have water from the river, from the sea, from rain, and also groundwater is coming up. So in four ways the water is coming. (Institutional stakeholder, male)

We have in our street a simple association and they come together one or two times a year but here in this street the problem is the opposite, the water level in the ground is too low. And for that reason the wooden piles under the old houses, they only stay intact when they are below water, wooden pile stays intact when they are below water levels. And when the water

levels get more down the top of the piles they get rotten so when you walk on the street you see at the moment they are working on the foundations. So the opposite problem. The water level is too low in the ground. The ground water is too low. (Citizen stakeholder, male)

Social related threats have also cropped up in the interview as a bigger threat than the risk of flooding. Several interviewees mentioned that 'there are so many nationalities living' in Rotterdam (Institutional stakeholder, female; Citizen stakeholder, male) and not a lot of people have high education due to people working in the harbor (Institutional stakeholder, female; Institutional stakeholder, male). Some see the big social and economic gap that one interviewee said,

If you have that in your world you cannot really focus on energy transition and sustainability, stuff like that. I think there is too big of a gap between those people and those people who can actually look forward because they are privileged in that kind of sense. (Institutional stakeholder, female)

This social and economic gap is also seen by one interviewee that hinders people from 'joining society' (Institutional stakeholder, female). The same interviewee also mentioned that there is an aging population in Rotterdam where most are concentrated in the south.

4.3. Perception and definition of resilience

The interviewees were asked to define resilience and describe what a resilient city is. Interviewees with a more technical background defined resilience in terms of their technical knowledge, referring to 'a system is able to bounce back in the state it was before' (Institutional stakeholder, female; Planner stakeholder, male (2); Citizen stakeholder, male (2); Institutional stakeholder, male (2)). Some referred to concepts of the Rockefeller Foundation.

I have always in my mind the definition of Rockefeller Foundation about urban resilience as a way to handle shocks and stresses in the best way. . . So we work, the Rockefeller Foundation had sort of a definition and also all kinds of resilience qualities, like robustness, flexibility, redundancy, integration. (Institutional stakeholder, male)

While one interviewee defined it holistically.

When I make a definition of a resilient city and that is also for the whole town planning. It is strong as it is complex. When it is simple, it is also simple to destroy. So the whole network of the city has to be not only one or two or three but ten different layers of mentality, of physical structures, of maintenance of the city, of all the those things, make it to a strong environment. (Citizen stakeholder, male)

While some also asserted that 'it should bounce back into a system where it has a higher level of resilience than it had before' (Planner stakeholder, male; Institutional stakeholder, male). Some interviewees also found the term 'resilience' as abstract (Citizen stakeholder, male) preferring other terms as robustness, preparedness, flexibility, or simply using the Dutch word 'veerkracht' (Institutional stakeholder female; Capital stakeholder, male; Institutional stakeholder, male; Citizen stakeholder, male). Some interviewees defined resilience and resilient city with a social orientation (Citizen stakeholder, male (2); Citizen stakeholder, female; Institutional stakeholder, female). The interviewees view the ability of the people to connect with each other as a way to make the city resilient.

When asked what factors contribute to making a resilient city, interviewees found social and institutional factors as the most important (Institutional stakeholder, female (3); Planner stakeholder, male; Institutional stakeholder, male (2); Citizen stakeholder, male (3); Citizen stakeholder, female; Capital stakeholder, male). Interviewees identified strong social networks, working together with the community and awareness as important to bring this idea of resilience (Institutional stakeholder, female (3); Planner stakeholder, male; Institutional stakeholder, male (2); Citizen stakeholder, male (3); Citizen stakeholder, female; Capital stakeholder, male). Some also pointed out to the ability to maintain this resilience through ensuring that there is a budget for maintenance and not just implementation (Citizen stakeholder, male; Citizen stakeholder, female). While some mainly point out the importance of people in general as factor in resilience.

But resilient city is all technical things but it also has to do with the people who live here, we all have to bring that up, we have to pay for it. It can only be done by the people who are themselves are one, aware of it, and two, they have to have the money and the knowledge. So the city can only be flexible if people want to pay for it and people can work together. It's the only way. So it starts at the bottom with people who are willing to cooperate. (Citizen stakeholder, female)

Well, I think that people in disaster context they rely on their networks. And there are a lot of examples in Rotterdam where there are stronger communities that people know their neighbors, that they work together, that they do workshops, that they cook together and those ties are very important within a disaster context. I also know that there are certain areas that people don't know their neighbors, that they are very distant from each other and I think that will be a problem whenever there is a disaster if you don't know where to go or where to search for help. I mean then you are by yourself and in a disaster context you always need other people. (Institutional stakeholder, female)

How Rotterdam is, I think. Rotterdam is a city that was bombed in the war. My father was living in the area where it was bombed in the war. Then my father and his brother and their mother, the three of them the house was gone and they went to live in the West in a house without anything, they started to build a new life. And many people did in Rotterdam, and the immigrants came from everywhere and they had nothing. Now [there are] many [ ] they started to work very hard in the harbor. That is resilience. Incredible, you know. So we are a very resilient city. It is really incredible how people survived the war and started with nothing and people came from everywhere and with nothing and they have a house and many children and grandchildren. Incredible. Sometimes they are sick because of the work, and they built their own life. That is resilience. People. (Citizen stakeholder, male)

5. Analysis and conclusion

The results of the interview indicate that the stakeholders see that there is a level of awareness on flood risk in Rotterdam. This level of awareness can be attributed to Dutch history lessons which is part of the educational curriculum. Since the 1953 Great North Sea Flood and Deltaworks project is part and parcel of the Dutch history this is also discussed in school. This means that there is a general understanding on the history of the Dutch way of managing water and preventing disasters. However, from the time of the 1953 flood the rarity of any disaster occurring have affected the level of awareness of the stakeholders specifically on flood risk. This time and experiential gap between 1953 and the present time have made

the population least concerned about flood risk. This is also exacerbated by a growing generation gap among the population who never witnessed the 1953 flooding or have ever experienced any type of flooding.

Interviewees with a more technical background recognize the vulnerability of the city to disasters including the possibility of a disaster from happening. However, this is not often translated to the non-technical stakeholders or the laymen. The government has instilled the feeling of safety and security among the citizens with the repetitive mention of risk being 1 in 10,000 years, a number calculated by scientists and engineers on the possibility of another disaster such as the 1953 flooding ever happening. In fact, most if not everyone knows the ratio '1 in 10,000 years' in the Netherlands but many people do not realize that the 1 in that ratio is a possibility that can happen anytime – today, tomorrow, next week or in the 10,000th year. Many interpret this as happening not in their lifetime. This perhaps is the second gap that can be recognized in the study.

In Rotterdam most of the people aware of the flood risk are those who live in Nordereiland which is outside the dike. Residents in Nordereiland are most of the time subjected to flooding during the storm season. This brings up the question whether awareness and concern on the risks of flooding depends on the location. It was raised by the interviewees that while location can be a contributing factor in the level of awareness of the stakeholders, as in the case of Nordereiland, it is also mainly due to the type of community existing in terms of social and economic status. People with lower income will be more concerned about their daily living expenses than the possibility of flooding or more so climate change. Those with higher income and higher education have a wider network in the city, pay higher income tax, and may have a stronger stance on government and/or political issues that may affect them and their community. This social and economic gap among the city stakeholders is also seen as a threat by the interviewees because it impedes on the ability of those belonging in the lower income from integrating in the city. Esteban (2017) noted strong stakeholders tied to the community as one of the contributing factors in collective engagement and rapid recovery after a disaster. Relating this to resilience building, citizens who do not fit into a community nor the city will have a much more difficult time seeing themselves as part of the city. Integration is important in resilience building because this makes citizens feel that they are connected to the city, that they are valued, and that they can contribute to its growth.

A fourth gap that can be seen from the interview is the way stakeholders define resilience. Stakeholders defined resilience in two perspectives, one is more technical attributing resilience to the city's physical make up. It is how the city is planned to adapt to the changing climatic conditions as well as ensure that the city can bounce back from any disaster. The strong preventive measures play a role in making the city resilient. Interviewees see the importance of continuous improvement of these preventive measures to incorporate climate change adaptation as a factor in creating a resilient city. This suggests a more structural, engineering, and spatial design element. The other perspective is mainly focused on the social aspect of resilience, in particular the role of the people of Rotterdam. The interviewees see that the people and their social networks are equally important to create a resilient city.

The last gap that can be drawn from the interviews is the translation of the word 'resilience' itself. Some interviewees perceive resilience as an abstract concept. The concept of resilience and resilient city is still lost in translation for some of the interviewees including some institutional actors who would rather use words such as robustness, preparedness and flexibility. The Dutch term veerkracht is more acceptable for many interviewees since it hits

the local language. In this way, it can be said that the acceptability of the concept of resilience may be better achieved if it is relatable, such as using the local language to draw the general population towards the vision of the city.

The collective engagement urban resilience framework shows that the mutual adaptation of roles of all stakeholders help in building resilience. If the level of awareness and concern on disasters, risks and vulnerabilities is low among the stakeholders, how then will stakeholders engage to address these risks and vulnerabilities. The gap between strong preventive measures and preparatory measures can be narrowed down by raising awareness on flood risk management, climate change adaptation, and resilience building. It will also help to make the concept of resilience more identifiable to all stakeholders. The goal is not exactly to make a unified definition of resilience and a resilient city but a definition that is more engaging.

6. Acknowledgements

I would like to thank the interviewees from the City of Rotterdam for their willingness to be interviewed and their honesty in sharing their views. I am especially thankful to my PhD promotor Dr. Jurian Edelenbos of the Erasmus University Rotterdam who has supported me from the beginning of my PhD journey, provided extensive feedback on my dissertation project, and continues to guide me in the direction that would most help me succeed.

7. References

Adger, William Niel (2000) "Social and ecological resilience: are they related?", Progress in Human Geography, Vol. 24, No. 3 (September).

Andavarapu, Deepika; Arefi, Mahyar (2016) "Understanding resilience in urban slums: Lessons from Pedda-Jalaripeta, India", plaNext, Vol. 2, (April).

Berry, Melissa M. (2013) "Thinking like a city: Grounding social-ecological resilience in an urban land ethic", Idaho Law Review, Vol. 50, pp. 117-152.

Elmqvist, Thomas (2014) "On urban social-ecological systems, sustainability and resilience - implications for SDGs and development of indicators", International Council for Science.

Esteban, Theresa Audrey O. (2018) Building resilience through collective engagement, paper presented at the conference Constructing an urban future: The sustainability and resilience of cities, Abu Dhabi, United Arab Emirates, March 18-19, 2018 edn.

Folke, Carl (2006) "Resilience: The emergence of a perspective for social–ecological systems analyses", Global Environmental Change, Vol. 16, No. 3, (August).

Folke, Carl; Carpenter, Stephen R; Walker, Brian; Scheffer, Marten; Chapin, Terry; Rockstrom, Johan (2010) "Resilience thinking: integrating resilience, adaptability and transformability", Ecology and Society, Vol. 15, No. 4, (December).

Gall, Melanie (2013) From social vulnerability to resilience: measuring progress toward disaster risk reduction, No. 13/2013 edn, UNU-EHS, Germany.

Gunderson, Lance (2010) "Ecological and human community resilience in response to natural disasters", Ecology and Society, Vol. 15, No. 2 (June).

Gunderson, Lance H.; Holling, Crawford Stanley (2002) Panarchy: understanding transformations in human and natural systems, Island Press, USA.

Heintze, Hans-Joachim; Kirch, Lotte;Kuppers, Barabara; Mann, Holger; Mischo, Frank; Mucke, Peter; Pazdzierny, Tanja; Prutz, Ruben; Radtke, Katrin; Strube, Friederike; Weller, Daniel; (2018) World Risk Report 2018, Bundnis Entwicklung Hilft and Ruhr University Bochum - Institute for International Law of Peace and Armed Conflict, Germany.

Holling, Crawford Stanley (1973) "Resilience and stability of ecological systems", Annual Review of Ecology and Systematics, Vol. 4, No. 1 (November)

Holling, Crawford Stanley; Schindler, David W.; Walker, Brian W.; Roughgarden, Jonathan; (1997) "Biodiversity in the functioning of ecosystems: an ecological synthesis" in Biodiversity loss: Economic and ecological issues, eds. C. Perrings, K. Mäler, C. Folke, C.S. Holling & B. Jansson, Cambridge University Press, Cambridge, pp. 44-83.

Keck, Markus; Sakdapolrak, Patrick; (2013) "What is social resilience? Lessons learned and ways forward", Erdkunde, Vol. 67, No. 1 (January)

Lu, Peiwen; Stead, Dominic; (2013) "Understanding the notion of resilience in spatial planning: A case study of Rotterdam, The Netherlands", Cities, Vol. 35 (December)

Marcus, Lars (2008) "Spatial Capital and how to measure it", New urbanism and beyond (January).

Marcus, Lars; Colding, Johan (2011) "Towards a spatial morphology of urban social-ecological systems", 18th International Seminar on Urban Form Montreal, 26-29 (August)

Mayunga, Joseph S. (2007) "Understanding and applying the concept of community disaster resilience: a capital-based approach", Summer academy for social vulnerability and resilience building, Vol. 1 (July)

Mehmood, Abid (2015) "Of resilient places: planning for urban resilience", European Planning Studies, Vol. 24, No. 2 (September)

Sharifi, Ayyoob; Yamagata, Yoshiki; (2016) "Principles and criteria for assessing urban energy resilience: A literature review", Renewable and Sustainable Energy Reviews, Vol. 60 (July)

Takeuchi, Kazuhiko; Elmqvist, Thomas; Hatakeyama, M; Kauffman, Joanne; Turner, Nicholas; Zhou, Dingyang (2014) "Using sustainability science to analyse social–ecological restoration in NE Japan after the great earthquake and tsunami of 2011", Sustainability science, Vol. 9, No. 4 (October)

The Rockefeller Foundation (2017) 100 Resilient cities. Available: https://www.rockefellerfoundation.org/our-work/initiatives/100-resilient-cities/

Wagner, Melissa; Chhetri, Netra; Sturm, Melanie (2014) "Adaptive capacity in light of Hurricane Sandy: The need for policy engagement", Applied Geography, Vol. 50 (June)

Walker, Brian; Holling, Crawford Stanley; Carpenter, Stephen; Kinzig, Ann (2004) "Resilience, adaptability and transformability in social–ecological systems", Ecology and Society, Vol. 9, No. 2 (December)

Watson, Ian; Finkl Jr, Charles W (1990) "State of the art in storm-surge protection: The Netherlands Delta Project", Journal of Coastal Research (Summer)

Wesselink, Anna J. (2007) "Flood safety in the Netherlands: the Dutch response to Hurricane Katrina", Technology in Society, Vol. 29, No. 2 (April)

Research Paper

Living with water

How memory and experience can help build community resilience in Dordrecht

Theresa Audrey O. ESTEBAN, Erasmus University Rotterdam, Graduate School of Social Science and the Humanities; The Philippines

Abstract

In 2021, Dordrecht, the oldest city in the Netherlands, will be commemorating the 600th anniversary of the St. Elizabeth flood. This disaster flood event inundated the entire Dordrecht and separated the city from Geertruidenberg. After the flood Dordrecht was left with only the old city center that the city had to reclaim their land. To date Dordrecht has remained an island surrounded by water. The city's vulnerability to flooding have prompted the city to actively participate in climate adaptation strategies and innovative design methodologies to help the island city cope with changing climatic conditions. Dordrecht is one of the cities participating in the Room for the River project which allows vast tracks of land to be flooded in the event of a big flood. The city is also surrounded by dikes that protect parts of the city from any impending flood danger. Still the historic city center which lies in the unembanked area occasionally experience flooding. Every two to five years residents of Dordrecht especially in the old city center experience some low level flooding due to high waters and heavy rainfall. Yearly the city conducts a drill in the city center to train people on how to place flood barriers and sandbags in front of their homes. However, there is also a sense of complacency especially for the areas in the city where the structural measures were heavily constructed (those that are within the dike). This feeling of complacency may have been placed due to their strong belief that the city is indeed safe due to the structural measures that have been carefully integrated to ensure that flooding will never happen again.

Memory-based disaster experience can be the starting point in building knowledge on disasters. Most often people who have experienced a disaster can provide experiential knowledge in dealing with disasters in the future. Further people who experience disasters on a more regular basis have more built in memory and knowledge. Using interviews from key stakeholders of Dordrecht, the paper will draw out how this memory-based disaster experience and living with water helps Dordrecht towards its vision to become a self-reliant island.

Keywords

Resilience, Collective engagement, Collective engagement urban resilience framework, Memory-based disaster experience, Netherlands

1. Introduction

The profound impact of the Sint Elizabeth flood is apparent in Dutch history. The Rijks Museum holds a piece of beautifully painted depiction of the Sint Elizabeth flood in four panels which "serve as a powerful illustration of the traditional narrative describing the fight against floods that shaped Dutch national identity" (van Asperen, 2019: 36). History, including the artistic representation of the flood disaster, impacted the collective memory of the Dutch that many understood the Sint Elizabeth flood as an apocalyptic event most especially in Dordrecht.

The impact of the flood in Dordrecht was huge that it wiped out 17 villages (Waals, et al., 2011) and separated Dordrecht from Geertruidenberg. Land was slowly reclaimed after the big flood through compartments where each compartment is protected by dikes (Waals, et al., 2011). Centuries of land reclamation and diking in Dordrecht have shaped the city into what it is now, an island city that lies between the Rhine and Meuse two large and important rivers not just in the Netherlands but the entire Europe.

Figure 1 The Saint Elizabeth's Day Flood 1490 by Master of the St Elizabeth Panels (Source: https://useum.org)

While the Sint Elizabeth flood was the biggest flood that made an impact on the physical and economic landscape of Dordrecht, the 1953 Great North Sea flood made a pivotal role in constructing a long-term flood preventive measure in the entire country through technology and engineering. The hardest hit area in the Netherlands was Zeeland where water levels reached NAP +4.55 (Rijkswaterstraat, 2019) still Dordrecht was not spared as water level reached NAP +3.70 (Hinborch, 2011) and inundated the city specifically the historic city center. In 1993 and 1995 extreme river discharge from the Meuse caused flooding in Zuid Holland. Also, in 1995 the threat of a flood event due to problems in the Rhine resulted to an evacuation of 200,000 people for a week (Jak and Kok, 2000). These flood events have resulted to not just preventive measures but adaptation measures such as the Room for the River project that allows vast tracks of land to be flooded in the event of a flood.

The City of Dordrecht like many other cities in the Netherlands are divided between the *binnen de dijk* (within the dike) and *buiten de dijk* (outside the dike). As a result of the compartmentalization, a large part of the island is *binnen de dijk*, while the historic city center, the area of the Staart, the inland seaport, and the green area near Hollands Diep and Nieuwe Merwede are *buiten de dijk*. Every two to five years Dordrecht residents most especially those living in the historic city center experience low level flooding due to high waters coming from the river. Such many of the residents in the unembanked areas are aware of the risks and vulnerabilities they are facing. For those in the embanked areas the residents rarely experience such flooding that the notion of risks and vulnerabilities is low.

Figure 2 Map of Dordrecht showing the embanked and unembanked areas (Source: Risicokaart.nl)

This paper focuses on memory-based disaster experience which is one of the thematic areas being investigated in the author's dissertation research 'Collective engagement: from disaster-prone city to disaster-resilient city'. Disaster experience provide some experiential knowledge in dealing with future disasters. Most often people who experience disasters on a regular basis have more built in memory and knowledge. Using interviews from key stakeholders of Dordrecht, the paper will draw out how this memory-based disaster experience and living with water helps Dordrecht towards its vision to become a self-reliant island. The paper proceeds with a discussion on memory-based disaster experience and how this can be the starting point in building community resilience. Thereafter, the empirical study will be presented with a brief discussion on the methodology. Finally, the analysis and conclusions will be discussed.

2. Memory-based disaster experience and resilience building

Cities are complex socio-ecological systems that grow in different pathways and timescales. The path to resilience is a dynamic process that goes through several dimensions. There is no one size fits all strategy in building resilience. The city's complexity in terms of not just the physical attributes but also social and cultural attributes require different approaches. One thing remains the same for most cities, in a disaster context experience results in a steep learning curve for the community, the government and many other city stakeholders to adapt to the situation. Hooli (2016) found that 'those who regarded themselves better prepared are those who have experienced and learned what the floods are like' (p. 702).

Memory-based disaster experience allows those who experience it to develop coping strategies (Pfister, 2011). This does not usually mean though that the learning is sustained through a long period. Pfister (2011) pointed out that a "disaster gap, the rare occurrence of severe hazards during almost a century, is a significant element in explaining the loss of functional disaster memory" (p. 17). Nevertheless, memory-based disaster experience play a significant role for groups, communities, cities and even nations to develop not just coping mechanisms but disaster mitigating infrastructures to ensure their safety and security. The Netherlands is a good example on this having ensured that the 1953 Great North Sea flood will never happen again, the Dutch implemented the Deltaworks project in 1958. The continuing research and improvements on water management and climate change adaptation showcase the stronghold of that flood memory.

Memory and learning are important in building resilience. In fact, the panarchy framework, an expanded concept of resilience, use the terms 'revolt' and 'remember' period to illustrate the adaptive cycles present in socio-ecological systems (Gunderson and Holling, 2002; Berkes, et al., 2008). The 'revolt' period causes the critical change (such as a disaster) while the 'remember' period "facilitates renewal and reorganization by drawing on the memory that has been accumulated" (Berkes, et al., 2008: 18). Specifically, Folke (2006) referred to memory as the "accumulated experience and history of the system, and it provides context and sources for renewal, recombination, innovation, novelty and self-organization following disturbance" (p. 259). Interestingly, the word "accumulated" is used in both context which means that it is a growing experience that builds capacity to renew and reorganize. Cook (2018) seconds this by presenting "collective memory as the accumulation of individual recollections" and "shared public memory becomes a dynamic force that shapes and transforms the narrative of what is remembered" (p. 329). If flooding incidents repeat overtime the chances of retaining memory and learning from it increases. But of course a flooding disaster is not something that many desire to happen in order for the city and its stakeholders to learn.

Trainings, narratives, and information that is widely disseminated to the general population help retain learnings derived from the experience. Repetition of these types of knowledge building activities and information reinforce awareness. A well-informed and aware

stakeholders helps the city in building urban resilience because it lessens the surprise a disturbance such as a disaster would bring. It increases their adaptive capacity.

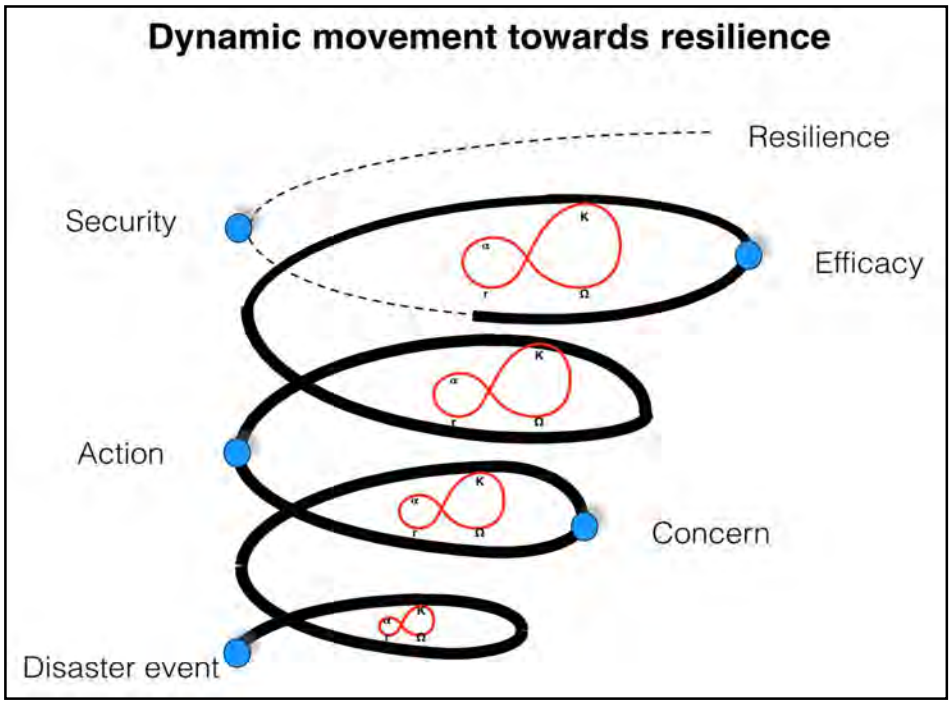


Figure 3 Dynamic movement towards resilience from the disaster event (Source: Esteban, 2018)

Esteban (2018) illustrated in Figure 3 that a disaster event, whether this was a recent or distant past experience, provoke city stakeholders to behave or act on this experience to improve their situation. In order for cities to build resilience cities go through a dynamic process of change through several dimensions (Esteban, 2018). Resilience is not the end of the process rather it should be understood as a continuous process of maintaining a level of stability. These dimensions follow an adaptive cycle of stability and change within the collective engagement urban resilience framework (Figure 4). The framework has two approaches in building urban resilience, the government and the self-organization approaches. Both approaches start from a collective concern where institutional and non-institutional stakeholders remember and learn from past disaster events. Stakeholders in this dimension have a shared vision and concern in building urban resilience. Collective action facilitates the exchange of information, knowledge and experiences to help in creating solutions (Esteban, 2018). Collective efficacy is the point where stakeholders with their knowledge strengthened by the exchange of information and experiences in their various networks actively engage. The last dimension is collective security, which can be seen in Figure 4 converges back to concern. Collective security is the dimension where stakeholders reach a high level of awareness. This means that the stakeholders are equipped with the knowledge and information on risks and vulnerabilities as well as how to prepare and act once a disaster happens.

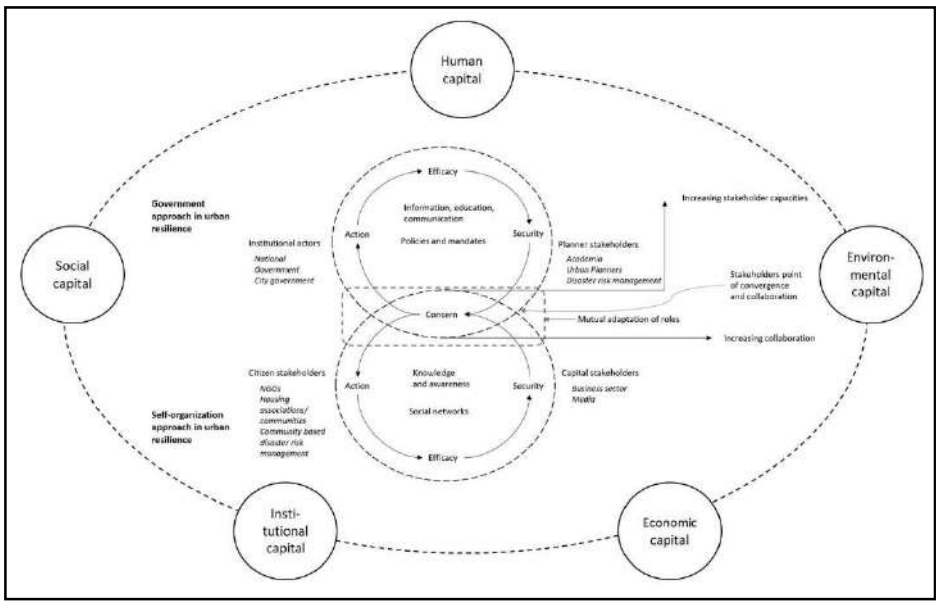


Figure 4 Collective engagement urban resilience framework (Source: Esteban, 2018)

How a city progress from one dimension to another depends on the domains of change that leads to its transformation state. Figure 5 shows the domains of change within the collective engagement urban resilience framework which influence the dynamic movement to urban resilience. Stakeholders are part of the domains of change and are in fact critical in the formation of either a formal or informal organization that can be the bridge between the government approach and the self-organization approach towards urban resilience. The bridge within this domain of change facilitate the translation of issues affecting the city as a whole into opportunities for change and renewal. This bridge is similar to the bridging social capital which is the inter-relationship with other groups and stakeholders within the city (Esteban, 2017). Strong social capital helps in establishing 'trust and reciprocity within and between networks' of stakeholders and actors (Esteban, 2017: 223).

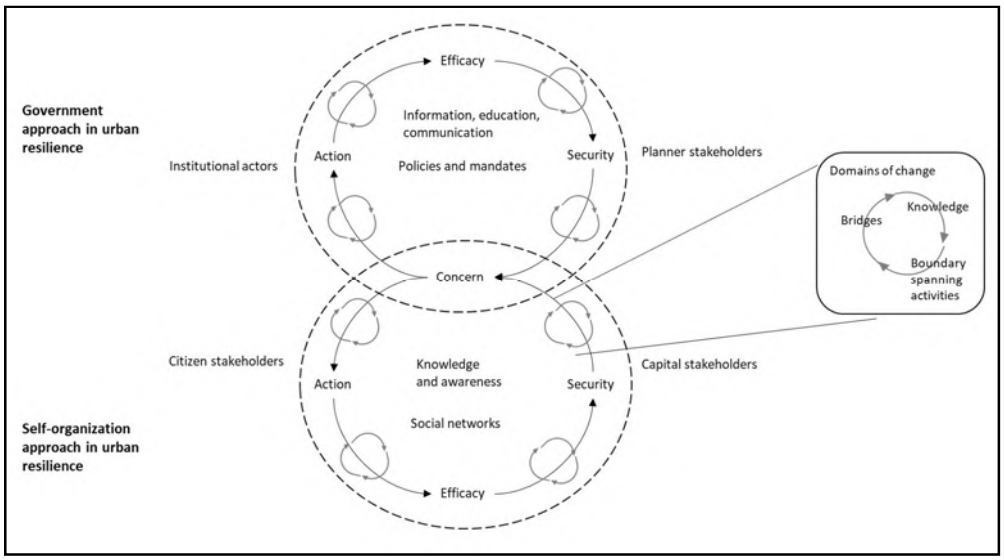


Figure 5 The domains of change within the collective engagement urban resilience framework (Source: Esteban, 2018)

3. Empirical study: living with water in Dordrecht

The paper used a qualitative approach through face-to-face interviews of key informants. Following the collective engagement urban resilience framework the key informants come from the institutional actors, planners stakeholders, citizen stakeholders and capital stakeholders. An initial list of three targeted informants were interviewed. Succeeding interviewees came recommended by the initial list creating a snowball until 15 interviewees were reached. The interviews were carried out by the author from November 2018 to February 2019 and forms part of the dissertation research. The questions asked during the interview ranged from the disaster experience, collaboration with stakeholders, awareness and concern, disaster risk management, resilience and resilient city. In this paper the objective is to draw out the memory-based disaster experience of the stakeholders in the City of Dordrecht and assess the level of awareness on the risks and vulnerabilities in living with water between areas in the city that are frequently flooded and those that rarely experience this. For that matter, the results of the interview on questions particular to disaster experience and awareness and concern is considered. This is also because there is a current limitation in the time for coding and analyzing all aspects of the interviews. However, this paper forms an important contribution to the overall analysis for the Dordrecht case in the dissertation project.

The qualitative data derived from the interviews were transcribed and processed using the Atlasti software. For the thematic areas disaster experience and awareness and concern a total of 14 themes emerged from the interviews. These were further coded using the three domains of change, bridges, knowledge and boundary spanning activities. A separate code memory-based disaster experience was used to draw out salient points on this specific topic. The findings presented below will begin with the memory-based disaster experience, followed by each domains of change.

3.1. Memory-based disaster experience

There is a collective memory on how Dordrecht was shaped by the 1421 Sint Elizabeth flood among the interviewees. The 1421 Sint Elizabeth flood "drowned 17 villages roughly in the hinterland" (Institutional stakeholder, male) and changed the entire landscape of Dordrecht. There was "a very large inland sea, then the island was gradually reclaimed from that sea" (Planner stakeholder, male) making "Dordrecht an island which is still is today" (Institutional stakeholder, male). The Sint Elizabeth flood affected the economic situation of Dordrecht that one interviewee even said, "if that flood would not have happened Dordrecht would probably be the Amsterdam of the Netherlands" (Institutional stakeholder, male).

The other big flood that the interviewees remember is the 1953 Great North Sea flood. However, interviewees noted that while the 1953 flood was a big flooding disaster for the country, in Dordrecht the effect was not as big. Interviewees noted that it was the province of Zeeland that was gravely affected and that it was the dike ring opposite of Dordrecht that got flooded (Institutional stakeholder, male (2); Planner stakeholder, male). The interviewees noted a minor flooding in the city center but acknowledge that the 1953 flood have had an impact on the collective memory of the country. Interviewees recalled that the national government vowed that the flood of 1953 should never happen again which resulted to how the Dutch deal with flood risk management through the Deltaworks project.

Interviewees recalled that the 1993 and 1995 riverine threat changed the water management strategy of the Dutch from responding to a disaster through preventive measures to adapting to disasters (Institutional stakeholder, male; Planner stakeholder, male). However, interviewees shared that since the 1953 Great North Sea flood no other disasters have happened in Dordrecht or in the country that in general people feel safe. Interviewees mentioned that flooding has been calculated to happen 1 in 10,000 years that people translate this to "not going to happen" and they have other "more urgent calamities to worry about so it is not in their priority" (Institutional stakeholder, male; Planner stakeholder, male). An institutional stakeholder interviewee opined that, "Perhaps some say we have done it too well because they don't see any risk anymore. . . The attention is fading and fading away. That's what happened in the Netherlands." (Institutional stakeholder, male). This is supported by the statement of another interviewee, "We are in Holland we feel so safe and well-protected. We don't have the experience of a real flood, only in '53 but there are not so many people that are really experiencing that. What other disaster have we faced not so many. So we don't have the experience and we don't know what will overcome us when it really happens, we don't know." The previous institutional stakeholder interviewee also pointed out that the older generation know about the 1953 flood because they experienced it. He said that the older generation are more concerned to the point that they will call the *waterschap* to check if the water pumps are working because they don't hear the pumps anymore.

3.2. Bridges

There are a lot of public organizations in Dordrecht that are interested in the city. The city government itself make efforts in making people more conscious of the risk of water (Planner stakeholder, male). Three of the planner stakeholder interviewees all come from academic institutions who have themselves done a number of studies on Dordrecht that range from technical engineering to social science related studies on public participation and governance.

Interviewees named the *veiligsheidsregio* (safety region) in Dordrecht as an organization that work together with the *waterschap* (waterboards) to improve awareness in the city on flood

risk. The national government and Dordrecht "as a city itself are working on awareness" (Institutional stakeholder, male). Institutional stakeholder interviewees noted the communication strategies that they conduct to the general population. An interviewee noted that awareness is improving in Dordrecht but also admit that there are still no studies on awareness or on what level of awareness the population has (Institutional stakeholder, male; Planner stakeholder, male).

3.3. Knowledge

The interviewees asserted that the people in general are not concerned about flooding since they trust the government and the flooding disaster happened long ago. But the interviewees also noted that the people in Dordrecht are more conscious of the flood risk than elsewhere in the Netherlands because people see the water bodies (Planner stakeholder, male (2); Planner stakeholder, female; Institutional stakeholder, male). One interviewee said that Dodrecht is "one of the few cities, especially the old town [that] is more or less in the river . . .you see some of the houses [ ] standing [on] the river so from centuries it is quite normal to live with the water" (Institutional stakeholder, male). He asserted that this has allowed them to adapt to changing water conditions and that this is not new to them.

Interviewees mostly refer to people living *buiten de dijk* as more aware compared to those living *binnen de dijk* because "they have regular elevated levels on the quays . . . the awareness there is bigger than behind the embankments" (Planner stakeholder, male). Comparing this to the people living within the dike rings an interviewee remarked "People inside the dike rings, they say 'a disaster will occur once in every ten thousand years, well it will not happen today and it will not happen tomorrow, but maybe several hundred years,' so it is much harder to make them aware that the situation can be tomorrow," (Institutional stakeholder, male). According to the interviewee this mindset makes it harder to communicate to people living within the dike to invest in their house in case of a flood because people will say "then make strong dikes and make sure that it will not happen" (Institutional stakeholder, male).

The higher level of awareness of people living *buiten de dijk* can also be attributed to the amount of information that is given to them. Yearly the people receive letters on high water levels and remind them on what to do in case of high water levels. One interviewee remarked, "I think that around the big rivers there is a lot of educational workshops and teaching moments for the citizens to be aware of what is happening and the government is really helping and making sure that every citizen actually knows about it," (Planner stakeholder, female).

3.4. Boundary spanning activities

There are ways to communicate flood risks one is through the website overstroming.nl however one institutional stakeholder interviewee shared that not a lot of people are aware of this. He said that even his colleague did not know about the website. Media (television and newspapers) and social media (Facebook) have been used to increase the communication and awareness among all stakeholders but interviewees also mentioned that it is really difficult to measure if these medium really reach the people (Institutional stakeholder, male (2)). One interviewee mentioned the TV series "Als de dijken breken" that actually brought "the consciousness on why we should evacuate" (Citizen stakeholder, male). The same interviewee also pointed out that after that show ". . two days later everyone forgot it. Goes back to normal life. And did anything change after this series? No. Apparently not."

In Dordrecht there is a yearly exercise where people in the old city center put *vloedschotten* (flood barriers) in front of their houses (Institutional stakeholder, male (2)). This is an exercise that the City of Dordrecht do together with the *waterschap* (Institutional stakeholder, male). There were also some exercise on how to evacuate within your house. Interviewees see the yearly *vloedschotten* exercise as a good way to make people aware of the flood risk and also to prepare themselves. Candidly an interviewee mentioned that, "It is a very good thing that there is a high water situation every two years because if it is once every thousand years people won't believe it or they will say it will not happen in my time," (Institutional stakeholder, male). The same interviewee opined that "there is a correlation with the last [experience], the period between the two flooding and the awareness." He made the example of the high water level they experienced in 2012 and 2013 where people 'reacted more accurately' in 2013 because with the flood in 2012 'it was 8 years ago [from] the last flooding.' He also shared that the city government have also made instruction films on how to use the flood barriers and the sandbags.

Interviewees shared that there are a lot of activities being done in Dordrecht to improve the awareness of people (Institutional stakeholder, male; Planner stakeholder, male). These activities are also being done together with other cities and even in schools. One of the more successful projects they have done in Dordrecht are the experimental projects on floating houses. "Experiments are rather a safe place to do different things but when you start working with each other for quite a while you get to know each other and know why, what their responsibilities are, what their problems are and when you know their problems and responsibilities you can make it also your own and combine it with your own urban development," (Institutional stakeholder, male). The interviewee see this as a way to keep the people's relationships and each others interests to make an integrated plan. Another interviewee mentioned that they plan to commemorate the Sint Elizabeth flood in 2021 by doing a number of activities every year until that time (Planner stakeholder, male). He said that there are two main things that they will do to make people more aware of rainfall flooding, one is to have open garden days in spring to showcase how they have 'greened their gardens'. The other is an open attic evening in autumn 'where people invite each other to their attic and they have a dinner there and play a game [ ] with the neighbors'. He further explained that the latter is 'to raise awareness about sheltering, that they have to [make a] shelter in their attic.'

4. Analysis: collective memory in Dordrecht

Results of the interviews reveal a collective memory on the flooding disasters that happened in Dordrecht and in the Netherlands. Much of these collective memory can be attributed to the ever present narratives depicted in art works and the landscape of Dordrecht which serve as a constant reminder on how the city was formed. There is a level of consciousness on flood risk that is present in Dordrecht with the fact that the city is an island surrounded by water. There is also a regular occurrence of high water levels in the old historic city center. While the 1953 Great North Sea flood did not have a big effect on Dordrecht its occurrence and the result thereafter (the implementation of the Deltaworks project) is in the collective memory of the Dutch in general.

It can be said that both the Sint Elizabeth and North Sea flooding disasters resulted to the natural movement of people to protect themselves from any impending danger. After the Sint

Elizabeth flood people reclaimed land from the sea to rebuild Dordrecht, and after the North Sea flood the Dutch vowed the flood disaster will never happen again by strengthening existing dikes, constructing flood barriers, among others. Through these engineering feats the Dutch have ensured the security of the population which as one interviewee has said "we have done it too well because they don't see any risk anymore." It is common knowledge for the people in the Netherlands that it is 'safe and well-protected' from floods. While these two flooding disasters are well within the collective memory, the disaster gap is wide that the level of awareness and concern for any flood risk is fading.

From the interviews it is quite apparent that Dordrecht is actively engaging with different stakeholders. The City of Dordrecht work closely with the *veiligsheidsregio* and *waterschap* on various activities in relation to prevention from as well as preparation for disasters. As formal bridges to city stakeholders the boundary spanning activities they conduct, such as the yearly *vloedschotten* exercise in the old historic city center, equips the residents with knowledge as well as a reminder on what can happen and how one should prepare for flooding. Yet, it can be noted in the interviews that the level of awareness on flood risk is stronger among people living *buiten de dijk* because of these regular exercises. Also, there is regular information on high water levels communicated to the residents in these areas. Such that even if with the glaring presence of the water in Dordrecht and the collective memory of the flooding disasters one cannot say that the risk of flooding is within the collective consciousness of all the people.

Dordrecht is working towards their vision to be a "self-reliant island" and improving the awareness of the people is an important facet of this. Quoting one institutional stakeholder interviewee, "The philosophy [is] *zelfredzaam*, self-reliant island, and that vision is still valid it's a bit undermined by the recent intervention but I think that vision to be self-reliant is I think a promising way." Planned activities specified in the interviews to increase awareness on flood risk, climate adaptation, and flood preparation is supported by planners and institutional stakeholders. This paves the way for opportunities to learn, remember, discuss, and experience that in turn will help in the transformation of Dordrecht into becoming *zelfredzaam*.

5. Conclusion: Three watermarks

Memory-based disaster experience. Memory-based disaster experience can help stir a shared experience to work towards a shared vision. History has shown that after the 1421 Sint Elizabeth flood and 1953 Great North Sea flood physical measures were done to secure the population from flood risk. In this case, the experience have left an indelible watermark on the manner of response the Dutch has with regards to flood risk – "never to happen again." While the narratives and the collective memory is still present the disaster gap that has emanated due to the strong preventive measures of the Deltaworks project after the 1953 flood have caused flood risk awareness to wane.

Living with water. The regularity of the high water levels and flood risk management activities *buiten de dijk* residents are trained and equipped with knowledge. This places them in line with the City of Dordrecht's vision to become a self-reliant island. Activities such as the proposed commemoration of the 600th Sint Elizabeth flood anniversary will help remind people of the rich history of the city as well as an opportunity to showcase projects such as the Room for the River which can be considered a high watermark on innovative climate change adaptation strategy.

Collective memory. Halbwachs (1980) differentiated collective memory from history by stating that collective memory "is a current of continuous thought whose continuity is not at all artificial, for it retains from the past only what still lives or is capable of living in the consciousness of the groups keeping the memory alive." Therefore, if the rest of the population of Dordrecht *binnen de dijk* continue to have a distant attitude towards flood risk then commemorations, remembrance, communication and information will remain a watermark visible only when held towards the light.

6. Acknowledgements

I would like to thank the interviewees from the City of Dordrecht for their willingness to be interviewed and their honesty in sharing their views. I am especially thankful to my PhD promotor Dr. Jurian Edelenbos of the Erasmus University Rotterdam who has supported me from the beginning of my PhD journey, provided extensive feedback on my dissertation project, and continues to guide me in the direction that would most help me succeed. I also would like to thank my colleagues Gerjan and Petra for candidly sharing with me their "flood memory" knowledge and childhood learnings one morning as I disturbed them in their office. Hoping they will not get tired of me talking about floods and disasters.

7. References

Berkes, Fikret; Colding, Johan; Folke, Carl (2008) Navigating social-ecological systems: Building resilience for complexity and change, Cambridge: Cambridge University Press

Cook, Margaret (2018) ""It Will Never Happen Again": The myth of flood immunity in Brisbane", Journal of Australian Studies, Vol. 42, No. 3 (August)

Esteban, Theresa Audrey O. (2018) Building resilience through collective engagement, paper presented at the conference Constructing an urban future: The sustainability and resilience of cities, Abu Dhabi, United Arab Emirates, March 18-19, 2018 edn.

Esteban, Theresa Audrey O. (2017) "Collective engagement: picking up after the storm" in Urban governance in the realm of complexity, eds. M.P. van Dijk, J. Edelenbos & K. van Rooijen, United Kingdom: Practical Action Publishing Ltd.

Folke, Carl (2006) "Resilience: The emergence of a perspective for social–ecological systems analyses", Global Environmental Change, Vol. 16, No. 3 (August)

Gunderson, Lance H.; Holling, Crawford Stanley (2002) Panarchy: understanding transformations in human and natural systems, USA: Island Press

Halbwachs, Maurice (1980) The collective memory, New York: Harper & Row

Hinborch, Milan (2011) Flood defence town centre Dordrecht, Master's Thesis edn, Delft, The Netherlands: Delft University of Technology

Hooli, Lauri Johannes (2016) "Resilience of the poorest: coping strategies and indigenous knowledge of living with the floods in Northern Namibia", Regional Environmental Change, Vol. 16, No. 3 (March)

Jak, Martine; Kok, Matthijs (2000) "A database of historical flood events in the Netherlands" in Flood issues in contemporary water management, eds. Marsalek J., Watt W.E., Zeman E. & Sieker F., Dordrecht, The Netherlands: Springer

Nederhand, José; Bekkers, Victor; Voorberg, William (2014) Self-Organization and the Role of Government: How and why does self-organization evolve in the shadow of hierarchy? Rotterdam, The Netherlands: Erasmus University Rotterdam

Pfister, Christian (2011) "The monster swallows you" RCC Perspectives, No. 1 (January)

Rijkswaterstaat (2019) The flood of 1953. Available: https://www.rijkswaterstaat.nl/english/water/water-safety/the-flood-of-1953/index.aspx

Risicokaart (2019) Risicokaart.nl. Available: https://www.risicokaart.nl/

Useum.org (2019) Master of the St. Elizabeth panels. Available: https://useum.org/artist/Master-of-the-St-Elizabeth-Panels

Van Asperen, Hanneke (2019) "Charity after the Flood", The Rijksmuseum Bulletin, Vol. 67, No. 1 (January-March)

Waals, Hans; Kelder, ETG; Van Os, Nico; Van Herk, Sebastiaan (2011) Working apart together–filling the water safety gap. In Submitted to 5th International Conference on Flood Management, Japan.

Case Study / Project

Promoting Water Resilience in Semarang:

Building a Coalition through the Water as Leverage (WaL) Program

Wiwandari HANDAYANI, Barry BEAGEN, Santy Paulla DEWI

Abstract

Like many cities in the region, Semarang faces mounting challenges related to climate change and rapid urbanization. In the past decade, Semarang has been engaging in a range of national and international networks to promote resiliency - from community programs to large scale infrastructure. This attention and engagement from local and global network of actors, collaborators, and donors cumulatively contribute to Semarang's strategic role in Indonesia as well as a leader in urban climate change mitigation and adaptation practice. More recently, Semarang is chosen as one of the three cities in Asia for the Water as Leverage program initiated by the Government of Netherlands in 2018 - a new opportunity for the city to not only tackle water-related issues and climate change, but also its various urbanization challenges. Semarang is compounded by a range of interrelated water issues from river and tidal floods, lack of clean water supply, drought and land subsidence. Government efforts tend to be responsive and partial, primarily focusing on mitigating tidal inundation occurring in coastal areas. However, with rapid urbanization along the watershed, its hilly catchment areas are also experiencing floods and intensifying downstream risks. The lack of comprehensive efforts from upstream to downstream is a result of complex institutional structures involving city, province and the national government. Indeed, collaboration and good cooperation amongst all stakeholders are key in realizing integrated water management from upland to coast.

This paper documents and examines the Water as Leverage program as an opportunity to build a coalition amongst disparate stakeholders to promote water resilience in Semarang. Some key questions to be addressed are: (1) how has the cumulative experience of resiliency building in Semarang contributed to the success (or at least so far) of the program? (2) how has the proactive role of the government contributed? (3) how the alignment of research and engagement between international teams and city vision was critical? This study uses qualitative methods to unpack the problems and issues faced by each stakeholder, more importantly, the actions taken and yet to be done to create institutional alignments. Methodologies include stakeholder mapping, institutional capacity analysis, and assessment of opportunities for collaboration.

As the process is ongoing, interim results have demonstrated that there are opportunities to build a strong coalition. The intensive research and engagement from the design teams and knowledge partners have resulted in a good commitment of the government in local, provincial, and national levels - further supported by the active involvement of local stakeholders, the including Semarang Advisory Councils consist of Professors of local Universities, various local community groups, and local NGOs.

Research Paper

Green Roof: An approach to repair the climate of Dhaka city

Ferdous Farhana HUQ, Rajshahi University of Engineering & Technology; Bangladesh
Nidalia ISLAM, Bangladesh University of Engineering & Technology; Bangladesh
Sakib ZUBAYER, Rajshahi University of Engineering & Technology; Bangladesh
Nessar Uddin Ahmed, Development Design Consultants Limited, Bangladesh

Abstract

Dhaka the capital of Bangladesh looks no better than a piece of hardscape from aerial view which justifies the swelling concern of replacing green areas with built up areas to fulfill the demand of briskly growing urban population. Increasing air temperature, changing rainfall pattern and 'unhealthy' air bears the proof of Dhaka city being an urban heat island created by the present development trend. Unrecoverable damage has already been done to the green spaces of this city which has turned this city as the most polluted city in the world. At the edge of the collapse of sustainability of this city new approaches such as 'green roof' can be used to repair its lungs. Although rooftop gardening has been a traditional concept in Bangladesh, in city-wide scale a very few buildings can be seen with green space in roof or balconies. This study employs satellite image analysis and GIS technology to identify the buildings with a green roof. This study uses a questionnaire survey to explore the commonly used green roof method, motivation benefits and challenges behind the implementation of the green roof. This research presents the global scenario of green roof and explores the possibilities of developing the green roof approach in city scale in Dhaka city.

Keywords

Green roof, Rooftop gardening, Urban Heat Island, Climate change, Satellite image analysis

1. Introduction

The world is going through a trend of migration, Poor infrastructure design, social and economic challenges are pushing people towards cities. Study shows that by 2050 the level of world's urbanization will be up to 69% whereas 86 % people of the developed nation and 66% people from less developed nations will be urban dwellers (Hui, 2011). Dhaka, the capital of Bangladesh is the home of 18 million people and has ranked as the densest city in the world with 47,400 people per square mile (Amin, 2019). Such rapid urbanization imposes excessive development pressure as any land is lucrative for physical development and construction due to heavy demand for it. As a result, Dhaka has lost its wetland areas significantly and this city occupies only 1% of its total land for parks and open spaces whereas in many modern metropolises this percentage is almost 20%-30% (RAJUK, 2015). Maheng et al (2019) mention Dhaka suffering from Urban Heat Island Effect (UHIE) along with other megacities of the world. UHIE is mainly generated when urban green space is replaced by thermal materials that store solar energy which lead to the increase of surrounding air temperature once it is re-emitted (Maheng et.al, 2019), Parvin and Adubu

(2017) addressed the UHI of Dhaka city from 2002 to 2014 by using remote sensing technique. Their study presents from 2002 to 2014 the built-up area of the city increased from 74.12 to 135.36 square kilometers. By these 12 years, the average yearly temperature has increased by 5 degree Celsius and this study suggested to focus on urban greening to curb the heating effect (Parvin and Adubu (2017). At present context, green roof, rooftop gardening, rooftop farming has become a new trend in many countries to utilize the built-up areas for greening as well as a source of urban food production (Safayet et al, 2017, green roof policies incentives and guidelines, 2014, Rahman et al, 2014, Patnaik et al, 2014, Sam and Hui, 2014, Rowe, 2010, Vazhacharickal, 2014, Shuvo and Hakim, 2013). This idea has not been adequately practiced in Dhaka city whereas that most of the roofs of Dhaka city are suitable for gardening and do not require major improvement work rather need some modifications (Islam, 2004 in Safayet et al 2017). Based on the discussed context this study aims at identifying the rooftop gardens of the research area, hardscape- softscape ratio of the research area, overall scenario of rooftop gardening practice, challenges and how this practice can be promoted widely from planning perspectives.

2. Gardening, Rooftop gardening, and Green roof

The root of the gardening lies in the ancient culture where a garden was seen not only as a source of food but also a sign of prestige and affluence especially which were extensively ornamental and associated with villas and palace of wealthy (Carroll, 2003). Gardening originated in Egypt continuing and evolving through the civilization of Mesopotamia, Greek, Roman, Medieval to reach the contemporary age and has given birth to the idea of formal landscaping (Lambert, 2019, Managbanang, 2013 Carroll, 2003). The origin of Green roof or rooftop gardening lies in the terrace garden from an ancient culture. The earliest known record of terrace garden is the ancient Ziggurat from Ur city of Mesopotamia. Hanging garden of Babylon by King Nebuchadnezzar is another example of a terrace garden which is considered as one of the seven wonders from the ancient world (Cartwright, 2018; Shamim, 2013). The formal definition of a rooftop garden says that it is a technique of growing plants on the roof of a building by using containers (Chicago dept. of Environment n.d; Spacey, 2016). Whereas Green roof is a technique of growing plants on the rooftop of a building over a protective waterproof membrane that separate hard roof from the soil (Rowe, 2011, Spacey, 2016). Generally, two types of a green roof are constructed which are extensive and intensive.

Extensive	**Intensive**
Height: 6-15 cm weight: 60-150 kg/sqm vegetation: Moss, herb, grass Retains water: 70-130 l/sqm Minimal irrigation, nutrient, and maintenance	Height: 15 cm->1m weight: 180-500 kg/sqm vegetation: Shrubs, perennials, small trees Retains water: 22-451 l/sqm More irrigation, fertigation, and maintenance required

Source: Hossain et al 2019; Jafari et.al, 2015

Although Rooftop gardening is the umbrella concept of the green roof there is a major benefit of a green roof over RTG which is, a green roof can retain stormwater where RTG does not provide this facility.

3. Green roof adaptation example and prospects in Bangladesh

The evidence from the study on the 'Secret garden located at the rooftop of a shopping complex in Malaysia suggest that having greenery element such as a green roof helps in regenerating and revitalizing the commercial setting in urban area and it helped people to be aware of green roof and its benefits (Rahman et.al, 2015). Singapore set an example of establishing a hydroponics green roof in 1988 in Changi general hospital (Jafari et al,2018; Mastura et. al 2017). Laski in Bangkok is a good example of rooftop gardening where this project intended to grow healthy vegetables for household consumption of the city and enhancing the green of the city (Hui, 2011; Jafari et al 2018). Hui (2011) in his study summarized different cases on green roof and RTG from all over the world. He discussed one case about 'Santropol Roulant' an NGO run by young people that supports RTG to ensure good health and food security of the senior citizen. RTG is now being commercially practiced in few areas of USA. The UK has undertaken low carbon policy and to implement this policy they are using RTG as a tool and now 14% of residents of London grow some foods in their gardens. Tokyo has passed an ordinance where it has been made mandatory for the buildings to keep green in 20% of its rooftops. Roppongi Hills at the center of Tokyo has RTG where paddy and vegetables are grown. Another great example of encouraging RTG is the law amendment by Taiwan government in 1995 declaring the rooftop as the public space so that tenants of the buildings can access the roof to use fully for storing things, plantations and drying clothes. These initiatives have enhanced RTG in the cities of Taiwan (Hui, 2014). Vazhacharickal (2014) in his study presented some exemplary cases of terrace garden as well as balcony gardens from Mumbai. In this study, he figured out major actors such as Marathi Vidnyan Parishad, Urban leaves, Mumbai port trust and Vidya Vaaridhi Trust who give advice, training, and awareness to people to set urban farms, terrace gardens and kitchen gardens (Vazhacharickal, 2014). Poddat et al (2017) scientifically proved the effectiveness of green vegetation on reducing heat gain and heat loss through the walls during summer and winter respectively.

Several types of research have been conducted on green roof practice in Bangladesh. Roy et.al (2016) presented homestead and rooftop gardening as one of the major techniques of enhancing urban forestry and urban greening for sustainable development in Dhaka city. Department of Agriculture Extension (DAE), Bangladesh launched "Integrated Quality Horticulture development projects enlisted 68 people from different parts of Dhaka city whom they train them to conduct rooftop gardening (Mastura et al, 2017). Many studies have mentioned about lack of initiatives from the government as the major reason for not practicing RTG. Therefore, such types of initiative from the government, as well as NGOs, are needed in higher numbers to repair the climate of the city. Shuvo and Hakim (2014) designed a compensative greening framework targeting rooftop gardening and apartment surface landscaping for reviving the green of Dhaka city.

4. Method of the Study

4.1. Study area

Ward 20 from the Zone 3 of Dhaka north city corporation is selected as the research area (Dhaka North City Corporation, 2016; Mediabangladesh.Net, N.D). The official ward name of this area is Mohakhali Niketon. This area is comprised of Mohakhali Shantiniketon residential

area and Gulshan Niketon housing area and located at the heart of Dhaka north city corporation. In this area primarily four types of land uses are observed which are residential, commercial, mixed-use and administrative. Among the land uses, the residential area comprises 72% and other land uses occupy 28%. Mohakhali slum occupies 25.8%, Gulshan Niketon area Occupies 26% and Mohakhali Shantiniketon residential cover 48.2% of the total residential area of the selected study area (RAJUK, 2004).

Figure 1 Research Area

Source: Prepared by Author by using Dhaka North City Corporation, 2016 and RAJUK 2004 data

4.2. Satellite Image analysis

WorldView-3 Satellite Mono 4 band (Red, Green, Blue, NIR) Image has been used in this study. The image was taken on 04th August 2018. The resolution of the image was 40 cm and it was clear enough to avoid any noise and cloud reduction operation. The satellite image was projected using Universal Transverse Mercator (UTM) within Zone 46 N– Datum World Geodetic System (WGS) 84. Training samples were developed in Geographic Information System (GIS) to create a signature file for supervised classification. Training sites are manually taken polygons from each type of land cover that identify and represent that particular type of and cover and the statistical characterization of these land cover using training sites is called the signature file (Good child, 2009). Maximum Likelihood Supervised Classification, using training sample and signature file, has been performed in order to classify the land cover and identify the rooftop vegetation as well. The land cover was divided into 4 classes such as Built up area including buildings and roads, rooftop vegetation, regular vegetation, and water body. Accuracy of the performed classification was assessed using Kappa Coefficient. In this regard, 280 ground truth points (70 from each class) have been taken from Google earth image of the study area of August 2018. Converting to raster pixels in the same resolution of the image, these random reference points have been compared to the classified image to calculate total accuracy and Kappa Coefficient. The value of the Kappa Coefficient varies from 0 to 1.00, while value over 0.7 is considered as acceptable (Daniel and Montero, 2011). The calculated value of the Kappa Coefficient was 0.87 which means the accuracy was acceptable.

4.3. Field Survey

Rooftop garden owner or the caretaker from 30 selected buildings from the research area was surveyed with a structured questionnaire. Survey findings were analyzed by using statistical tools.

5. Results and Discussions

5.1. Vegetation Condition of the research area

Satellite image analysis figured out that the rooftop vegetation covers almost 10% of the research area which proves the ongoing practices of rooftop gardening in ward 20 as well as justifies RTG's prospects to be practiced in city scale. Except rooftop gardening, other vegetations cover 26% of the study area whereas the built-up area covers 64% of the research area. At the current scenario hardscape vs softscape ratio is 1.8:1. If the percentage of RTG is omitted hardscape vs softscape ratio becomes 2.8:1. Therefore it is evident that RTG can significantly overshadow the hardscape ratio and contribute to enhancing the total softscape amount of the city.

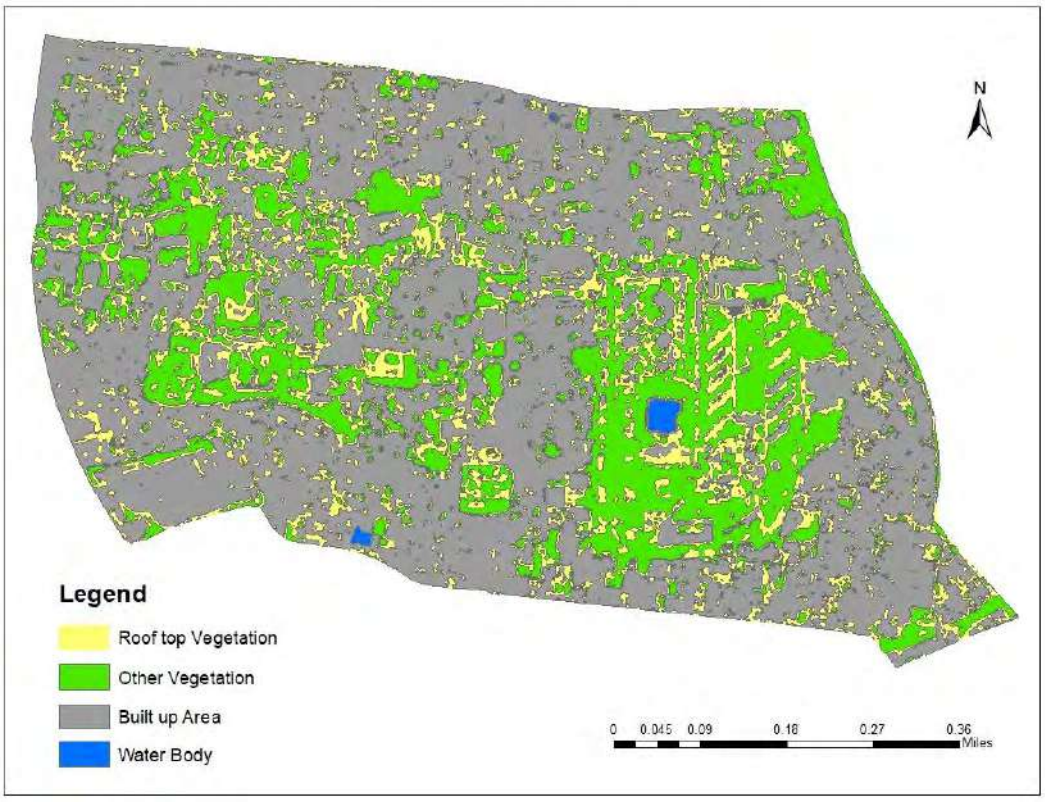


Figure 2 Vegetation and built up area in Ward 20

Source Author's preparations and adaptations from WorldView-3, Maxar Technologies Inc., (Formerly DigitalGlobe)

Table 1 Vegetation and Built up area Percentage in Ward 20

Land Cover Type	Area (Sq meter)	Percentage
Built up area	762939	64
Rooftop Vegetation	123540	10
Other Vegetation	309501	26
Waterbody	4408	0
Total	**1200388**	**100**

Source Prepared by Author

5.2. Motivation and Purpose of RTG

People living in Mohakhali Shantiniketon residential area and Gulshan Niketan housing share the same interest and enthusiasm towards roof gardening although the two areas have different aspects from a spatial point of view and urban facilities. Along with hobby working as the primary motivation for roof gardening, family members inspiration is also another important drive as in many case studies more than one family members are involved in gardening and they also inspire each other. The percentage of paid personnel is greater in Gulshan Niketan whereas the involvement of owner and caretaker are almost equal in Mohakhali residential area. Recreation is found to be the primary reason behind RTG whereas Organic food production for the family in this city life become the secondary pleasure in roof gardening.

5.3. Plants and Plantation technique

50 % of the respondents produce vegetables, fruits, and flower altogether in their gardens. Whereas rests of the respondents produce either of the plant type or any combination of them. In most cases, people have used two types of technique-Planter type (large drum and pot) or extensive type (permanent masonry planter box). 78% of respondents use planter technique for rooftop gardening. 17% of the respondents use both planter and extensive rooftop gardening technique whereas only one case found who use planter and intensive gardening method for rooftop gardening. People use the large drum, plastic containers and soil pots as planters for growing different types of. Among the thirty respondents, two respondents mentioned using only large drum planter as they only grow fruits. For creating extensive rooftop garden people of the study area construct a base with brick and concrete covered with a plastic sheet. Above it, they place soil with a depth varying from 1 foot to 3 feet. The soil layer is walled with brick and concrete. This is the general method they use for the extensive or intensive type of gardening.

Figure 3 Roof Top Gardening Scenario in Research Area

Source Field survey, 2019

5.4. Collection of Gardening equipment

People of the study area collects their gardening equipment i.e. plats, seeds, fertilizer, soil, pesticide from nursery but they also followed other methods too i.e. random collection of seedlings (village house, , etc.). Two cases were found where the garden owner started gardening with the own seedbed and plant collection. They collect gardening equipment from random spots. The nearest nursery of the area is BRAC nursery which is <500m from

the Gulshan Niketan area and 500m-1km from Mohakhali area. Four cases were found who collect their equipment from the nursery that is located >1km.

5.5. Costing of RTG

40% of the respondents mentioned that they spend < 5ooo take for starting the rooftop garden. 28% spend 5000tk to 20,000 takes as an initial cost of rooftop gardening. Rest 32% spent more than 20000 takas.

5.6. Challenges of RTG

The survey finds that 99% of the people who has roof garden do not face any structural error for roof gardening in their building. Only 1% respondent showed concern about the dampness. 45% of the respondent didn't find any difficulties for roof gardening. 22% of respondents think lifting goods to the rooftop and maintenance are challenges for a rooftop garden. The other 23% responds that watering, bugs, insects, and problems are a hindrance for roof gardening.

5.7. Impact of RTG on urban heat reduction

32% of respondent suggested that they didn't find any benefits in heat reduction. If we analyze the square fit of the plantation, we see that the percentage of green with the total floor area is below 30%. It indicates that if a good amount of floor area is not covered then we are not going to get the full benefit of roof plantation. The respondent also suggested that if they move from the current location, they will continue gardening in their new home too. Only 18% wasn't sure or reluctant to continue gardening. Those who are tenant complained that sometimes landlord doesn't allow them to use the roof for gardening. But if they are given opportunity, they are very enthusiastic about the rooftop garden.

6. Recommendations

The respondents of the survey area recommend many suggestions to inspire roof gardening. Creating social awareness is the most recommended, government incentive – in forms of tax reduction, supplying plants and seeds are the second highest suggestion. Few respondents suggested that training and workshop from the government can be arranged to encourage roof gardening. One respondent suggested that government certified paid personnel from City Corporation can visit and help in the development and maintenance of RTG. Some respondents emphasized ensuring the access of the tenants for the purpose of gardening. This recommendation section of this research has been developed based on recommendations suggested by users and the best practices from worldwide.

6.1. Ensuring the place of RTG in Bangladesh National Building Code

The best practices from the world show that different countries have made green roof mandatory by adding policy in their building code (Inhabitect LLC (2014); Hui, 2014, Mastura, 2017). The current BNBC mentions about mandatory green around the building at the ground but does not mention anything regarding green on the rooftop (BNBC, 2012). A few design guidelines can be added to our BNBC code so that any structural hassles can be maintained easily. The "Imarat Nirman Bidhimaa-2008" already have a rule which excludes the water fountain, pergola roof, green/open to sky terrace and veranda from FAR included

area to encourage people to design a building with more openness. The inclusion of green roof can increase the percentage of the extensive plantation. Design of the green roof can exempt construction area from the FAR included area. This research recommends reviewing current BNBC and adds a new policy on the green roof so that the builders, Architects, and engineers incorporate this policy into their design.

6.2. Ensuring access to the roof

Majority of the people living in the study area are either tenant or own one or multiple flats. People who live as a tenant in multi-storied buildings most often lack access to use the roof. This research has found some cases in the study area where the roof has been used for gardening by multiple flat owners or tenants who have access to the roof. This is a good example of developing rooftop gardens in a cooperative way. An initiative from Government is needed to ensure the free access of the tenants to use the roof for storing, drying clothes or gardening purpose. Such example has already been set by the Government o Taiwan (Hui, 2014). Government associations or NGOs can encourage the landlord, frat owner and tenants to develop rooftop garden in a cooperative manner.

6.3. Property tax reduction

Property tax reduction is currently a popular initiative taken in different states including New Yorkton inspire green in the building (Inhabitect LLC, 2014). Such tax incentive programs can be taken by the Bangladesh government which will surely encourage residents to develop gardens at roofs.

6.4. Encouragement from Government and NGO's

Survey findings indicate that regardless of urban facility and amenities dwellers of the overall city are very enthusiastic and carries a positive thought on roof gardening. The cost and hurdle ship don't discourage them rather arranging training and awareness program from the government can increase the percentage of proactive people who loves gardening. Making people aware of the benefits of rooftop gardening through mass media can be another way of informing people about RTG. Government or NGOs can launch programs aiming at encouraging people for RTG. They can provide free soil, seeds, fertilizers, plants to people as a part of the encouragement for developing rooftop gardens. They also can initiate small loans programs to encourage RTG.

7. Conclusions

Although Gulshan Niketon Housing area and Mohakhali Shantiniketon residential area are located in the same ward, they differ in both planning and spatial characteristics. Nevertheless, the positive feedback and enthusiasm are almost the same from both the areas. People living in planned Gulshan Niketon housing area and organically developed Mohakhali residential area try to establish a rooftop garden according to their ability. The research findings acknowledge that there is a huge scope of making people encouraged at vast scale on developing rooftop gardens at residential areas. Many people have hidden wish to have a garden at home but they lack inspirations, proper guidance, and scope to use the hard surface of the building. It suggests that using the current crush for rooftop gardening to reduce the hardscape of Dhaka city will not be challenging form user point of view. Most

of the users are indifferent of the challenges of developing a rooftop garden as they hold a very positive attitude towards RTG. Furthermore, maximum users believe that RTG helps to cool down the microclimate of the roof. This research has found out that large scale RTG contributes significantly to cool down the temperature of the top floor of the building rather than small scale RTG. It is the responsibility of professional and policymaker to start a positive ripple of roof gardening in an urban scale. RTG at urban scale will not only benefit to reduce UHI effect but also bless the city with aesthetical and psychological benefits.

8. References

Amin, Mehedi Al (2019) “Dhaka remains the world’s most densely populated city”, Dhaka Tribune

Carroll, Maureen (2003) "Earthly paradise: Ancient Gardens in History and Archaeology”, Los Angeles, The J Paul Getty Museum

Cartwright, Mark (2018) “Hanging Gardens of Babylon”, Ancient History Encyclopedia

Chicago Dept. of Environment (n.d) "Chicago's Green Roofs: A Guide to Rooftop Gardening”, Chichago, ComEd

Daniel, Gomez; Montero, Javier (2011) “Determining the accuracy in image supervised classification problems”, EUSFLAT-LFA 2011, Aix-les-Bains, France (July)

Dhaka North City Corporation (2016) “Geographical Location & Area of DNCC” http://old.dncc.gov.bd/geographical-location-area-of-dncc/

Field Survey (2019) “Field Survey in Ward 20 for questionnaire survey and collecting photographs conducted by authors”

Goodchild, Michael (2009) “Geographic Information Systems and Science: Today and Tomorrow”, Procedia Earth and Planetary Science, 1,

Hossain, Md Aslam; Shams, Shahriar; Amin, Mahmud; Reza, Md Sumon; Chowdhury, Tanvir Uddin (2019), “Perception and Barriers to Implementation of Intensive and Extensive Green Roofs in Dhaka, Bangladesh”, MDPI.

Hui, Sam C M (2011), "Green roof urban framing for high-density urban cities", the Hainan China World Green Roof Conference, Hainan (Haikuo, Boao, and Sanya), China.

Inhabitant LLC (2014) “Green roof policies and guidelines, North American green roof policy guide”, Green Roof for Healthy Cities

Islam, Khandaker, M, Shariful (2004) “Rooftop Gardening as a Strategy of Urban Agriculture for Food Security: The Case of Dhaka City, Bangladesh”, International Conference on Urban Horticulture

Jafari, Neda; Utaberta, Nangkula; Yunos, Mohd; Ismail, Nor (2015) “Benefits of Roof Garden in Order to Usage of Urban Agriculture at Roof Garden in High-Rise Building in Malaysia”, AENSI, November.

Lambert, Tim (2019) "A Brief History of Gardening". http://www.localhistories.org/gardening.html

Maheng, Dikman; Ducton Ishara; Lauwaet Dirk; Zevenbergen, Chris; Pathirana, Assela (2019), "The Sensitivity of Urban Heat Island to Urban Greenspace—A Model-Based Study of City of Colombo, Sri Lanka", MDPI.

Managbanang, Emmanuel Linguaje (2013) "Ancient Gardens" https://www.scribd.com/document/167833589/Ancient-Gardens

Mediabangladesh.Net (N.D) "Dhaka city Map-South and north City Corporations" https://www.mediabangladesh.net/dhaka-city-map-south-and-north-city-corporation/

Parvin, nigar sultana; Abudu, Dan (2017), "Estimating Urban Heat Island Intensity using Remote Sensing Technique", International Journal of Scientific & Engineering Research, Vol_8_april.

Patnaik, Binaya (2018), "impact of green roof in urban living", International Journal of current engineering and technology, Vol_8_December.

Poddar, Sinchita; Park, Dong Yoon; Chang, Seongju (2017). Simulation Based Analysis on the Energy Conservation Effect of Green Wall Installation for Different Building Types in a Campus. In *8th International Conference on Sustainability in Energy and Buildings, SEB-16,*. Turin: Elsevire.

Rahman, Rafida Syumi; Hamidah, Ahmad; Mohammad, Sapura; Rosley, Solehin, Muhamad, Fitry (2017) "Perception of Green Roof as a Tool for Urban Regeneration in a Commercial Environment: Secret Garden Malaysia", Procedia - Social and Behavioural Sciences, Elsevier, 170 (2015)

RAJUK (2004) "Detailed Area Plan DAP Final Plan of Dhaka Metropolitan Development Area" RAJUK

RAJUK (2015) "Draft Dhaka Structure Plan 2016-2035", RAJUK

Rowe D. Bradley (2011) "Green roofs as a means of pollution abatement" Environmental Pollution, Elsevier 159 (2011)

Roy, s; Datta, S; Haque, M.M (2016) "Urban forestry and urban greening for the sustainable urban development-A case of Dhaka north city corporation area (Zone-1)", J. Bangladesh Agril. Univ. V 14 No2

Safayet, Mastura; Arefin Md. Faqrul; Hasan, Md. Musleh Uddin (2017) "Present practice and future prospect of rooftop farming in Dhaka city: A step towards urban sustainability", Journal of Urban Management, Vol 6 (2017)

Shamim. H (2013) "A brief history of roof garden", Heather Shamim Photography

Shuvo, Faysal Kabir; Hakim, Sheikh Serajul (2013), "A Proposed Framework for Regenerating Urban Green in Dhaka City," Bangladesh Institute of planners, vol_6_december.

Spacey, J (2016) " Green roof vs rooftop gardening", Simplicable

Vazhacharickal, Prem Jose (2014), "balcony and terrace gardens in urban greening and local food production: scenarios from Mumbai metropolitan region (MMR), India", International Journal of Food, Agriculture and Veterinary Sciences, Vol 2, August.

Research Paper

Urban Design Study of Resilient City in Greater Bay Area[1]

Peijun LU, South China University of Technology; China

Yimin SUN, South China University of Technology, State Key Laboratory of Subtropical Building Science; China

Bilin CHEN, South China University of Technology; China

Sheng XIA, South China University of Technology; China

Abstract

With the increasing climate change, the contradiction between the vulnerable natural conditions and rapid urbanization in Guangdong-Hong Kong-Macao Greater Bay Area becomes much more prominent. Urban security is threatened by various severe natural disasters, such as rising sea level, storm surges, and intensified floods, etc. To solve this problem, based on the theory of resilient city, this paper develops three resilient urban design principles: 1) integrated city principle; 2) adaptive technology principle; 3) flexible design principle, and build a research-design-feedback loop pattern. In the research and prediction stage, we quantitatively calculate the influence of natural disasters that may happen in the future in the Greater Bay Area and map the disaster influence in the natural basement layer, urban infrastructure network layer and urban settlement layer by Geographic Information System(GIS) through scenario stimulation. Based on this, the most severely affected areas in the future will be defined as key design areas. In the urban design stage, we focus on one of the key design areas – Pazhou and stimulate multiple scenarios to assess the urban resilient risk. We propose different integrated urban design strategies to balance the urban development and risk, select the adaptive hydraulic engineering technology to realize a more sustainable green infrastructure and build a flexible development framework to face the future uncertainty. In the evaluation and feedback stage, we develop a time series model of heavy rainfall to evaluate urban resilience in different design and quantify the impact of natural disasters through a set of urban resilience indicators in various layers, in order to pick up more resilient design to optimize. The practice experience shows that the resilient city is a long-term process, which requires an interdisciplinary cooperation mode, among research, design and feedback and a great management and control platform and a multi-objective evaluation index system so as to achieve real-time monitoring, regular evaluation, and dynamic control. This study attempts to make up for the lack of resilience city research in planning and design practice, to provide practical experience for the next stage of urban building.

Keywords

Resilience, Greater Bay Area, Planning and Building, Design and feedback

[1] International Cooperation and Exchanges National Natural Science Foundation of China (Cooperation Project of China, Netherlands and Britain) : Adaptive Urban Transformation (AUT) - Territorial governance, spatial strategy and urban landscape dynamics for a more resilient Pearl River Delta (No:51761135025) ;

1. Background: Urban Resilience in Greater Bay Area facing severe challenges

The Pearl River is the second largest river in terms of stream flow. Guangdong-Hong Kong-Macao Greater Bay is located in the complex area in the Pearl River which is formed by the three main river Xijiang, Beijing, and Dongjiang (Liang Xiong, 2019). The Greater Bay is one of the most quickly developing region in the field of urban expansion in the world for the past four decades. The built-up area emerged at an average speed of 122.25 km2/year between 2000 and 2016 (Yang Zhiwei, 2018), while the GDP increased over 1000 folds from 1980 to 2016 and the population grow explosively from 20.1 million to 61.46 million between 1982 and 2016. However, on the one hand, the Greater Bay Area belongs to the estuary alluvial plain, which located in low altitude and sea-land boundary that determined its own ecological vulnerability (Meyer & Nijhuis, 2014). On the other hand, the frequent natural disasters led by climate change, rapid urban expansion and an increasing number of the population have caused serious damage to the ecological environment of Greater Bay Area, weakening the urban resilience to natural disasters and shortening the life cycle of sustainable development (Dai Wei, 2019). According to historical statistics, from Qin Dynasty to Qing Dynasty (over 2100 years), more than 100 floods have occurred in the Guangzhou section of the Pearl River, with an average of 20 years per flood (Qingzhou, 2009). Since the 20th century, Since the 20th century, there have been two major floods causing more than 100,000 deaths and injuries (Qingzhou, 2002). Therefore, as the Greater Bay Area has risen to be a national strategy, it is more urgent to improve the urban resilience by urban study, plan, and design, and propose a systematic framework to make resilience cities.

Both foreign and domestic scholars have achieved preliminary results on the resilience city in the Greater Bay Area. Liang Xiong and Steffen Nijhuis mapped the landscape formation, water infrastructure network and urbanization in the Pearl River District from 4000 BC to 2015 AD, to show the different dynamics of the delta and understand the interaction among the tangible and intangible components of the delta system (Liang Xiong, 2019). Based on the study of the post-disaster spatial resilience planning and design in Delta city such as Rotterdam in the Netherlands, New York and New Orleans in the United States, Dai Wei had built a systematic spatial plan framework for Delta city and try to apply into urban design in Pazhou West District (Dai Wei, 2019; Dai Wei, 2018). South China University of Technology has carried out a series of historical studies on the theme of the water system. Liu Wei had studied on the urban canal-system of ancient Guangzhou (Wei, 2015). Li Jiahao research on evolution and dynamic mechanism of the water system in Shunde, Foshan.

Next, in the first part, this study firstly proposes three resilient urban design principles: 1) integrated city principle; 2) adaptive technology principle; 3) flexible design principle, and presents a research-design-feedback loop pattern adapted to the current situation of the Greater Bay Area. In the second part, this study evaluates the comprehensive influence of the natural disaster may happen in the future in the Greater Bay Area by scenario analysis and define the key design area. In the third part, this study takes Pazhou as an example to apply the resilience urban design. On the basis of the assessment on multi-scenario risk, the design propose different development model to balance the benefit between the urban development and urban risk, apply the mix land use principle to deal with the uncertainty in the future and pick up a suitable, adaptive and ecological engineering technology to achieve a public, sustainable infrastructure. In the fourth part, this study builds a time series model of

heavy rainfall to assess the urban resilience of different design. In the last part, we point out the limitation of the evaluation system and discuss the tendency in the future that urban planning and design will toward integration and interdisciplinary, so we suggest to build a management platform to control the implementation.

2. Strategy: Resilient Urban Design Principle

Resilient cities are defined as the ability of the urban system to digest and absorb external disturbances, maintain the original structure and the key functions (Resilience Alliance, 2007). Its basic structure can be summarized into four aspects: economy, engineering, environment and society (Chen Li, 2017). Therefore, based on the Layer-cake model by Ian McHarg (IL McHarg, 1969), Dutch scholars developed the vertical stratification research methods in the 1980s. Meyer studied the Delta City resilient evolution law of urban system and decomposed the evolution of urban system into three layers based on spatial flow: 1) the first layer is the natural basement, mainly dealing with the natural environment, including the agriculture system, water system, and ecological system; 2) The second layer is the urban infrastructure network, which consists of subsystems such as transportation system, water conservancy system and municipal engineering system. 3) The third layer is the urban settlement, which mainly reflects the social and economic status of the city. This layer is composed of some subsystems such as land use system and industrial development system. Mayer's research team also used Geographic Information System (GIS) to mapping the development of different layers of Delta Cities around the world, revealing the evolution rate change of different layers and the restriction relationship between different layers (Meyer & Nijhuis, 2014). On the basis of this research, Dai Wei proposed the delta spatial planning principle based on the resilience system, emphasizing that the planning goal of improving urban resilience is based on the inherent evolution law of the urban system, the collaborative planning as the means and scenario stimulation as the planning guidance. Through case analysis (Dai Wei, 2019).

In view of the current situation of urban development in the Greater Bay Area, the author proposes three resilient urban design principle:

1) Integrated city principle: Taking the phenomenon about “individually in the process of construction” into account, the author thinks that the city should be considered as an entirety and the solution of the urban problem should be considered as a comprehensive and interdisciplinary process.
2) Adaptive technology principle: In view of the current situation that engineering technology tends to be a large-scale transformation of nature. The author believes that we should deepen the grasp of the engineering technology and emphasize to adopt the appropriate, ecological and sustainable engineering techniques to achieve a high-quality and high-resilience green infrastructure system.
3) Flexible design principle: in order to address the uncertainty of policy and the variability of natural disasters in the future. The author emphasizes the method for responding to dynamic demand, using the scenario simulation to explore the flexibility and adaptability of land use and building the dynamic management and control system to implement.

Based on the above principles, the author develops a research-design-feedback loop pattern for the actual situation in the Greater Bay Area. Starting from the macroscopic natural basement research, planning and designing the urban infrastructure network to guide the urban social and economic development.

1) Research Forecasting: Studying other professional research results and similar cases, some of the most probable and most demanding scenarios in the future are derived as planning simulation scenarios to increase the proactive prevention strategy for uncertainty.
2) Systematical Design: Focus on the scenarios analysis result, identify the key to constrain the future development, propose the urban design integrate development framework to determine the spatial layout, rationally select the land use model to cope with the uncertainty of future development, and select appropriate engineering techniques based on construction needs.
3) Evaluation Feedback: It belongs to a part of design control. Builds a quantitative indicator system to correct the design direction and implementation direction through feedback. When there is a large deviation between the evaluation result and the expected goal, feedback is given in various forms such as qualitative, quantitative, grading and shaping.

3. Research Forecasting: Scenario Analysis Delineating Key Design Areas

Greater Bay Area is selected as the macro-level scenario simulation. As shown in Figure 1, it is the urban agglomeration of Guangzhou(GZ), Shenzhen(SZ), Foshan(FS), Dongguan(DG), Zhongshan(ZS), Zhuhai(ZH), Huizhou(HZ), Jiangmen(JM), Zhaoqing(ZQ), and two Special Administrative Regions of Hong Kong(HK) and Macao(MC), which is planned to be constructed as a world-class urban agglomeration and the forth Bay Area in the word.

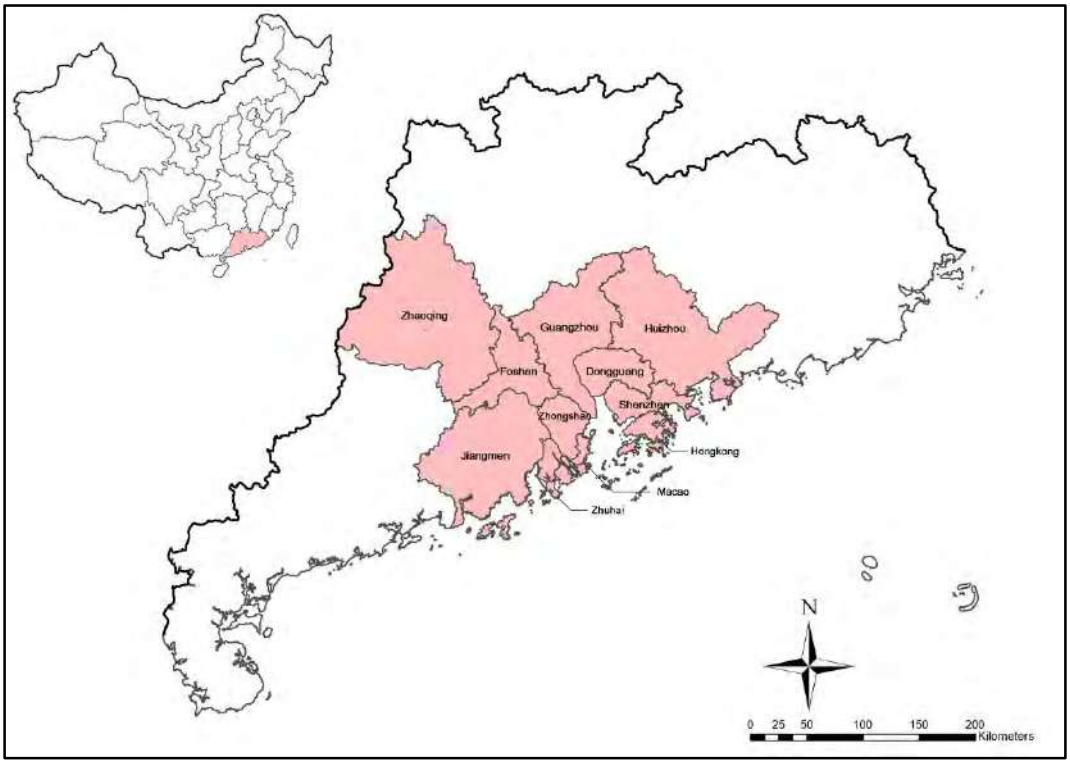


Figure 1 regional scale (Source: by author)

The research data includes the 2017 urban Land-Use and Land-Cover Change (grid resolution of 30m) describing the natural basement of the Greater Bay Area, and the urban road space distribution data and urban elevation data (DEM) demonstrating the urban infrastructure network. All the data is provided by the Resource and Environment Data Cloud Platform (http://www.resdc.cn/Default.aspx). In addition, the economic and population data of the street units of the Greater Bay Area are mainly from the statistical yearbooks of each city (Table 1). The research data also includes boundary vector data for the street (town) unit of Greater Bay Area, which is obtained from the open source map data platform OpenStreetMap (https://planet.openstreetmap.org/). In order to ensure the unification of the data, the study uses the ArcGIS platform to convert all data into a horizontal Mercator projection.

City	Area (km^2)	Population (million)	Population Density (persons/km^2)	GDP (billion dollar)	GDP per km^2 (million dollar/km^2)
GZ	7436	14.4984	1949.76	321.26	43.20
SZ	2020	12.5283	6202.28	336.00	166.34
ZS	1770	3.26	1841.81	51.25	28.95
DG	2512	8.3425	3321.06	113.28	45.09
FS	3875	7.6567	1975.92	140.41	36.24
ZH	1696	1.7654	1040.92	39.97	23.57
ZQ	15006	4.1154	274.25	31.52	2.10
JM	9554	4.5617	477.46	40.19	4.21

HZ	11159	4.777	428.09	57.23	5.13
HK	1104	7.392	6695.65	327.08	296.27
MC	29	0.648	22191.78	303.93	10408.67

Table 1 Population and GDP data of each city in Pearl River Delta (Source: statistical yearbooks of each city)

3.1. Assessment of the Impact of Disasters on the Natural Environment and Urban Construction on a Macro Scale

Considering that storm surges and sea level rise will become one of the main natural disasters in Greater Bay Area, the study adopts a spatial overlaying method to extract land data of 3 layers of natural basement, urban infrastructure network and urban settlement, which are affected by storm surges under different scenarios. Among them, the estimation of sea level rise is based on the research results of Li Guangsheng research group specifically for sea level change in the Pearl River Delta: in consideration of sea level rise and storm surge superposition, the optimal condition of the Pearl River sea level elevation in 2050 is estimated to be 3.3m, and the worst situation is estimated to be 4.5m (Li Guosheng, 2013).

Therefore, without considering the protection capability of the seawall, supported by GIS spatial analysis technology and based on the DEM data of the Pearl River Delta region, we first analyze the various types of land areas that are submerged at different heights of sea level rise, and then draw the impact of sea level rise superimposed storm surges on the natural basement and urban infrastructure network in Greater Bay Area under different scenarios in 2050, and point out the possible impacts of farmland, green space, constructed land and roads in different cities. Then we estimate in detail the impact of sea level rise superimposed storm surges on street-scale urban construction.

Figure 2 illustrated the impact of sea level rise on the natural environment and urban construction under different scenarios. With the increase of sea level and storm surge water level, the flooded area ranks first of farmlands and constructed lands in the Greater Bay Area, which is followed by the water areas and the tidal flats around it, while the flooded area of grasslands and woodlands are growing very little. Specifically, under the best estimate of sea level rise and storm surge water increase in 2050, the total area of submerged farmland is 734.01 km², and the total constructed land area is 835.28 km², accounting for 36.88% and 41.97% of the total area inundated, respectively. Under the worst estimate in2050, the total area of submerged farmland is 1054.12 km², and the total constructed land area is 1054.12 km², with respectively 36.99% and 42.30% of the total inundated area.

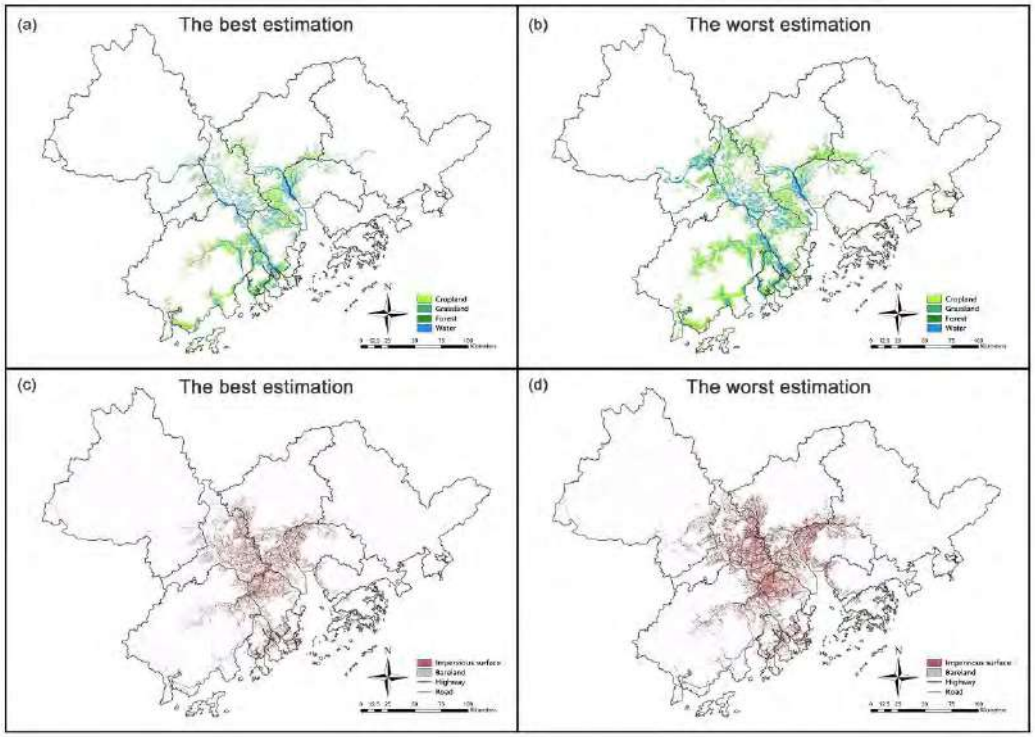


Figure 2 Different estimation of rising sea level on the natural environment and urban construction (Source: by author)

Specific to each city (Table 2), in the estimation of the impact of sea level rise and superimposed storm surges under different scenarios from the perspective of the natural system, Foshan has the greatest impact, followed by Zhongshan and Zhuhai. Specifically, under the optimal estimation scenario, Foshan is flooded with 15.30% of farmland and 19.03% of grassland, and under the worst one, it is flooded with 25.08% of farmland and 28.70% of grassland. From the perspective of the urban system, Zhongshan and Foshan are seriously affected, and Zhuhai and Jiangmen go next. That is, the impact on the west bank of the Pearl River was greater than that on the east coast.

city	Cropland		Grassland		Construction Land		Urban Network	
	Best	Worst	Best	Worst	Best	Worst	Best	Worst
GZ	5.75%	9.39%	4.90%	8.26%	8.56%	14.55%	7.88%	13.53%
SZ	1.66%	3.06%	1.57%	2.78%	3.37%	6.22%	3.44%	6.68%
ZS	11.01%	14.34%	11.17%	14.73%	15.87%	22.72%	17.33%	25.33%
DG	6.71%	11.02%	5.66%	9.50%	8.49%	14.51%	8.41%	14.71%
FS	15.30%	25.08%	19.03%	28.70%	19.23%	30.46%	19.06%	30.49%
ZH	9.68%	13.37%	9.48%	12.52%	13.30%	19.59%	13.09%	19.99%
ZQ	3.05%	5.85%	4.53%	8.02%	7.40%	14.66%	3.68%	7.83%
JM	7.99%	11.97%	7.92%	11.40%	12.02%	19.04%	11.29%	18.20%
HZ	2.34%	4.72%	1.53%	3.14%	3.35%	6.45%	2.04%	4.31%

HK	4.41%	8.26%	2.02%	3.77%	6.80%	13.26%	3.57%	7.28%
MC	5.71%	12.02%	15.01%	28.95%	10.07%	17.56%	7.68%	14.08%

Table 2 Different estimation of rising sea level on various land use in each city (Source: by author)

3.2. Assessment of the Impact of Disasters on the Socio-economy on a Medium Scale

The above research reveals the impacts of natural disasters on the layers of the natural basement and urban infrastructure network, and in this part, we consider the impact of natural disasters on the city's socio-economy. We take the area of the inundated built-up area/the area of the built-up area of the city to measure the degree of disaster in the streets, and the GDP per street unit in 2017 to measure the degree of economic development. Figure 3(a) and (b) illustrate the scatter plot of these two variables. At the meanwhile, we define the built-up area of more than 12% submerged (average of the best and worst estimate) and the degree of economic development exceeds 2×108CNY/km² (median) as the vulnerable street unit, and we respectively display them in Figure 3c and Figure 3d.

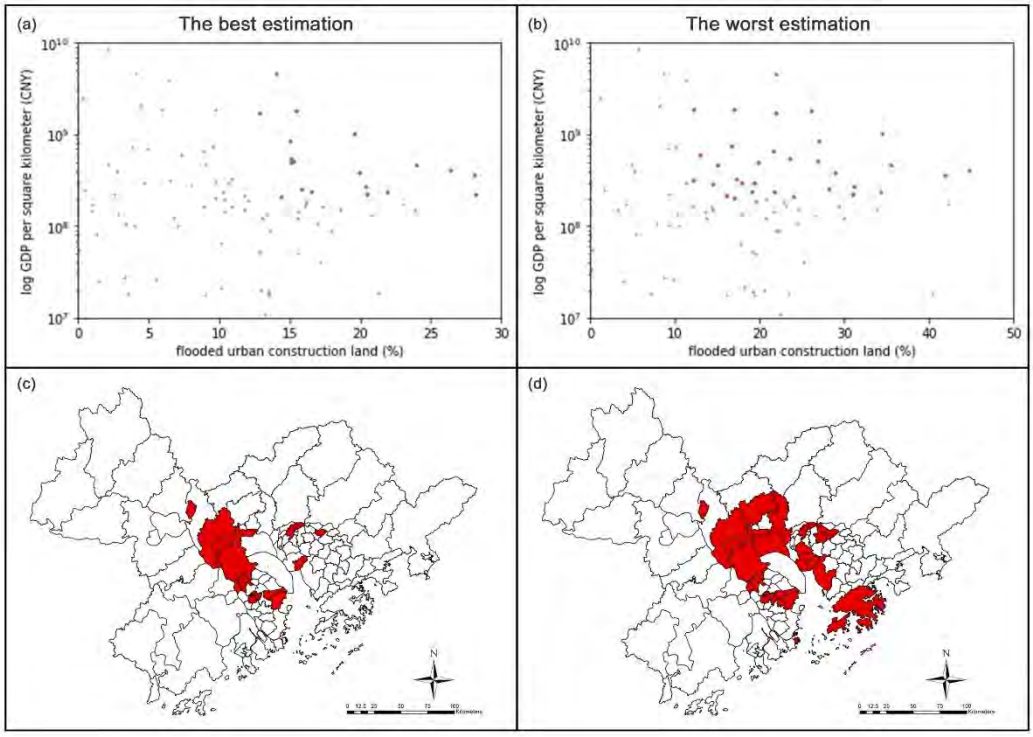


Figure 3 Different estimation of rising sea level on economics in each district (Source: by author)

The analysis shows that under the best estimation scenario, sea level rise and storm surge disasters mainly threaten the urban areas on the west bank of the Pearl River Estuary, mainly in Foshan, Guangzhou, and Zhongshan. In the worst-case scenario, the threat of disaster will spread to most of Guangzhou and Dongguan and Hong Kong on the east bank of the Pearl River.

3.3. Delineate Key Design Areas Based on Research Results

On the basis of the research, we use the spatial superposition method to integrate the impact of natural disasters on layers of urban infrastructure network and urban settlement, to make a resilient urban design in the key areas, key control areas and general control areas of the

Greater Bay Area (Figure 4). Among them, the key areas refer to those where resilient urban design is urgently needed to cope with natural disasters that are likely to come, and to avoid major impacts on the city's socio-economy; the key control areas refer to the development of resilient urban planning to cope with possible natural disasters and to reduce the corresponding socio-economic losses; the general control areas refer to natural disasters that can carry out relevant tough urban studies to cope with accidents. The Central and Eastern Pazhou, which is in the key control area, is selected as the design area for further planning.

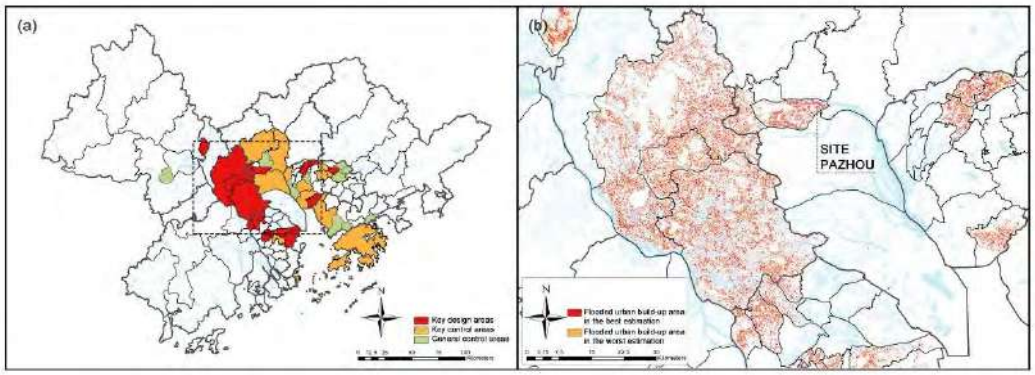


Figure 4 Key Design Areas and Pazhou (Source: by author)

4. Systematical Design: Taking Urban Design of Central and Eastern Pazhou in Guangzhou as an Example

Pazhou Island, Guangzhou, which is located at the junction of the eastern and the central waterways of Pearl River, has a low terrain and has been affected by typhoons and floods. In Junuary 2019, South China University of Technology (SCUT) and the University of California, Berkeley (UC-Berkeley) held a joint design workshop based on the central and eastern Pazhou, trying to explore the design methods for urban resilience in Pearl River Delta cities from the perspective of rainwater management, urban integration and compact development.

4.1. Risk Simulation and Assessment of Pazhou Island under Multiple Scenarios

Pazhou Island is located in Haizhu District of Guangzhou, surrounded by water, at the eastern junction of the front and rear channel of the Pearl River, and its southwest side is Huangpu Canal. It is the alluvial island, the terrain is low and the coastline is about 10km. At present, the elevation of the east side of the island is about 8.05m, and the elevation of the top of the southeast side is 6.95m. The average annual tidal level of the Pearl River recorded at the hydrological station (Sun Yat-sun University Station) near the east side is 8.227m (2018), and that recorded at the Huangpu Station near the southwest side is 6.94m (Figure 5).

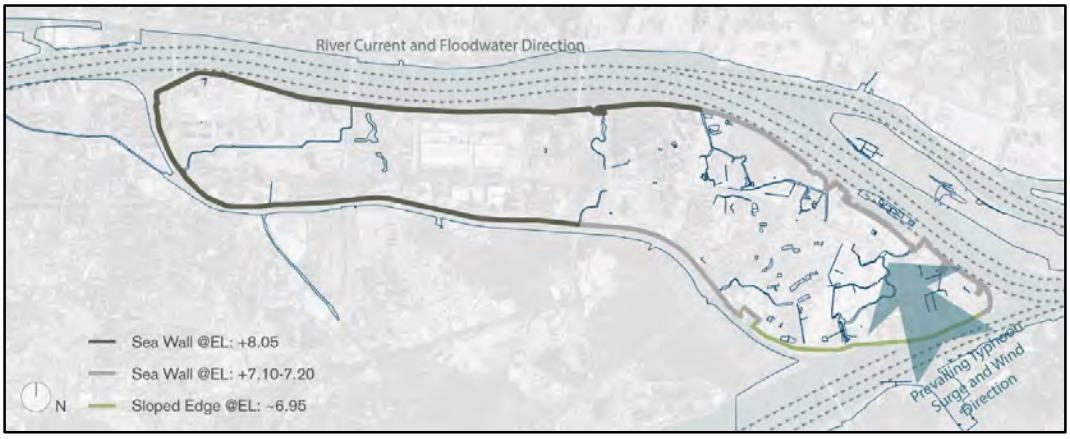


Figure 5 Hydrologic regime and water conservancy facilities (Source: UCB-SCUT workshop)

According to the universal risk of sea level rise that is likely to be faced in the Greater Bay Area, and the possible heavy rainfall and storm surges that may be caused by typhoons, in this workshop, a model for analyzing the elevation of Pazhou Island and its different heavy precipitation conditions (Figure 6) was established based on the topography of the island, without considering existing embankments, sluices and other water conservancy facilities, so as to simulate strong precipitation in 50 mm, 100 mm and 200mm (2018 Typhoon Mangosteen).

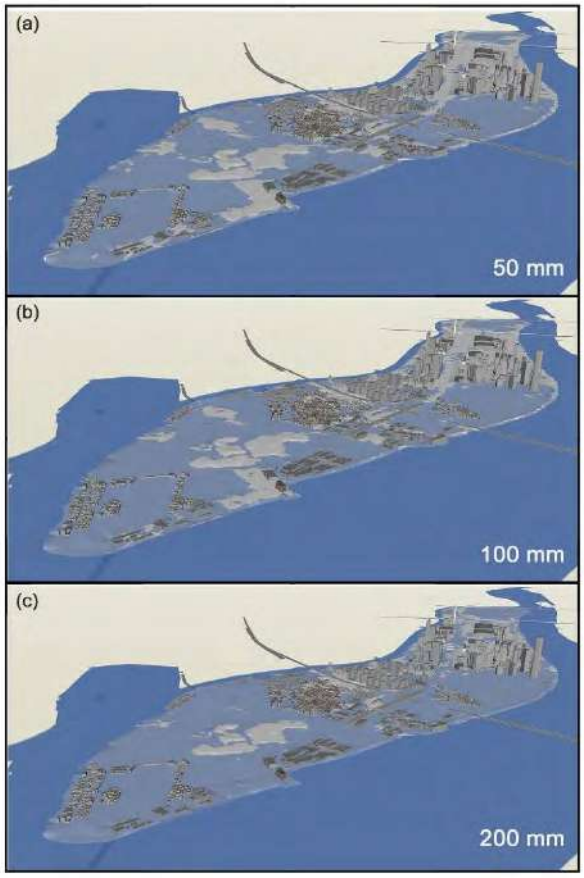


Figure 6 Flood risk scenarios (Source: UCB-SCUT workshop)

4.2. Overall Resilient Urban Design of Central and Eastern Pazhou

Resilient Urban Design emphasizes the adaptability and learning ability of urban systems, to build a stable, diverse, redundant, integrated, flexible, and interconnected urban infrastructure and environment that is resistant to risks and adapts to interferences. Therefore, in view of the above risk simulation and assessment of the island, corresponding feedbacks and overall design strategies (Table 3) are proposed, which involve interdisciplinary aspects such as urban planning, water conservancy engineering and ecological design.

Risk	Related Majors and Feedbacks	Specific Design Strategies
Low-lying alluvial island	1） urban planning: classification of land development based on the terrain	①Land developments of higher intensity are concentrated in the highlands; ②Residential areas are arranged at high points, followed by commercial, business areas and major transport facilities, and finally green space, farmland, and other submersible areas.
	2） water conservancy engineering: artificially adjust the site elevation according to the current land shape and extreme water lever	①The height of parts of the embankments is adjusted, which is a hardened waterfront area with a narrow scale; ②The low-lying ground of residential areas are to be lifted up.
	3） ecological design: maintain continuity in low-lying habitats	①The current broken water system and green space are to be connected. ②Blue-green infrastructure connecting with the external ones are reserved in the newly built areas.
Threats of storm surges and floods	1） urban planning: integrate land use and urban transportation according to base terrain	①The mix-use land pattern is advocated to promoted the diversity of urban space and mitigate the degree of damage to the same area by the risk of storms and floods; ②A low-carbon redundant traffic space is to be established guided by public transportation, and the redundancy is increased by constructing pedestrian bridges on low-lying lands.
	2） water conservancy engineering: combine rigid engineering tools with resilient green infrastructure	①Rigid measures are taken to reinforce dikes in places which lack buffers and where is with large urban construction; ②Decentralized rainwater storage design is adopted in combination with green infrastructure, and the existing farmland and

		wetlands are preserved in low-lying areas to improve the adaptability to storm threats.
	3） ecological design: establish natural floodplain combining low-lying lands	①Water squares, rain gardens, undercut or sloped green spaces are established according to different functional parts of the city; ②Recreational and other facilities are introduced to the natural floodplain in order to create multi-purpose space.

Table 3 Urban design strategy of Central and Eastern Pazhou (by author)

The workshop adopted two different holistic development models (Figure 7) to explore how to strike a balance between urban development and adaptability to stormwater hazards. Two different development visions were presented through design: one is to achieve intensive land development, which needs to invest in higher flood control facilities; the other one is to preserve existing farmland, vegetated areas and other open spaces, so that the constructed area and the green infrastructure system are organically integrated, and the cost of flood control is relatively low.

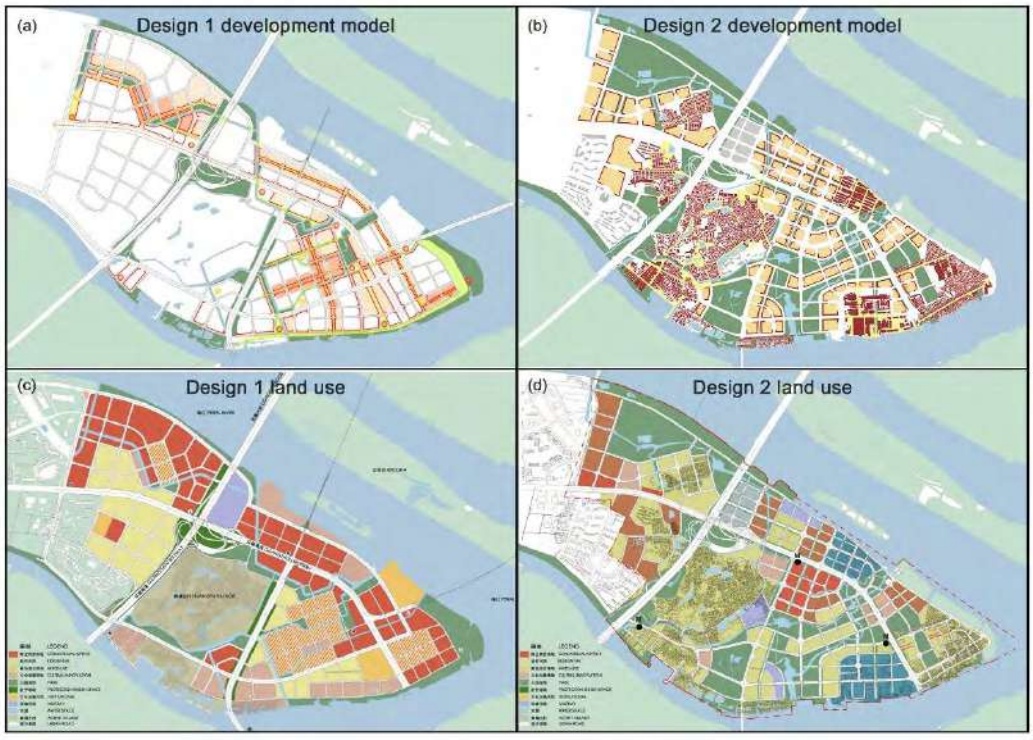


Figure 7 Development model and land use of two urban design (Source: UCB-SCUT workshop)

4.3. Engineering Means Selection and Adaptability Evaluation

Due to the relatively heavy rainfall in Pazhou Island, it is likely to face the threat of heavy storm surges and floods, if the rainwater is not properly stored, but only removed by engineering means. The workshop proposed three possible hydraulic engineering design strategies and evaluated them: First, to prevent flooding by increasing the elevation of the base. This strategy is relatively straightforward, but involves huge earthworks; Second, to establish a flood defense system, such as dikes, sluice, etc. and centralized flood discharge

facilities, such as flood drainage channels and intercepting ditches, etc. This Strategy is more effective in a short period of time, but the centralized drainage facilities may lead to land subsidence; Third, to bring together the water conservancy and ecosystem to create a decentralized rainwater storage system to store, manage and reuse rainwater on site.

The first two strategies are rigid static water conservancy engineering methods, and often do not have the adaptability and learning ability in storm disasters. Once the future climate change makes the flood exceed the engineering design standards, the water inflow will still occur in this island. The last method is more flexible and sustainable, but it requires a certain amount of land. In summary, appropriate technical means should be selected in combination with the different situations of the site.

4.4. Application of the Principles of Flexibility in Design

The principles of flexibility in specific design is embodied in a smart and compact urban growth and a mixed-function block design. A mix-use zone is created within a walkable scale, and multiple zones are connected by constructing multiple levels of public space, so as to further enhance the interconnectivity and redundancy of urban resilience.

To achieve the resilient open space design of the above-mentioned combining urban planning, water conservancy engineering design and ecological landscape, and to meet the current development capacity, it is necessary to carry out appropriate high-density development in the constructed area of the central and eastern Pazhou, pre-planning spaces for green infrastructure. Combined with the walkable scale of “small blocks and dense road network”, mix-use block design is proposed (Figure 8), according to the needs of development intensity of different regions. Besides, the urban public services are considered, to achieve a certain degree of the balance between occupation and residence in order to reduce carbon emissions. What’s more, the adaptability of climate in south China is considered in the block design, such as the street interface in the form of an arcade, the ventilation openings and courtyards in the blocks, and the square design, and so on.

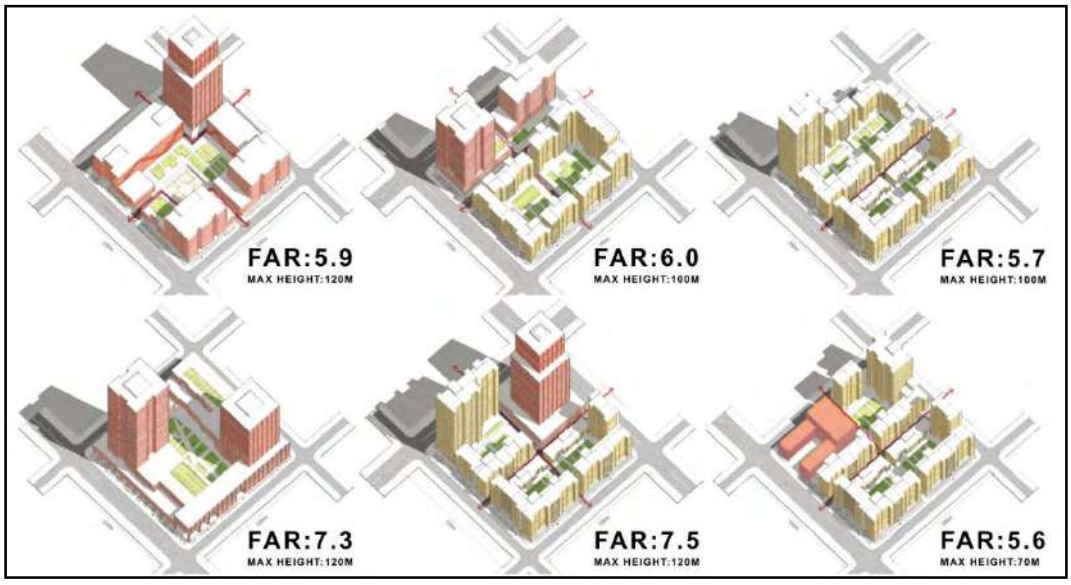


Figure 8 Block design of mix land use (Source: UCB-SCUT workshop)

5. Evaluation Feedback: Multi-program Quantitative Assessment of the Resilience

Based on the initial formation of the urban design, we design a set of resilience indicators to evaluate the resilience of different urban design plans and feedback to the urban design stage. The purpose of the evaluation feedback is to introduce the theory of resilient city in the early stage of design, to form a comprehensive consideration of urban ecology, urban design and water conservancy. Through early scientific decision-making, the repeated planning and design modifications during the constructing phase are to be reduced, which may hopefully save time and resources.

5.1. Time Series Model for Urban Resilience Assessment of Heavy Rainfall

Not considering existing embankments, sluice gates and other water conservancy facilities and assuming that the urban drainage system runs smoothly and the water level of Pearl River remains constant (7m), we construct a time-varying model for analyzing different rainfalls in Pazhou to simulate the impact of quantity of the rainfall on various urban systems. Input data includes different elevation areas for each design (Figure 9) and their corresponding land use type. The set scenarios are 50mm, 100mm, 200mm precipitation, and the precipitation time is 3h. The quantified indicators of output include the height of the rise in stagnant water and the temporal changes in the various types of land that are submerged.

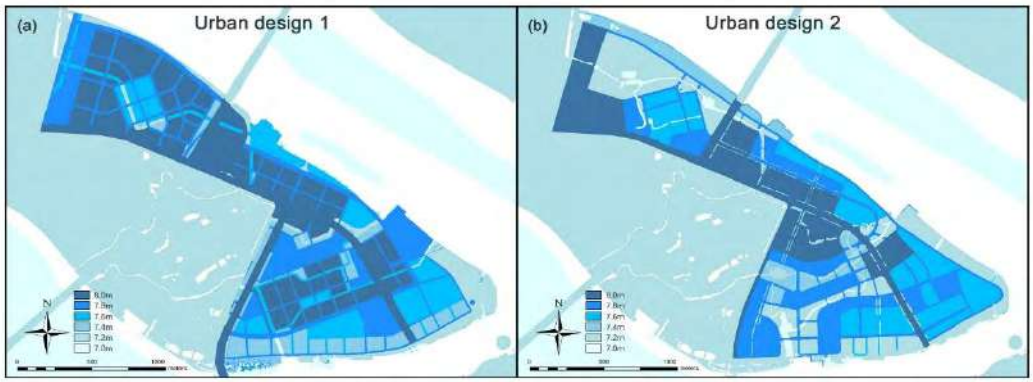


Figure 9 Elevation of two urban design (Source: UCB-SCUT workshop)

Figure 10 illustrates the temporal variation of the water surface height along the rainfall process in different scenarios. Overall, the water lever of urban design 1 has increased rapidly. The maximum height of the accumulated water is close to 0.7m. The speed of the stagnant water is also fast. The water level is maintained at 0.05m within 9 hours after the precipitation. In urban design 2, the increase in the height of the accumulated water is relatively flat. The maximum height of the accumulated water is about 0.6m, but the speed of the whole water volume is also slower. It stays at about 0.1m for a long time, so the time of water accumulation is longer.

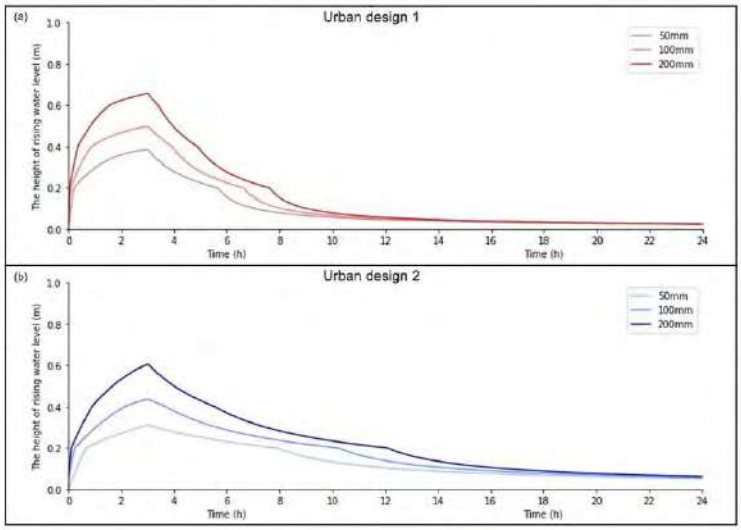


Figure 10 The temporal variation of height of rising water level in different scenarios in two urban design (by author)

Specifically, urban design 1 and 2 perform well in heavy rainfall facing 50 mm of rainfall, and the natural basement absorbs most of the precipitation and protects the urban system from precipitation. However, in the face of 100mm heavy rainfall, there is a difference in the performance of the two. The natural basement of urban design 1 is difficult to absorb a sufficient amount of rainfall, but the urban infrastructure network is well protected because of the urban design, so precipitation directly affects commercial land on the layer of the urban settlement. Urban design 2 retains sufficient natural ecological land and green space, and the city has strong resilience. The difference in resilience between the two schemes is that: when facing with serious natural disasters, the overall recovery of urban design 1 is strong, but the capacity for disaster response is insufficient. About 10% of urban constructed land (commercial and residential land) is flooded. Although the recovery rate is slower in urban design 2, the disaster preparedness is sufficient. Only 4% of the urban land is inundated, and the late stage of disaster recovery mainly through the water system on the layer of the natural basement which does not affect the urban operation.

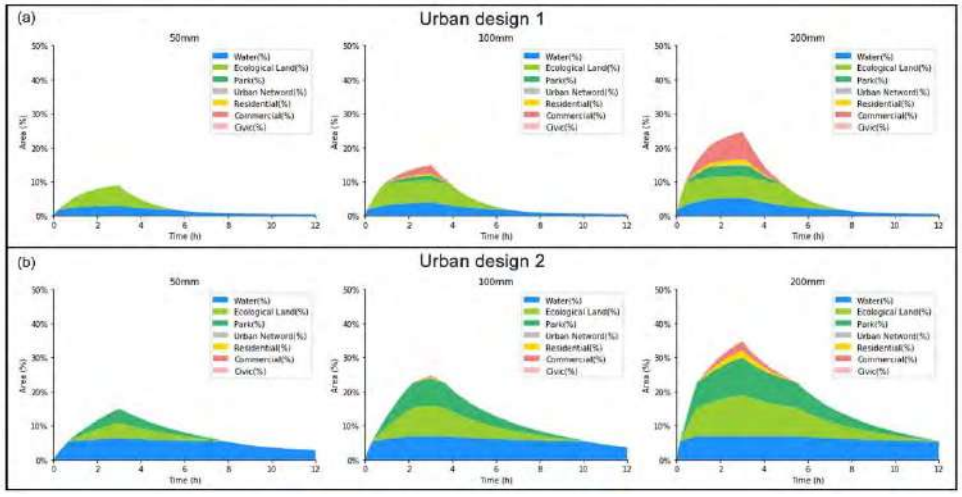


Figure 11 The temporal variation of area of various land use in different scenarios in two urban design (by author)

5.2. Feedbacks Based on the Results of the Assessment

Based on the evaluation results, we put forward 3 feedbacks on the next stage of urban design to enhance urban resilience.

Appropriately increase the covering area of the natural basement and adjust its elevation to meet the urban water conservancy project implementation to achieve the 100-year construction standard, which can be continuously measured through the feedback model.

In residential and commercial areas that may be submerged, it is recommended that the ground floor be overhead and designed as a semi-public space to enhance the quality of the space and to cope with sudden precipitation.

The underground public space should be set up to consider the extent of flooding, and the underground public space entrance in the flooded area should be specially designed to protect the normal operation of the underground public space.

6. Discussion

6.1. Interdisciplinary cooperation mode: integration of research, design and feedback

The city is a complex giant system. Each city's challenges require multiple disciplines in collaboration to propose solutions. The natural disasters caused by climate change in cities also require urban planning, water conservancy projects, and ecological design to build an interdisciplinary platform. In this process, urban planning is responsible for formulating urban development frameworks from the perspective of urban systems and balancing the interests of each system. Ecological design is responsible for regulating the relationship between urban artificial systems and ecological natural systems, and adjusting the development framework to ensure sustainable urban growth. Urban design is responsible for shaping urban public spaces and urban blocks within the development framework and maintaining flexibility to face the future uncertainties. The water conservancy project is responsible for assessing and selecting appropriate engineering techniques to achieve sustainable goals. In this interdisciplinary exchange and cooperation process, it is indispensable to break through the traditional academic constraints of “architectural-planning-landscape” and to explore from a broader interdisciplinary field. It is the key to establish a cooperation mechanism between the urban study and other professions.

6.2. Management and control platform: evaluation indicator, real-time monitoring and dynamic maintenance

The evaluation feedback process can effectively adjust the design optimization direction and implementation direction, but the strength of the adjustment depends on the perfection of the evaluation index system. Through reflection on the evaluation index system in the design process, we understand that the above evaluation system is limited to the short-term impact on the urban system when natural disasters occur, and fails to show the strength of the urban reconstruction ability after encountering natural disasters. Moreover, the existing evaluation system is limited to a single target, and it fails to evaluate the impact of disasters on urban infrastructure (such as medical and municipal facilities) and urban population economic development. This is also part of the next work.

It is important for a management and control platform to do real-time monitoring, regular assessment, and dynamic maintenance. In the planning and design phase, the platform can quantify the urban resilience of the design and guide to select excellent solutions. During the design implementation phase, the platform can supervise the implementation progress in real time, assess the urban resilience periodically, and compare design and implementation to find and correct the deviation. Besides, through the dynamic maintenance of the platform, the first-hand data of each system in the city can be obtained, which is beneficial to enriching the knowledge library of urban evolution and development, and further analyzing the law of urban evolution.

7. Conclusion

Resilient cities are not only the inevitable requirement of the development of the world city, especially the coastal cities, but also the practical need for the Greater Bay Area to realize leap-forward development. Based on the theory of resilient city, this paper proposed three resilient urban design principle and a research-design-feedback loop pattern and applied from the Greater Bay Area to urban zone-Pazhou. The practice process shows that the design research (the analysis of previous designs and patterns) and research-by-design (testing different possibilities for an area) both play an important role in resilience urban design. And these create a complete design closed-loop. The experience also points out the limitation of the evaluation index, suggests that the resilient city evaluation indicator needs to move from short-term to long-term and from a single goal to multiple goals, so as to improve the quality and efficiency of resilient cities.

(Designers and students participating in UCB-SCUT workshop include: Patrick Webb, Andrew Salmon, Mingxi Zhu, Lu Huai, Yuanjing Luo, Desong Shi, Preeti Srinivasan, Fanshu Li, Ziyu Cai, Eleni Oikonomaki, Sihan Sun, Dengyue Wang, Mingqi Xue. Thanks for your active participation)

8. References

Xiong, Liang; Steffen, Nijhuis(2019) Exploring spatial relationships in the Pearl River Delta, In Cities as Spatial and Social Networks, Springer: Cham.

Yang, Zhiwei; Chen, Yingbiao; Wu, Zhifeng; Zheng, Zihao (2018) “The Coupling between construction land expansion and urban heat island expansion in Guangdong-Hong Kong-Macao Greater Bay”, Journal of Geo-information Science, Vol. 20 No. 11.

Xiong, Liang; Steffen, Nijhuis (2014) Urbanized deltas in transition, Techne Press.

Dai, Wei; Sun, Yimin; Han, Meyer; Bacchin, Taneha K (2019) “Delta spatial planning method based on system resilience”, Urban Development Studies, Vol. 26 No. 01.

Wu, Qingzhou (2009) Research on flood control of ancient Chinese cities, China Architecture & Building Press.

Wu, Qingzhou (2002) “A review of China's floods in the 20th century”, Journal of Catastrophology.

Dai, Wei; Sun, Yimin; Han, Meyer; Bacchin, Taneha K (2018) “Toward resilience planning: a study of delta planning based on international perspective”, Urban Planning International, Vol. 33 No. 03.

Liu, Wei (2015) Study on the Relationship between Urban Canal-system of Ancient Guangzhou and City Development, South China University of Technology.

Li, Jiahao (2015) Research on Evolution and Dynamic Mechanism of Water, South China University of Technology.

Resilience Alliance (2007) Urban Resilience Research Prospectus, Australia: CSIRO.

Chen, Li; Zhu, Xigang; Sun, Jie (2017) “The Basic Concept, Mechanism and Planning Ideas of Resilient Cities”, Modern Urban Research.

McHarg, Ian L.; Lewis, Mumford (1969) Design with nature, New York: American Museum of Natural History

Li, Guosheng; Li, Kuo (2013) “Integrated assessment on risk of storm surges in the central coastal area of Guangdong Province”, Journal of Southwest University (Natural Science Edition), Vol. 35 No. 10.

Case Study / Project

Effects of ongoing infrastructure improvements in relation to planning policy

for flood resilience and historic urban morphological development in Jakarta

David MATHEWSON

Abstract

This paper explores historic institutional responses to flooding and the influences of such planning policies on the spatial development of Jakarta within the context of pressures from severe flooding and rapid urban development set against a background of significant recent institutional change from the national to the local level in recent years. This study will focus on the local and city scales, considering recent changes to patterns of urban spatial development across Jakarta as new flood defences and mitigation measures have been incorporated in various parts of the city which form part of a wider network of flood and water management infrastructure currently being implemented by local and national government. Several sites will be analysed using urban morphology with GIS-based mapping and satellite imagery to understand the impact of this new infrastructure on existing communities in different parts of Jakarta and the relationship between typology, context and decision-making at the local and national governmental levels.

While this article will study spatial impacts at the local scale, it will examine how these disparate sites form part of a wider trend at the extent of the city-region, because the nature of flooding means that both upstream and downstream areas are affected and the origins of problems can arise far from visible disasters. Using document analysis, newspaper articles and historic maps and satellite images, a historic institutionalist approach will be used to understand the policy context and decision-making process involved with the practical realisation of flood-resiliency in the city, which has resulted in a number of side-effects, including displacement of local residents, problems of land tenure, access to affordable housing, severance of social networks and interruption of local livelihoods.

Case Study / Project

Earthquake Post-disaster Relocation Identification

in Meuredu Pidie Jaya Nangroe Aceh Darussalam

Dani MUTTAQIN

Abstract

Indonesia's geographical position was crossed by the world's active fault lines which are prone to earthquake. Physically and non physically was affected by earthquake. Growing trend of disaster was induced displacement to reduce risk by relocation, adaptation and protection were means mitigation. High risk of earthquake disasters area was identified to reducing the impact of earthquake risk by the government and stakeholders. Through micro zonation mapping of earthquake-prone areas known to areas that have a high risk of earthquakes. The determination of the areas that are in active fault becomes a protected area for fault lines was the regulation by Indonesia Government. The existence of settlements around active faults can improve settlement development and population density. Restrictions on the development of settlements around active faults are as far as 20 meters from active faults. Land management can be an effort in reducing disaster risk through land consolidation and land pooling. Identification of land requirements and conformity to spatial planning in determining locations for regional relocation in efforts to reduce disaster risk.

The purpose of this study is to identify suitable locations in the relocation in terms of physical and spatial plan. Through the GIS analysis method by combining micro zonation and active faults against spatial regulation. The results of the analysis show that there are 78 building units in active faults, 1 unit of public facilities, and buildings that have a high risk for collapsing a total of 179 units. The total land requirement in Meuredu District is needed for the relocation location which is 3.62 ha and the availability of land is 23 ha.

Research Paper

CHANGED PRECIPITATION PATTERNS AND THE NEED FOR A NOVEL APPROACH TO BUILDING PLOT PLANNING

The lessons learnt in the sub-alpine climate zone of Slovenia

Dr. Matej NIKŠIČ, Urban Planning Institute of the Republic of Slovenia; Slovenia
Jernej ČERVEK, Ministry of the Environment and Spatial Planning & University of Ljubljana; SI

Abstract

The events related to climate change are recently challenging the Slovenian urban planning. One of them are the floods in urbanised areas that call for a radically new approaches to how the urban built structure is organised and managed. The continental (and largest) part of Slovenia has a subalpine climate which has been traditionally characterised by a moderate precipitation throughout the year. This is now being changed as the larger amounts of water fall on the ground in a shorter period. As the current urban structure is not shaped in accordance with these new circumstances, parts of the cities are getting flooded more often. Some mitigation measures have been implemented, however to address the issue comprehensively new urban planning approaches are needed too. The paper will present one of the tools that has been developed within the endeavours of the national Ministry of Spatial Planning to reform the urban planning system to better reflect the changes posed by the climate change. It is related to the urban design criteria for building plots planning. To allow the rainfall to penetrate the soil as soon as the precipitation reaches the ground, new measures in organisation of the building plots will be provided. The current system defines the percentage of the built-up area within the plot but does not consider the permitted percentage of the paved open spaces (which do not allow the water to penetrate into the grounds), therefor it will be supplemented by the new measures based on the ability of the plots to allow the penetration of the water. The paper firstly presents the current system of building plots regulation within the Slovenian planning system. It then reports the results of the extensive analyses that focused on the existing characteristics of building plots for different building typologies across the country (housing, production, trade, public services) with the aim to map the state of the art in terms of the potential of the existing building plots to allow the water to flow into the grounds. The third part explains the methodological framework for the new approach to the building plots regulation. The last part presents the newly proposed approach and relates it to other urban design tools that need to support the implementation in practice. The concluding section relates the lessons learnt in Slovenian case to the similar situations elsewhere and stress the responsibilities that the urban planning and design have in providing future urban environments that will ensure the environmentally just living conditions for all.

Keywords

urban environments, precipitation, building plot, urban design, urban planning regulation

1. Introduction

1.1. The changing climate conditions in Slovenia

Slovenia is a Central European country, measuring 20.271 km2 and positioned between three distinctive geographical regions: the Alps, the Pannonian Plain and the Adriatic Sea. Most of the country is characterised by the hills and valleys with water streams (Melik, 1963). Even if the territory of the country is small, its geographical diversity results in a great variability of weather and climate conditions – the influences of the Mediterranean (coastal), Alpine (mountainous) and continental climate all meet and intervene in Slovenia.

As observed in many other parts of Europe, the climate conditions are quickly changing in Slovenia too. According to the national environment agency at the Ministry of the environment and spatial planning "climate change represents an increasing threat to environmental, social and economic development and requires rapid intervention" (internet source 1). The changes include the rising of the average temperatures in the last 20 years, the changed air currents, weather patterns and distribution of precipitation. The hazardous weather phenomena are rising too. An outstanding issue are the changes in the precipitation distribution which cause either floods or droughts. The changed precipitation distribution comes also due to the increased number of severe storms. This has very severe consequences for both rural and urban areas (Kajfež-Bogataj, 2008).

In the urbanised areas the excessive rainfall and short-term strong downpours are the climate change driven events that cause some of the major problems. Due to the relatively high percentage of the covering of the ground by an impermeable material in the urbanised areas the amount of the water that falls to the ground cannot directly leak through the soil. Additionally, the soil sealing is contributing to the increased heat-island effect, which in turn results in more thunderstorms and increased precipitation.

According to IPCC (2007) Slovenia can expect the average temperatures to increase for up to 3.5 °C by the end of the century. This means that the uprising issues need to be addressed systematically, also by challenging the existing and finding new future practices of planning and design of urban areas. This paper investigates the possibilities and opportunities offered by the introduction of the new spatial law in Slovenia which foresees the introduction of the so-called building plot as a basic tool for organisation of the built-up areas.

1.2. Building plots regulation

In 2017 Slovenia adopted a new spatial planning law, so called *Zurep-2* (Official Gazette of the Republic of Slovenia, 2017). The three main topics covered by the law are the spatial planning, land policy and monitoring and control. It sets the basic rules of spatial planning and management at the national level, while it also foresees the adoption of more detailed rules and regulations in the additional legally biding documents. One of these detailed regulations will be the National spatial order (in Slovenian: *Državni prostorski red*), which will replace the existing Spatial order of Slovenia (in Slovenian: *Prostorski red Slovenije*, abbreviated as PRS) (Internet source 2).

The still valid PRS defines the general planning rules at the national level. By the time of its adoption (2004) the climate change processes had not been accelerated to the extent as we know them today, therefor the adaptation and mitigation measures were not deliberately addressed. PRS covers the issues of changed precipitation patterns indirectly by defining the

approaches to channel the rainfall into the sewage system. E.g. it defines that the water from the roofs of the objects as a rule shall be drained within the object's building plot via the infrastructure such as drifting devices, sinking ditches or drainage pipes in accordance with the environmental protection regulations. At the same time, it stays rather flexible in terms of the regulation of the percentage of the surface of a building plot that can be sealed – this is regulated through the footprint index only which varies in accordance to the dedicated land use, however it does not regulate the character of the parts of the building plot that are not built-up. In practice this means that the open spaces within the building plots in theory can be either hundred percent sealed or hundred percent green surfaces. In practice this percentage greatly varies. Accordingly, the ability of the building plots to sink the rainfall directly into the ground varies too.

The aim of the study presented in this paper was to firstly analyse the state of the art in Slovenia in terms of the (un)sealed surfaces within the building plots for various types of developments, and secondly, to propose a new planning approach that would at the national level regulate the percentage of the sealed surface within the building plots. The study was undertaken under a leadership of the main national research institution in the field of urban planning, i.e. Urban Planning Institute of the Republic of Slovenia, in cooperation with LUZ Urban institute of Ljubljana and BD projektiranje Ltd in 2018 and 2019.

2. Analyses of existing building plots for different building typologies

2.1. The context

Reckien et al (2018) who made a comprehensive analysis of local climate planning to date and classified the alignment of climate change plans with spatial (local, national and international) plans in European Union report that cities of central and northern Europe in general have more elaborated approaches to adaptation and mitigation to climate change through planning documentation than cities in other parts of Europe. The endeavours of Slovenia in this field are largely related to some international documents and protocol, e.g. Kyoto Protocol and the related Operational Programme to Reduce GHG Emissions (internet source 1). This document lists many environment-oriented goals as a response to a climate change, such as savings of end-use energy, increasing the proportion of electricity generated from renewable energy sources, increasing the share of biofuels and increasing the renewable energy sources in energy end-use. However, these goals do not address the need to rethink the way how the planning of the cities most detailed land-use elements (i.e. building plots) shall be adapted to better meet the changed climatic circumstances. Some efforts have been made within other region-based international policies such as the Alpine Convention (AC) which sets the (sustainable) development goals for eight Alpine countries of Europe while protecting the nature (Morandini and Roblek, 2011) and was adopted by Slovenia in 1995 (Bogataj et al, 2011). One of the clear objectives of AC is to reduce the damage of the soil, among others via the restriction of soil sealing. AC as a guiding document does not define which tools each signatory country of the convention shall use to reach the objective in practice - this depends on the planning and other regulatory systems in each of the AC countries.

Slovenian Ministry of the environment and spatial planning has recognised an opportunity to develop such a tool within the preparation of the new National spatial order. However, the state of the art had to be revealed first in order to get an insight on the amount of the sealed soil within Slovenian cities and other settlements as described further below.

2.2. Analitical framework

The project brief clearly structured the research into two phases: the analytical phase (phase one) and the guidance-defining phase (phase two).

The analytical phase had the objective to identify relevant case studies across the country and reveal the following:

- the minimum, the maximum and the average size of building plots for each of the most common building typologies (housing, public services, trade and production);
- the percentage of the built-up surface of the plot;
- and the percentage of the sealed part of the open space within the building plot.

The task of the analytical phase was also to reveal the level to which each studied case is in compliance with the demands set in the local spatial development plans in terms of the above-mentioned criteria.

Due to the great variety of landscape conditions (and related climatic conditions) around the country the project brief demanded to choose the case studies in different parts of the country, i.e. in all statistical regions as well as in all architectural regions of Slovenia that have been defined previously in the study commissioned by the Ministry (Fister, 1993). It was also demanded that in each architectural region one urban settlement and one non-urban settlements are analysed. The third demand of the brief was that the chosen case studies shall represent a wide array of settlements by size (big, medium and small size settlements).

The brief also defined that in each of the settlements a number of typical morphological unit has to been chosen (so called distinctive morphological pattern) reflecting each of the main building typologies (housing, production, trade and public services).

Based on the demands of the project brief the following urban settlements have been included as case studies (the number of inhabitants is indicated in brackets): Ljubljana (> 100.000); Velenje, Novo mesto, Koper (10.000 – 20.000); Trbovlje, Ptuj (10.000 – 20.000); Idrija, Radovljica (5.000 – 10.000); Sevnica, Cerknica (3.000 – 5.000); Črna na Koroškem and Radenci (< 3.000). While among other (non-urban) settlements the following were chosen (the corresponding statistical region is indicated in brackets) Moravske toplice, Martjanci, Tešanovci (Pomurska); Lormanje, Šetarova, Zg. Voličina (Podravska); Podgorje, Šmartno pri Slovenj Gradcu (Koroška); Topolšica, Zavodnje, Bele vode (Savinjska); Čemšenik, Razbor pri Čemšeniku, Jesenovo (Zasavska); Kostanjevica na Krki, Orehovec (Posavska); Dolenjske toplice, Dolen. Sušice, Selišče (JV Slovenija); Dobrova, Polhov Gradec (Osrednja Slovenija); Begunje, Dobrova vas, Rodine, Smokuč (Gorenjska); Nova vas, Nemška vas na Blokah, Veliki vrh (Primorsko-Notranjska); Kozana, Dobrovo, Biljana (Goriška); Šared, Malija (Obalno-Kraška).

The more demanding step of the sampling was choosing the morphological units to be studied within each case study settlement. The research team decided to use a combination

of orto-photo analyses and on-site visits to choose the most relevant units. Once they had been selected a clear boundary was defined to enable a technical (GIS) part of the analyses.

The technical part of the analyses was done in the Arc-GIS environment on the following order (see Figure 1):

1. preparation of the dataset; the cadastre and other information from geodetic and other relevant state-datasets for each case study has been uploaded. This included the ortho-photo images, polygons of built structures, plot-division and road network for each case study;

2. digitalisation of the boundary of each morphological unit that has been studied;

3. based on the information from steps 1 and 2, the overlapping of relevant data gave precise numbers on the size of building plots, the percentage of the built-up surface of the plot and the percentage of the sealed part of the open space within the building plot.

Figure 1 An example from the Arc-GIS database showing the analysed morphological unit for the case of family-housing typology (red – boundary of studied morphological unit, blue – buildings, yellow and grey - private and public traffic surfaces, green – private gardens).

The analyses of the level that each studied case meets the requirements of these criteria as set in the local spatial development plans had were done by on-line or physical review of these plans.

2.3. Results of analytical step

As shown in the Table 1 below, the share of the type of surfaces greatly varies depending on the land use and the building typology. In the majority of non-housing typologies, the greatest share goes to sealed open spaces, with the exception of schools, kindergartens and family farming where the greatest share goes to unsealed open spaces. The unsealed open spaces are unsurprisingly also the most common type of surfaces within all building plots dedicated to housing typologies.

Table 1 The share between the built-up surfaces, sealed open spaces and unsealed open spaces for different land-use and building typologies

Type of surface:		Built-up surfaces (%)	Sealed open space (%)	Unsealed open space (%)
Land use / Building typology:*				
Trade	Shopping centres	35	50	15
	Local shops	26	54	20
Public services	Mixed use	29	56	15
	Fire-brigade	27	42	31
	School	23	15	62
	Kindergarten	25	18	57
	Healthcare centre	25	38	37
Production	Industry	40	43	17
	Small production and warehousing	36	47	17
	Large scale farming	28	39	33
	Family farms within settlements	22	16	62
	Remote family farms	18	24	58
Housing	Deteched houses	21	14	65
	Semi-deteched houses	29	9	62
	Row houses	31	14	55
	Smaller blocks of flats	20	28	52
	Large-scale housing	24	28	48

** For each land use and related building typology many concrete case-studies were analysed, the table shows the average values.*

These results show that some types of building plots have greater ability to sink the rainfall water directly into the ground then the others - in Slovenian case among the types shown in Table 1 the following have the highest ability: detached houses, semi-detached houses, schools and family farms within settlements. While the lowest ability has been detected mainly among the production-related typologies, such as industry, large scale farming, small scale production and warehousing.

The study also showed that in some studied cases the demands set in the local spatial development plans were not met. Out of all 246 studied cases, in 15 cases the footprint index was exceeded, in 21 cases the floorspace index was exceeded, in 13 cases the green-space index was exceeded and in 10 cases the open-living-area index was exceeded. The size of the building plot was exceeded in 16 cases, while the heights of the buildings were exceeded in 13 cases.

3. New approach to the building plots regulation in Slovenia

3.1. Methodological framework

Based on the results of the analytical phase and in accordance with the project brief, the second part of the project dealt with the development of the new regulation of the

organisation of the building plots in Slovenia. The main goal of such an endeavour was to improve the capacity of the urbanised areas to sink the water directly into the grounds by leaving appropriate amount of building plot's surface unsealed. At the same time, it was equally important to bear in mind the functional demands of each building type - to provide enough appropriate surfaces that allow the functioning of each building type, e.g. allowing enough open paved surfaces for the motorised traffic manipulation around warehousing etc.

One of not many Slovenian studies of the relation between the climatic conditions and the morphological patterns in the cities revealed that "the key parameters with the cooling effect are: green areas and their placement and the lack of traffic areas, particularly stationary traffic (i.e., parking)" (Fikfak, 2017, p. 18/20). The own analyses of the research team showed that while the built-up surfaces of the building plots stay within the very comparable limits (between 18% and 40% of the total surface of the building plot, as shown in Table 1) there are greater differences when it comes to the share of (un)sealed surfaces of the open spaces within the building plot: the sealed vary from as low as 14% up to 56%, while unsealed from 15% to 65%.

All these insights directed the project team into rethinking of the existing system that defines the organisation of the building plots. It is based on the distinction between the built-up and open space within the building plot, while there is a need to clearly define also the relation between the sealed and unsealed surface.

A new model was therefor based on the distinction between these two basic categories:

- the sealed area (in Slovenian: *neprekriti del*). The built-up area and all paved open spaces account into this category. The decisive criterion is that within sealed area the water cannot freely penetrate into the soils;
- the unsealed area (in Slovenian: *raščen teren*). The green spaces without underground construction account into this category. The decisive criterion is that within unsealed area the water can freely penetrate into the soils.

As shown in Figure 2 the category of sealed area is then subdivided further into the 1st sealed open space dedicated to motorised traffic, and 2nd sealed open space not dedicated to motorised traffic and 3rd the built-up area. While the category of unsealed area includes the green areas only in the part where there is no underground construction which would block the water enter the soils (e.g. cellars etc.). The open living area (marked with dashed grey line in Figure 2) extends across both new basic categories – it includes the unsealed surfaces in total while only a part of the sealed surface (the one that does not hold motorised traffic) – keeping this category as a part of the new system too was seen as important to continue the legacy of the existing system where the open-living-area index was introduced to assure enough surfaces for the non-motorised users of the open spaces surrounding the buildings.

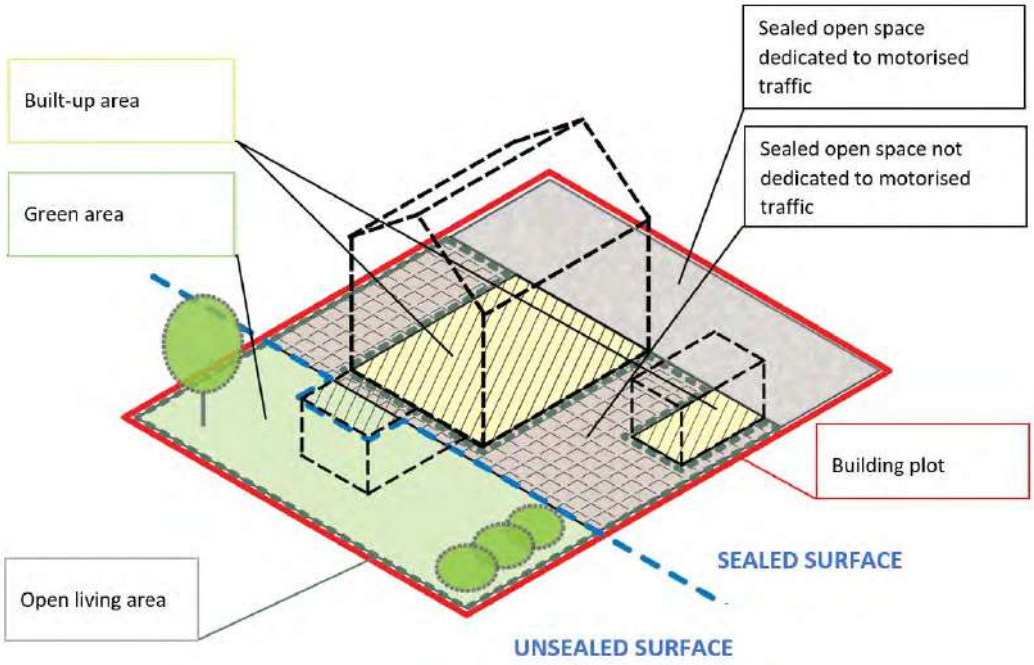


Figure 2 The organisation of the building plot into two basic categories (sealed surface and unsealed surface) with sub-categories

In order to regulate the permitted percentage of the sealed surface within the building plot, a new urban planning index was introduced: sealed surface index (in Slovene: *faktor prekritih površin* – FPP), which defines the maximum percentage of the sealed surfaces and must not be exceeded.

3.2. Defining the building plot regulation by types

In order to achieve the appropriate extent of the unsealed surfaces in practice, each of the building plot types (reflecting the land use and its building typology as shown in Table 1) had to be defined by the percentage each of the categories defined in Figure 2 can cover. As shown in Figure 3 four aspects were defined for each of the land uses and related building typologies:

- A) the percentage of built-up area (maximum allowed),
- B) the percentage of sealed open space dedicated to motorised traffic (maximum allowed),
- C) the percentage of sealed open space not dedicated to motorised traffic (minimum required),
- D) and the percentage of unsealed surface (minimum required).

Nevertheless, the land use and related building typology could not be the only decisive factor. In some cases, it was important to consider the location of the building plot within the urbanised area. Many Slovenian cities follow the policy of densification of the urban areas nowadays in order to avoid the greenfield developments (Cotič et al, 2017). Therefor for those housing typologies that can appear in both densely built up as well as in the more suburban (lower densities) zones this distinction has been made. Similarly, the distinction between the farmhouses within the settlements and the farm houses standing alone in the

landscapes was made in the new system too. In some cases (see Shopping centres in Table 2) it was also defined how much of the unsealed area must be defined in one larger piece (and not scattered around in many smaller pieces).

Table 2 The share between the built-up, sealed and unsealed surfaces within the building plot for different land land-use and building typologies, as proposed for the new Slovenian National spatial order

	Built-up area	Sealed surfaces		Unsealed surfaces
		For motorised traffic	Not for motorised traffic	
	Max (%)	Max (%)	Min (%)	Min (%)
Housing				
Detached houses	central: **40** non-central: **30**	central: **20** non-central: **30**		**40**
Villas	**20**	**20**		**60**
Semi-detached houses	central: **40** non-central: **35**	central: **30** non-central: **35**		**30**
Row houses	**50**	**20**	**10**	**20**
Smaller blocks of flats	central: **40** non-central: **35**	**25**	**15**	central: **20** non-central: **25**
Large housing estates	**35**	**20**	**15**	**30**
Public services				
Kindergartens	**30**	**20**	**15**	**35**
Schools	**30**	**20**	**15**	**35**
Healthcare centres	**50**	**25**	**5**	**20**
Trade				
Smaller local shops	**50**	**15**	**5**	**30**
Larger local shops	**40**	**30**	**10**	**20**
Shopping centres	**40**	**20**	**10**	**30** (out of which at least 50% in one unit)
Agriculture				
Farms	within settlement: **50** out of settlement: **60**	within settlement: **30** out of settlement: **20**		within settlement: **20** out of settlement: **20**
Production				
Industry and warehousing	**60**	**25**		**15**

4. Soil sealing as one of the considerations in building plots organisation

Soil sealing is however only one aspect of the organisation of the building plots and may not stay the only one if the high-quality urban environments are to be achieved. Therefor the proposed new regulation addressed some other aspects of the plot organisation too.

4.1. Integration of soil sealing measures and urban design measures

To make a clear guidance for the future decision makers at the local levels of spatial planning in Slovenia (local authorities, local planning offices, urban planning bureaus etc.) the guidance has been prepared in a form of the Manual (Nikšič et al, 2019). The introductory pages give some general approaches to the organisation of the building plots, such as explain main terminology and definitions, list the general objectives of building plot organisation (functioning of the building, environmental footprint, relation to the existing context, sanitary and technical requirements and above all the assurance of quality living standards), and then explains the division of the building plot into two main categories (sealed and unsealed surface) and their sub-categories. As shown in Figure 3, the requirements for the organisation of the building plot for each of the building typologies is presented in a textual and graphical manner.

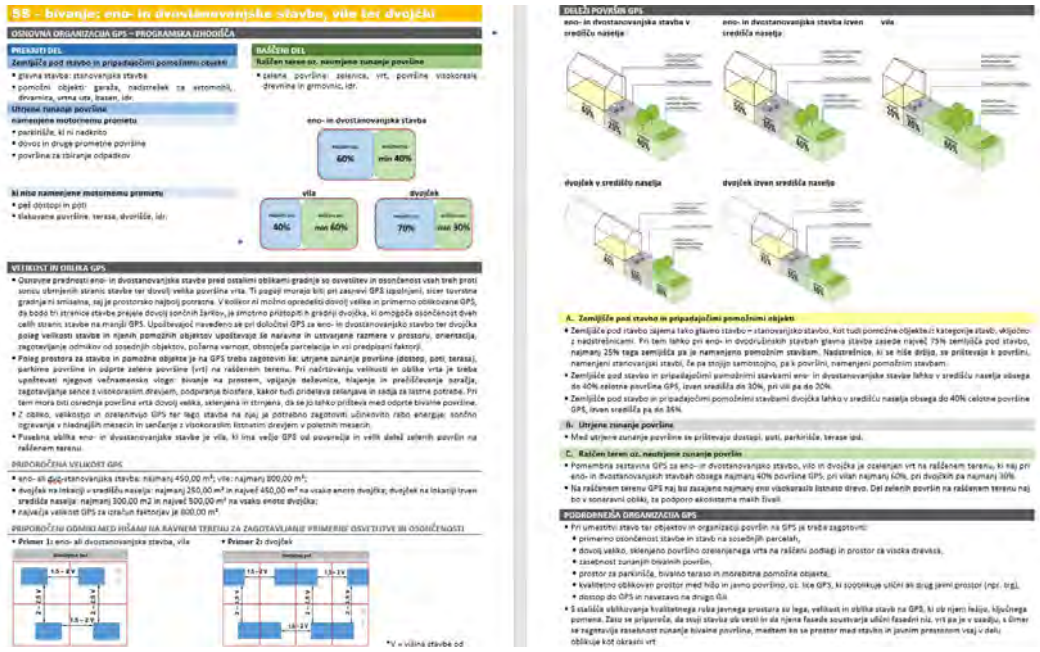


Figure 3 An example of the textual and graphical guidance for the organisation of a building plot in the manual for building-plot organisation (the case of Detached housing)

4.2. Implementation issues

The preparation of the Manual is only the first step in the process of changes aiming to introduce a new practice of building plots planning in Slovenia. The important further steps must be done. Firstly, the new approach has to be translated into a legally biding form within the new National spatial order. If this will not be done and the new guidance will stay only at the level of the recommendation it is less likely that the long-term goals (i.e. the ability of plots within urbanised areas to directly sink the rainfall into the soil) will be reached. And secondly, a new approach (and Manual) has to be promoted to the decision

makers and any other potential user, preferably via short face-to-face teaching or video lectures that would explain a rational behind the new approach as well as detail the information how to use and implement the new regulation for each of the addressed typologies.

5. Concluding thoughts

The climate change with the changed precipitation patterns is forcing the city authorities, planners and other stakeholders in urban development to rethink the long-established practices of city making. One of the basic elements and tools of the regulation of the urban areas is the regulation of the building plots. As this study showed on the case of Slovenian planning system, the current approach to building-plot organisation must be reformed to address the fact that it is important to regulate the amount of the surfaces that stay unsealed – not only by regulating the footprint and open-living-area index, but also the sealed surface index. It is of a great importance to raise the awareness that the capacity of the city to sink the rainfall greatly depends on the amount of the open space that is (not) sealed. In order to rise this awareness, the combination of soft (manual, educational activities) and hard measures (translation of recommendation into a legally binding rules) must be followed.

Acknowledgments: The authors of the paper acknowledge the important contributions to the project *Manual on urban design criteria for building plots planning* (which was the base of the paper) of the following experts (abc order): Bernarda Bevc Šekoranja, Nina Bizjak Komatar, Boštjan Cotič, Simona Čeh, Bogdana Dražič, Zala Jerman, Matic Klun, Zala Koleša, Katarina Konda, Barbara Mušič, Simona Peršak Cvar, Janja Solomun and Mojca Strbad.

References

Bogataj, T., Bartol, B., Polajnar, B. (2011) Alpska konvencija v Sloveniji in njeno izvajanje na lokalni ravni. Alpine convention in Slovenia and its implementation at local level. Innsbruck: permanent committee of Alpine convention.

Cotič, B., Bizjak, I., Nikšič, M., Koblar, S., Mušič, B. (2017) Povezava nalog, ki obravnavata degradirana območja, opredelitev do izdelanih metodologij in oblikovanje predloga rešitve. Linking projects dealing with degraded areas, assessment of the methodologies developed and formulation of a proposal of the solution. Ljubljana: Urban Planning Institute of the Republic of Slovenia.

Fikfak, A., Kosanović, S., Konjar, M., Grom, J. P., Zbašnik-Senegačnik, M. (2017) The Impact of Morphological Features on Summer Temperature Variations on the Example of Two Residential Neighborhoods in Ljubljana, Slovenia. *Sustainability* 2017, 9, 122; doi:10.3390/su9010122.

Fister, P. (1993) Glosar arhitekturne tipologije. Glossary of architectural typology. Ljubljana: MOP.

Internet source 1: Republic of Slovenia, Ministry of the environment and spatial planning, Slovenian environment agency. Accessed on May 5 2019: https://www.arso.gov.si/en/soer/climate_change.html.

Internet source 2: Uredba o prostorskem redu Slovenije – Regulatory act on Spatial order of Slovenia. Accessed on April 21 2019: http://pisrs.si/Pis.web/pregledPredpisa?id=URED3526.

IPCC (2007) *Climate Change 2007 - The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the IPCC*. New York: Cambridge University Press.

Kajfež-Bogataj, L. (2008) *Kaj nam prinašajo podnebne spremembe. What the climate change is bringing us.* Ljubljana: Pedagoški inštitut.

Melik, A. (1963) *Slovenija: Geografski opis. Slovenia – Geographical facts.* Ljubljana: Slovenska matica.

Morandini, M., Roblek, I. (2011) *Alpine Convention : reference guide*. Innsbruck : Permanent Secretariat of the Alpine Convention.

Nikšič, M., Bevc Šekoranja, B., Bizjak Komatar, N., Dražič, B., Konda, K., Mušič, B., Solomun, J. (2019) Manual on urban design criteria for building plots planning. Ljubljana: Urban planning institute of the Republic of Slovenia, LUZ, BD projektiranje.

Official Gazette of the Republic of Slovenia (2017) *Zakon o urejanju prostora. Law on spatial planning.* Uradni list RS, 61/17.

Reckien, D., Salvia, M., Heidrich, O., Church, J. M., Pietrapertosa, F., et al (2018) How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28. *Journal of Cleaner Production*, Elsevier, 191, pp. 207-219.

Case Study Paper

Embodied Carbon Emission Analysis of Industrial Sector Based on Input-Output Analysis : Case Study in Bitung City, Indonesia

Sani NURAINI, Bandung Islamic University (UNISBA), Indonesia
Imam INDRATNO, Bandung Islamic University (UNISBA), Indoensia

Abstract

Bitung has the status of Special Economic Zones (SEZ) for the field of fisheries, oil industry, and other logistical support in the eastern region of Indonesia by the Indonesian government gazette of 2014. Based on Bitung City in Figures received from the Statistics of Bitung City (BPS), the Gross Domestic Regional Product (GDRP) at current prices in Bitung City in 2017 worth 14.09 trillion Rupiah still experiencing an increase compared to 2016 worth 12.68 trillion Rupiah. The largest share of GDRP in Bitung City in 2017 was the manufacturing of 33.63 per cent. Despite the advantages, Bitung City is experienced environmental degradation, even though economic growth continued to increase. This study aims to build a model of environment-economy linkages through Input-Output (I-O) Environment and to calculate the impacts of the economic sector in Bitung City. The paper presents the conceptual and analytical framework of the Input-Output approach of the Bitung City. The I-O Model is based on the Bitung City I-O tables and the methodology developed by Wassily Leontief. The model databases use the 2017 I-O tables and data series provided by BPS. The analysis conducted leads to two main conclusions: first, three groups of key industries for the economy was identified; second, while an increase GDRP growth, it has an impact on the environment.

Keywords

Input-Output Model, Economic Growth, Carbon Emissions

1. Introduction

As the largest archipelago nation in the world, Indonesia is one of the countries that are most vulnerable to the negative impacts of climate change. Generally, the global climate change model has predicted that Indonesia will experience an increase in temperature, intensity of rainfall that will increase the risk of floods and droughts, and extended dry seasons. The impact of climate change will among others take the following forms : increased frequency of extreme climate occurrences, that affect community health and sources of living, degrade biodiversity, and instability of the economy (Ministry of National Development Planning, 2014).

Ample scientific evidence has substantiated that climate change is already occurring and felt by the entire global community. In Indonesia, the economic impact of climate change is estimated to be very significant even though it is still difficult for being accurately estimated (Indonesia Ministry of National Development Planning, 2014). Nevertheless, several studies have shown that economic losses that are directly as well as indirectly attributed to climate change in Indonesia in 2100 could reach 2.5 percent, namely four times the average global GDP loss due to climate change (The World Bank, 2010). In fact, if the probability of a disaster occurring due to climate change is also take into account then the economic losses could reach 7 percent of GDP (The World Bank, 2010).

Nowadays, Indonesia has the opportunity to improve the economy through the manufacturing industry. Consequently, Indonesia needs to anticipate the potential risks of negative impacts on the environment and natural resources (United Nations Environment Programme, 2005). As climate change becomes a reality, Indonesia continues to seek a balance between its current and future development. In 2010 the Government of Indonesia pledged to reduce emissions by 26% (41% with international support) against the business as usual scenario by 2020 (Indonesia Ministry of National Development Planning, 2014 p. 2). North Sulawesi needs to reduce emissions by 15,3% and Bitung City at least 7,3% by 2020 (Indonesia Ministry of National Development Planning, 2014 p. 128).

The manufacturing industry is a key sector in many national economies and is involved in creating sustainable economic growth (Behun et al., 2018, p. 23). At the same time, industrial processes can have negative environmental impacts, causing climate change, loss of natural resources, air and water pollution and extinction of species. These threaten the global environment as well as economic and social welfare (European Commission, 2006).

North Sulawesi is a province with it is capital Manado, has 15 regencies/cities which is divided to 11 regencies and four cities (Kristiningsih, et al., 2018, p. 7). The land areas of Bitung are 33.279,10 hectares or 2,9% out of North Sulawesi land area (Statistics of Bitung City, 2018, p. 9). Based on Government Regulation No.32/2014 on Bitung SEZ (Special Economy Zones), SEZ with the total area of 534 hectares (BPIW Kementrian PUPR, 2018, p. 7).

Figure 1 Special Economy Zones (SEZ) Bitung City
Source: Authors, 2018

Based on data from Statistics of Bitung City (BPS), Gross Domestic Regional Product (GDRP) at Current Prices in Bitung City in 2017 worth 14.09 trillion Rupiah, experiencing an increase compared to 2013 worth 9,54 trillion Rupiah (Figure 2). The largest share of GDRP according to successive business fields in Bitung City in 2017 was the Manufacturing 33.63 per cent. Bitung City is known as an industrial city and one of the largest fish producing cities in North Sulawesi (Statistics of Bitung City, 2018, p. 400).

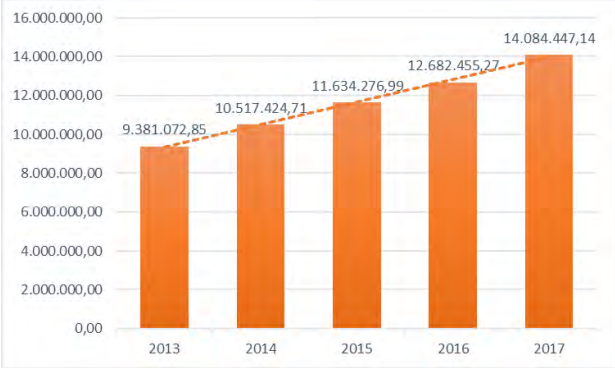


Figure 2 GDRP of Bitung City 2013-2017
Source: Statistics of Bitung City, 2018

Despite the advantages, including the purpose of establishing SEZs is to encourage and enhance internal competitiveness, growth, job creation, and foreign exchange earnings. SEZs have a mixed record. Moreover, SEZs today operate in an ever more challenging environment. However, based on data received from the World Input-Output Data (WIOD) in 2017, three biggest sectors have an impact on emissions to the environment in Bitung City, which: manufacturing sector, agriculture, forestry and fishing sector, and the transportation and storage sector. The three sectors show the condition of the last 3 years in Bitung City has decreased from 2015 to 2017 about 8.58 per cent. Means, that experienced environmental degradation, even though economic growth continued to increase.

This study aims to build a model of environment-economy linkages through Input-Output (I-O) Environment and to calculate the impacts of the economic sector in Bitung City.In Section 2, the findings are presented and discussed in relation to relevant GHG and green economy theory, to assess the necessity of information resources for a pro-active approach to gas emission in the industrial sector. Section 3, data and methodologies. Section 4, the main findings of the study. Then Section 5, summarised the study and gave some recommendations.

2. Literature review

2.1. National Action Plan for Green House Gas Emission Reduction

The National Action Plan for Green House Gas Reduction (RAN-GRK) is a follow up from the Indonesian commitment to dealing with climate change issues. To follow up the GHG emission reduction commitment, the RAN-GRK was developed to provide a policy framework for the central government, local governments, prívate sectors, and other key stakeholders in implementing actions related directly and indirectly to GHG emission reduction efforts during the period of 2010-2020 according to the Long-Term Development Plan (RPJP 2005-2025) and the Mid-Term Development Plan (RPJM). The RAN-GRK was approved in a Presidential Regulation No. 61 Year 2011.

The RAN-GRK proposes mitigation actions in five priority sectors (Agriculture, Forestry and Peatland, Energy and Transport, Industry, Waste Management) as well as other supporting actions that are an integral part to the national development planning which supports the principles of economic growth, poverty alleviation and sustainable development (Thamrin, et al., 2011)

2.2. Green Economy

The industrial revolutions that have unfolded across different world regions since the end of the C18th liberated economic growth by unlocking and harnessing vast reserves of fossil energy. They freed millions of people from laboring on the land, produced the conditions for the growth of cities, and fueled the growth in welfare and well-being experienced the world over. There were many social costs as well, and societies have found responses to these such as the rise of social security provisions from taxation.

There have also been deep-seated environmental costs of industrialization which have been revealed through science, piece-by-piece. Brown, gray, and green environmental problems, related to local pollution, and later to nature protection and global issues like ozone depletion and climate change, have emerged as prominent issues in parallel with industrializations across different regions and countries.

The green economy is not about maximizing production or consumption. It is about improving the well-being of individuals in an environmentally-friendly and sustainable manner. Therefore, the way we measure progress in a green economy is critical to the success of transforming societies towards a green economy. The present indicator used to measure progress, the gross domestic product (GDP), which measures an economies products and services, is ill-suited for the purpose (IHDP, 2012)

2.3. The Green Industrial Policy Turn

Green Industrial Policy can provide an instrument to facilitate structural change and accelerate a country's transition towards an Inclusive Green Economy. Green industrial policy tools can be broadly understood as 'sector-targeted policies that affect the economic production structure with the aim of generating environmental benefits (World Bank, 2013). A green industrial policy is therefore 'an industrial policy that is meant to trigger and facilitate structural changes as entailed, or required, both to respond to environmental conditions or situations, and to develop a green, circular economy (UNIDO, 2016)

3. Methodology

Before outlining the methodologies for analyzing the input-output matrices used in the study, let us first introduce the data and a few useful notations that will help us present the intuitions behind each methodology.

BIMINDO is the center of economic growth in the North Sulawesi Province and has huge potential in the maritime, fisheries, agriculture and tourism sectors. Metropolitan BIMINDO (Bitung-Minahasa Utara-Manado) has the potential to build a low-carbon city and resilience to climate change. Bimindo is the center of economic growth in the maritime industry, urban economics through Bitung SEZ. Bitung as SEZ based on Government Regulation No.32/2014, can support the development of ports and supporting infrastructure, development of commodity export and import, and human resource capacity building. Bitung's rapid urbanization is increasing pressure on the physical environment not only in terms of population increases, but also in the economy, including the fishing industry (ICCTF, 2018, p. 2).

In introduction, there is a statement that Bitung's economic development reduce environmental quality, as understood that economic development is spread across various

sectors. Each sector has a different production technology and it produces a difference in the amount of environmental impact. Differences in the types and quantities of inputs and technologies used by each economic sector and have different impacts on the environment. therefore it needs to be identified, which sector has a large impact and which sector has a small impact on the environment? Economic and environmental activities show a systematic relationship, economic involves the production, distribution, and consumption that is accommodated by the environment, thus raising questions about how to analyze economic linkages with the environment.

3.1. Data Sources

The data used are based on the Gross Domestic Regional Product (GDRP) of Bitung City 2017, the input-output tables of North Sulawesi Province 2014, which were published in 2014 respectively. The main data sources are the 2014 input-output tables of North Sulawesi Province. These tables are published by Statistics of North Sulawesi Province (BPS – Badan Pusat Statistik). We use Indonesia's sectoral energy use by energy commodity is collected from the World Input-Output Database (WIOD).

3.2. Methods

The methodological approach in this study is to use the input-output approach of analysis. Now input-output methods are usually used to calculate the energy consumption and can be easily applied to all sectors regardless of the length and complexity of their production process.

The table for the year 2014 built by the researcher depending on the actual data, while the table for the year 2017 built by the researcher by updating the 2014 table using the RAS method. According to Indonesia's standard industrial classification system, we aggregated the North Sulawesi Province input-output tables into 17 sectors to satisfy the study efficiency.

Input-Output Fundamentals

The basic Leontief input-output model is generally constructed from observed economic data for a specific geographic region (nation, state, county, etc.), concerning the activity of a group of industries that both produce goods (outputs) and consume goods from other industries (inputs) in the process of producing each industry's own output – interindustry consumption. The data required to fulfil the input-output model consists in flows of products from each of the producing sectors to each of the purchasing sectors. These interindustry flows (or intersectoral) are measured for a particular period (usually a year) and in monetary terms. Basically, an input-output model consists of three basic tables, which are analysed in the following sections: the transaction or flow table, the technical coefficients table and the direct requirements table (Alexandra, 2001, p. 9).

Technical Coefficients Table

The technical coefficients show the value of inputs purchased from all sectors in the economy per monetary unit of output in a particular sector, in other words, they show the production function for each production sector. For instance, for a given sector A, technical coefficients represent the value of purchases from each sector in the economy that must be made by the sector A in order for it to produce one monetary unit worth of output. Therefore, technical coefficients can be derived by dividing all entries in each sector's column by the total outlay of that sector. If, from the transaction table, x_{ij} symbolise the value of sales from sector i to sector j and x_j the total output of sector j, the technical

coefficients (described by the symbol a_{ij}) for each sector are calculated using the following equation (Alexandra, 2001, p. 12) :

$$a_{ij} = \frac{X_{ij}}{X_i}$$

With this table for the economy as a whole, it is possible to calculate the secondary demand on the output of the industries that supply a specific industry's suppliers and so on through successive outputs until the effect of the final demand has been traced (Miller & Blair, 2009). The effect of an event at any point is transmitted to the rest of the economy step by step via the chain of transactions that links the whole system together.

Backward Linkages

Backwards linkages measured by using coefficient matrices (A), it is summation of the elements of the column for the target sector (Osama et al., 2013, p. 36), by using the data of I-O of the Bitung economic we have been reached results as shown in table 1.

$$BL(d)_j = \sum_i^n a_{ij}$$

In its simplest form, a measure of the strength of the backward linkage of sector *j*– the amount by which sector *j* production depends on interindustry inputs – is given by the sum of the elements in the *j*th column of the direct input coefficients matrix $\sum_i^n a_{ij}$. Since the coefficients in A are measures of direct effects only, this is called the direct backward linkage (Miller & Blair, 2009, p. 556)

Forward Linkages

The focal idea for forwarding linkages is to study the impact of increased output that occurs or may occur in the used sectors when there is a change in its provider sector of production inputs. (Osama et al., 2013, p. 37). Where $FL(d)_i$: the ration of intermediate demand to total demand X_i for a particular sector.

$$FL(d)_i = \sum_j^n \frac{X_{ij}}{x_j} = \sum_j a_{ij}$$

Also it measures the impact of forward linkages sectors dependency to other sectors when production of this sector is used as inputs production in other sectors, high impact of these linkages to a particular sector that includes the expansion in this sector will generate the power stimulate all sectors to enlargement. In other words, the impact of forward linkages happens when particular sector products used as inputs in production one sector or more from other sectors which generate an incentive to do new activity or increase production for specific sector which means these linkages stimulate new investment through creation excess supply (Zahran, 1968).

Environmental Input-Output Analysis

A straightforward approach to calculate pollution generation is by using generalised input-output analysis Assume a matrix of poluution output or direct impact coefficients, which here is called D^p, and $D^p = [d_{kj}^p]$. The elements of this matrix are the amount of pollutant abatement per dollars' worth of industry. Meanwhile, we have a vector of total outputs, which we call X^{p*}. The level of pollution associated with the total output can be seen as :

$$x^{p*} = [D^p(1 - A)^{-1}]\, f$$

Forcesting

Exponential smoothing (ETS) methods are the most widely used forecasting methods. ETS an intuitive forecasting method that weights the observed time series unequally (Ostertag & Ostertagova, 2012, p. 62). Forecasting methods are used to produce emissions data in 2017. The data available from the World Input-Output Data (WIOD) is until 2009. Specifically in this study using *forecasting.ets* using the latest version, AAA from the ETS algorithm in Excel on the Ms.office 2016 formula as follows:

xlfn.FORECAST.ETS (x,Known_Y's, Known_X's, 1, 1)

Information :
x = Year used
Y's = Data range (value)
X's = Data range (Year)

Simulation

A simulation is an approximate imitation of the operation of a process or system (Banks, et al., 2010). The simulation used in this study aims to assume a model scenario. The scenario assumes an increase in GDRP for 17 sectors simultaneously. It can be seen as :

$$\Delta X = \frac{1}{(1 - A)^{-1}} \Delta Y$$

ΔY = $\Delta Y_{2016}.trend\ Y_{2010-2016}$

Where *ΔX* shows changes in economic output and *ΔY* indicates changes in final demand.

$$\Delta D = \Delta X.\frac{E_i}{TI_i}$$

Information :
ΔX = Output of all sectors
ΔY = Final request
ΔD = Impact of emissions
E_i = Emissions in sector i
TI_i = Total Input in sector i

4. Results

4.1. Linkages Analysis

The result of the study show that between economic sectors in Bitung City are related to one sector on other sectors. The result of the study, show that between economic sectors in the Bitung City are related to each other. The linkages analysis is to identify "key" or "leading" sectors in that economy (those sectors that are most connected and therefore, in some sense, most "important") in Bitung City. Means, if there is an increase in the final demand in a sector is one rupiah, it will cause of increased final demand in all sectors is one rupiah.

Backward Linkage (BL)

The main suppliers of inputs are business activities sector (0.0588), electricity and gas sector (0.0486), and the manufacturing sector (0.0401). Highest backward spread index is business activities sector (1.4929), accommodation and food service activities sector (1.2218), and electricity and gas sector (1.2018), table 1. Means, if spread index (α>1) is an indication that

the sectors have the ability to develop other sectors as a provider of inputs for the production activities in the sector.

Sector	BL	Index
Agriculture, Forestry, and Fishing	0.0134	0.6710
Mining and Quarrying	0.0116	0.6740
Manufacturing	0.0401	1.1482
Electricity and Gas	0.0486	1.2018
Water supply, Sewerage, Waste Management and Remediation Activities	0.0288	0.9655
Construction	0.0398	1.1830
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	0.0258	0.9119
Transportation and Storage	0.0366	1.1904
Accommodation and Food Service Activities	0.0396	1.2218
Information and Communication	0.0191	0.8187
Financial and Insurance Activities	0.0335	1.0807
Real Estate Activities	0.0097	0.6683
Business Activities	0.0588	1.4929
Public Administration	0.0227	0.9026
Defence and Compulsory Social Security	0.0240	0.8839
Human Health and Social Work Activities	0.0356	1.1109
Othe Services Activities	0.0237	0.8746

Table 1 Backward Linkage of Bitung City
Source: Input-output tables of Bitung City, Updating 2017, the results of data processing

Forward Linkage

In table 2 In table 2 shows that the highest of forward linkage is manufacturing sector is equal to 0.1267 this figure means that if there is an increase in the output by one unit then output these sectors will provide additional output in other sectors amounted to 0.1267. Means that the output manufacturing sector is widely consumed and used as inputs for production activities in other production sectors.

Highest forward linkages are manufacturing (0.1267), wholesale and retail trade sector (0.0736), and transportation and storage (0.0591). Highest forward spread index are manufacturing sector (2.8484), wholesale and retail trade sector (1.8257), and agriculture, forestry, and fishing sector (1.7424), table 2. Means, if the spread index forward linkages to more than one (β>1), it indicates that the sector has the power thrust against other sectors. Improvement on the output produced will greatly affect the production process of other sectors. However, if the index is less than 1, which mean the sector is less able to provide a thrust force in the production process of other sector.

Sector	FL	Index
Agriculture, Forestry, and Fishing	0.0554	1.7424
Mining and Quarrying	0.0062	0.5720
Manufacturing	0.1267	2.8484
Electricity and Gas	0.0043	0.5332

Water supply, Sewerage, Waste Management and Remediation Activities	0.0002	0.4934
Construction	0.0315	0.9237
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	0.0736	1.8257
Transportation and Storage	0.0591	1.6990
Accommodation and Food Service Activities	0.0163	0.6943
Information and Communication	0.0187	0.7539
Financial and Insurance Activities	0.0247	0.8745
Real Estate Activities	0.0353	0.8923
Business Activities	0.0017	0.5137
Public Administration	0.0142	0.6752
Defence and Compulsory Social Security	0.0112	0.6012
Human Health and Social Work Activities	0.0220	0.7478
Othe Services Activities	0.0102	0.6092

Table 2 Forward Linkage of Bitung City
Source: Input-output tables of Bitung City, Updating 2017, the results of data processing

4.2. Multiplier Effects

A multiplier coefficient measures the increase in the total output of the economy in response to one unit of the initial increase in final demand in industry. If a one rupiah initial increase in the final demand of a given industry induces a three rupiah increase in the total output of the economy, then the output multiplier is three.

The result shows that the impact (multiplier) have an influence on the development of the economic sector in Bitung City. Based on the results, the three sectors have the highest multiplier value, including : business activities sector (3.0532), accommodation and food service activities sector (2.4988), and electricity and gas sector (2.4580). These three sectors have the ability or potential to increase GRDP.

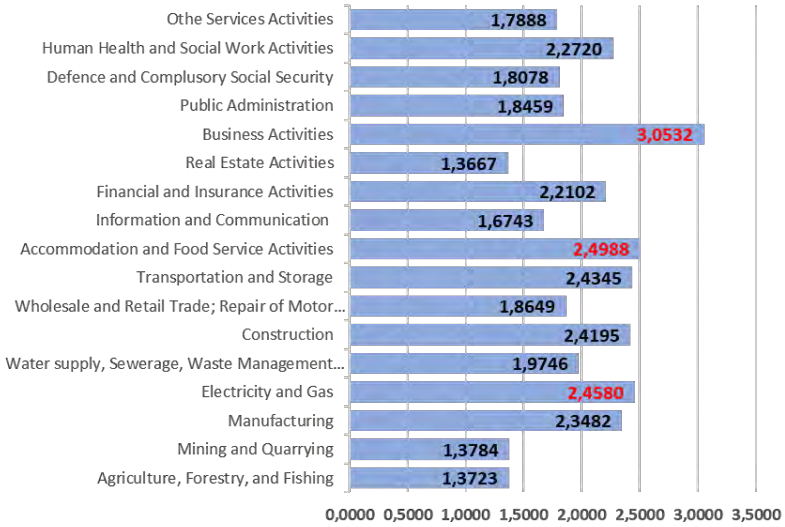


Figure 3 Multiplier Effect Input-Output Table of Bitung City, Updating 2017.
Source: Input-output tables of Bitung City, Updating 2017, the results of data processing

4.3. Simulation Results

Input-output simulation : when the economy rises considering changes in the final demand of 17 sectors. The simulation is shown, the economy rises considering changes in the final demand of 17 sectors, and the increase in GRDP is assumed by calculating the GRDP per sector over the past five years.

Simultaneous change of 17 sectors can increase GRDP worth 1 760 110 million rupiah. The amount equals the GDRP growth is 13.37 percent. Simultaneous changes in 17 sectors that have an impact on the environment, in addition to increasing GDRP growth rate, the influence of the 17 sectors increased the emissions of 3 109 million tons. The amount is 6.43 percent.

Sector	GRDP			
	GRDP	Shock	Million Rp	Percent
Agriculture, Forestry, and Fishing	2.769.194	115.254	269.687	9,74
Mining and Quarrying	619.481	30.119	37.825	6,11
Manufacturing	4.736.608	137.077	410.425	8,66
Electricity and Gas	11.968	293	2.107	17,60
Water supply, Sewerage, Waste Management and Remediation Activities	27.244	922	1.509	5,54
Construction	1.293.937	125.434	166.176	12,84
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	1.181.037	110.214	249.369	21,11
Transportation and Storage	2.065.936	178.993	339.273	16,42
Accommodation and Food Service Activities	110.678	8.057	21.187	19,14
Information and Communication	240.022	15.789	36.373	15,15
Financial and Insurance Activities	496.358	44.454	85.019	17,13
Real Estate Activities	301.609	19.967	40.511	13,43
Business Activities	32.931	2.137	4.723	14,34
Public Administration; Defence and Complusory Social Security	310.470	21.571	35.915	11,57
Education	100.544	7.651	10.523	10,47
Human Health and Social Work Activities	277.587	19.786	34.420	12,40
Othe Services Activities	96.014	7.819	15.069	15,69
	14.084.447		**1.760.110**	**227,36**

Table 3 Simulation : The Impacts of Change on Gross Domestic Regional Product (GDRP)
Source: Input-output tables of Bitung City, Updating 2017, the results of data processing

Sector	GRDP			
	Emission	Emission Coeff	Emission	Percent
Agriculture, Forestry, and Fishing	2,769	0,000000012	0,003	0,12
Mining and Quarrying	0,620	0,000001247	0,047	7,61
Manufacturing	**4,737**	**0,000003135**	**1,287**	**27,16**
Electricity and Gas	0,200	0,000005779	0,012	6,09
Water supply, Sewerage, Waste Management and Remediation Activities	0,027	0,000000073	0,000	0,40

Construction	1,294	0,000000185	0,031	2,38
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	1,181	0,000000277	0,069	5,84
Transportation and Storage	2,066	0,000000048	0,016	0,79
Accommodation and Food Service Activities	0,111	0,000000398	0,008	7,63
Information and Communication	0,240	0,000000526	0,019	7,96
Financial and Insurance Activities	0,496	0,000000200	0,017	3,43
Real Estate Activities	0,302	0,000000240	0,010	3,22
Business Activities	0,070	0,000001780	0,008	12,01
Public Administration; Defence and Complusory Social Security	0,310	0,000000251	0,009	2,91
Education	0,101	0,000000733	0,008	7,68
Human Health and Social Work Activities	0,278	0,000000096	0,003	1,20
Othe Services Activities	0,096	0,000000437	0,007	6,87
	14,90	**0,000015418**	**1,555**	**6,1**

Table 4 Simulation : The Impacts of Environmental Emissions
Source: Input-output tables of Bitung City, Updating 2017, the results of data processing

5. Conclusions

The paper presents the conceptual and analytical framework of the Input-Output approach to Bitung City. The model uses annual Input-Output (I-O) tables, support estimation equations for technical coefficients, macro indicators and other variables. The I-O Model is based on the Bitung City I-O tables and the methodology developed by Wassily Leontief. The Model databases uses the 2017 I-O tables and data series provided by Statistics of Bitung City (BPS) for 58 sectors of the economy, which are aggregated into seventeen sectors.

Hence, this study firstly explores by using forward and backward linkages methods, we have identified three groups of key industries for the economy : (i) business activities sector (0.0588), electricity and gas sector (0.0486), and manufacturing sector (0.0401); and (ii) manufacturing (0.1267), wholesale and retail trade sector (0.0736), and transportation and storage (0.0591). Results show that the production of manufacturing sectors does have a strong capacity to stimulate the domestic economy. Then, Multiplier effects three sectors have the ability or potential to increase GRDP, which : business activities sector, accommodation and food service activities sector, and electricity and gas sector.

Based on simulation results show that the environmental impact from economic growth, considering changes in final demand of 17 sectors in Bitung City. The simultaneous change of 17 sectors can increase GDRP worth 1 760 110 million rupiah. The amount equals the GDRP growth is 13.37 percent. It has an impact on the environment which increased the emissions of 3 109 million tons. Particularly manufactuing sector, we found that while an increase GDRP growth in the manufacturing sector, at the same time it has an impact on the environment which increased the emission is 27,16 percent.

6. References

Alexandra, M. (2001) 'Environmental Input-Output Analysis : Application to Portugal'.

Banks, J., Carson, J. S., Nelson, B. L. & Nicol, D. M., 2010. Discrete-Event System Simulation. 5 ed. Upper Saddle River: Prentice Hall.

Behun, M. et al. (2018) 'The Impact Of The Manufacturing Industry On The Economic Cycle Of European Union Countries', 10(1), pp. 23–39. doi: 10.7441/joc.2018.01.02.

BPIW Kementrian PUPR, 2017. Masterplan dan Development Plan Infrastruktur Pekerjaan Umum dan Perumahan Rakyat (PUPR) Terpadu Dengan Kawasan Ekonomi Khusus Bitung. Jakarta: Kementrian PUPR.

ICCTF, 2018. Proceeding Workshop IBC Metro Bimindo. Jakarta, Indonesian Climate Change Trust Fund (ICCTF).

IHDP, 2012. Green Economy and Sustainability. Bonn: International Human Dimensions Programme on Global Environmental Change.

Indonesia Ministry of National Development Planning, 2014. POTRET Rencana Aksi Daerah Penurunan Emisi Gas Rumah Kaca (RAD-GRK). Jakarta: Badan Perencanaan Pembangunan Nasional (BAPPENAS).

Kristiningsih, T. et al., (2018). Sulawesi Utara in Figures. Sulawesi Utara: BPS-Statistics of Sulawesi Utara Province.

Miller, R. E. & Blair, P. D., (2009). Input-Output Analysis. 2nd ed. New York: Cambridge University Press.

Mirzaee, S., 2016. An Environmental Input-Output Analysis of Boston's Climate Action Plan. Northeastern University Boston.

Osama, B. et al. (2013) 'Inter-Sectoral Linkages in Jordan Economy: (Input-Output Analysis)', 13(7).

Ostertag, O. & Ostertagova, E., (2012). Forecasting Using Simple Exponential Smoothing Method. 62 Acta Electrotechica et Informatica, 12 No.3(10.2478/v10198-012-0034-2), pp. 62-66.

Statistics of Bitung City, (2018). Bitung City in Figures. Bitung: BPS-Statistics of Bitung City

Thamrin, S. et al., (2011). Guideline For Implementing Green House Gas Emission Reduction Action Plan. Jakarta: Ministry of National Development Planning/National Development Planning Agency.

The World Bank, 2010. Development and Climate Change, Washington DC: The International Bank for Reconstruction and Development/The World Bank.

United Nation. 2015. Paris Agreement.

Zahran, H., (1968). Economic Development Problems in Developing countries. Al Kamaliah Press, Cairo.

Case Study / Project

An assessment and delineation of Socio-economic Resilience Landscapes of the Region

based on the inherent latent factors of vulnerabilities

Shivangi Singh PARMAR, Joy SEN, Arkopal GOSWAMI

Abstract

In this era of climate change and rapid urbanization, it is important to understand the metabolism of the regional system to achieve socio-economic resilience. The concept of socio-economic resilience of the region is used to refer the capacity of systems of the region to absorb or adapt shock and vulnerabilities. Broadly, the overall socio-economic resilience of the system is affected by sudden external shocks and inherent latent weak conditions. Latent weak conditions slowly make the regional system weak and more susceptible to vulnerabilities. It is difficult to directly observe the latent factors of socio-economic resilience since these constructs are unobserved or hidden. However, the possible method of measuring the latent factors of socio-economic resilience have been done from the data collected on related variables that can be directly observed and measured. The development of sustainable cities and region by providing a socio-economic resilience measurement framework in terms of latent factors of vulnerability and dimensions of resilience could be the major contribution of the study and it will aid policy-makers in the planning of socio-economically resilient region. The following paper focuses on the determination of factors of the inherent latent weak conditions of socio-economic vulnerabilities and their relationships.

The main objective of the paper is to assess socio-economic resilience based on the interrelationship between the levels of vulnerability of susceptible regions and indicators of socio-economic resilience. In the first part of the study, identification and extraction of the determining factors have been done in following two categories äóñ adaptive capacity and sensitivity factors, followed by the study of principal components and dispersion analysis of following two categories. Then in the second part of the study, income-inequality measurement and nesting-shift-share analysis of the susceptible regions has been done to understand the income and employment scenario of the 19 districts of West Bengal, India. Using extracted secondary data, under the two category, factors were determined and its nesting is analyzed in the following 19 districts of West Bengal, India to assess the interrelationships of levels of vulnerability and indicators of socio-economic resilience. Later using GIS, Temporal analysis has been done to visualize the spatial relationships of levels of vulnerability and Socio-economic Resilience. Delineation of levels of socio-economic vulnerability of the region based on inherent latent weak factors of socio-economic vulnerabilities would give a platform to policy-makers for a better understanding of the metabolism of the region through identified latent weak areas contributing to the susceptibility to vulnerabilities of the region.

Case Study / Project

Identifying climate resilience challenges in Vietnamese cities.

Case studies of Can Tho and Da Nang

Thai Son PHAM

Abstract

This paper aims to identify and discuss major issues regarding urban climate resilience in urban areas in Vietnam, through an investigation on the Can Tho and Da Nang, two medium-size cities located in the Southwest and Centre regions of the country. It starts with a short introduction on the concept and framework of urban resilience and a quick investigation on the understanding and application of the concept in the context of Vietnam. After that, using official figures sources from the technical departments and Climate Change Office of the two cities, the paper comparatively points out the urban resilience challenges coming from natural conditions, urbanization patterns, climate change related conditions and risks of the two cities. Subsequently, data collected from the direct observation, interviews and consultation with various stakeholders in Can Tho and Da Nang, including experts working for organizations, technical departments, districts and wards as well as selected residents from vulnerable areas, show that resilience capacity of the two cities is still limited with weak coordination mechanism and plans, uncomprehensive understanding of risks due to the absence of data and empirical analysis and lack of financial resources. Besides, although being the main beneficiary of development projects, the participation of citizens is limited, and community resilience are not sufficiently addressed and promptly guided. To address the resilience issues above, in the conclusion some policy implications for Vietnamese cities will be discussed and prospective research directions on resilience topic in Vietnam will be proposed.

Case Study Paper

Role of Women Self Help Groups in Disaster Resilience and Livelihood Regeneration: Post Flood Experience from Kerala

Dr. Priyanjali Prabhakaran, Associate Professor, CET, India
Prof. Suja Kartha, Professor, MCAP, India

Abstract

The Indian state of Kerala witnessed one of the worst floods in nearly a century in August 2018. More than 400 lives were lost and more than a million persons had to move to relief camps. The government and the civic society together overcame the disaster with great effort. The disaster management plans in place required a revisit and a rethink. A study of the revival efforts of one of the worst affected villages was conducted in September 2018. The study pointed out the need for a detailed spatial plan for disaster resilience, and recovery. Also it showed the power of women self help groups in mitigating the effects on flood and reconstructing their livelihood. The case of a severely affected village is examined. The methods used include, sectoral studies, observation and interviews. The village's experience in facing and mitigating the floods gives rise to the need for a spatial planning strategy to address the disaster during its occurrence and the recovery to be followed. Critical infrastructure were affected during the floods, parts of the major connecting roads (State highways) were submerged in water, closing evacuation routes. Many Agricultural and fishing farms were submerged in addition to a lot of houses. Many small scale traders lost everything they had. After the flood waters receded many roads including major state highways could be used with minor repair. Women self help groups called "Kudumbasree" units came forward to restart cooperative farming in the paddy, plantain and fish farms with the help of agriculture department of the state government. The floods proved to be devastating. However normal life could restart with great effort. If the village had a proper plan in place to discourage building activity in flood plains and a recovery plan in place the extent of damages could be reduced. Living under the threat of more floods and droughts expected in near future, this study proposes a resilience action plan using the social capital of women self help groups.

Keywords

Flood Resilience, Livelihood Regeneration, Women Self Help Groups, Gender Mainstreaming

This paper is part of a larger study of flood resilience conducted at College of Engineering Trivandrum. The authors wish to express their gratitude to the 2017-19 batch of M.Planning (Housing) students

1. Flood Resilience

Many studies have predicted more floods and droughts in many regions of the world in the context of climate change. The frequency of occurrence of floods and related climate hazards is likely to increase in near future. Large scale land use conversion and increase in anthropogenic activities lead to greater risks during disasters. Kerala experienced the worst

flood in last 94 years, in August 2018, often compared to the devastating floods of 1924. The flood has left many lessons of to be learnt for planners and disaster management experts. Even with all disaster management and risk zonation plans in place Kerala had to suffer the effect of flood leaving deep marks in the physical and social fabric. The highly literate community of Kerala rose to the occasion and took the lead role in rescue, relief and rebuild activities.

Kerala the southernmost state of India is often classified as an Extended Metropolitan Region- An area of 38863 square kilometres with 44 rivers and 590 km of coastline showing widespread urban characteristics. According to Disaster management plan of Kerala, 14.52% of the state is vulnerable to floods. Flooding during Monsoon and drought during summer is being witnessed more frequently in recent years. Many attribute this to widespread land use conversion including reclaiming of paddy and wetlands for dry crops and building activities. Flood resilience is the ability of a community to face a hazard and come back to normal life with minimum damage. A proper management plan can aid the community to get to safe place, cause minimum damage to assets and to recover to normal life in a short span of time.

2. Community participation in risk reduction

Local community can play a vital role in disaster risk reduction and mitigation. Community is the first responder at the time of a disaster. Community level capacity building can reduce the vulnerabilities and increase resilience. Community can play a great role in rescue, rehabilitation and mitigation phase. However it requires coordinated efforts and proper leadership to put a preparedness plan in place.

While flood waters started rising in Kerala, the community was the first to respond. Fisherfolk who are skilled in dealing with deep waters came forward with their boats and started rescuing the stranded people. In addition to the relief camps opened by the state administration, private persons, families, NGOs, and religious organizations also came forward to start relief camps. The youth, especially students came forward to volunteer work in the relief camps. Relief materials were collected from all over the state and truck loads of relief materials were transported to relief camps.

Community volunteering should be utilised with a proper plan so as to ensure that relief material and personnel reach all shelters. In many cases inaccessibility caused delay in receiving relief materials.

A major hurdle faced by relief workers was the reluctance of affected people to shift to relief camps. A lot of persuasion was required for convincing the people to move to relief camps.

2.1. Flooding in Karumalloor

Karumalloor is a village under the jurisdiction of a “Village Panchayath” (the smallest self governance unit in a three tire system). The elected Governing Body of the Village Panchayath is responsible for ensuring people participation in all aspects of Planning. 50% of the elected representatives are women. The village has an area of 21.05 Sq. Km. and a population of 36,078 as per Census 2011. The northern boundary of the village is the river

Periyar, the longest river in Kerala which flows from the Western Ghats on the East towards the Arabian Sea on the west. Majority of the population is depended on agriculture. Paddy is a major crop cultivated here. Vegetables, plantain and some dry crops are also cultivated.

Figure: Immediate context of Karumalloor Village

Paddy was a major crop cultivated all over Kerala. In the past three decades this has drastically reduced due to the increasing cost of Labour. Largescale paddy field reclamation has resulted in ground water depletion and more surface runoff. In Karumalloor many women self help groups have started paddy cultivation on leased fields. This new initiative has increased paddy production and curtailed wetland reclamation. Kerala Paddy and Wetland conservation act (2008) prohibits reclamation of paddy fields.

In August 2018, excessive rain and poor reservoir management resulted in the river overflowing into the paddy fields and most of the low lying area. Water has risen upto 10-11 m from the riverbed. Many houses and roads also were submerged. Even critical infrastructure, like roads and bridges, community health centre and Village Panchayath office were also flooded.

Housing

The village has 13,928 houses as per the development report of the Panchayat (2017). Since the village is near the town Aluva, the development pressure has resulted in many apartments buildings being built near the river bank. Some of these apartments were submerged upto two storeyes during the floods.

There are 19 low income housing areas (housing colonies) in the village. These housing units are mostly government funded within 150-200 Sq. m. Plots. Many of the housing colonies are located in low lying land as land value is low in these areas. 80% of these houses were affected by floods and had to be relocated to relief camps. There were 7 relief camps which were opened in five schools, one college and one church.

50% of the population depended on tapped water from treated source for drinking water and another of 29% on uncovered well. Both the local water supply sources and wells were s largely affected and contaminated by flood waters. Solid waste management also was a major issue after the flood waters receded. Most of the households had cattle and poultry,

only a part of which could be rescued during floods. Post floods', removing the carcases of cattle was a major task. The Panchayath with the help of local community carried out it properly. Timely removal and disposal could prevent major outbreak of diseases. However burning was considered as an effective method which resulted in atmospheric pollution.

3. Women self help groups in Kerala

"Kudumbashree" is a major network of women self help groups all over the state. Started in 1997, it is considered as a major poverty alleviation scheme in the state. The self help groups are active in many areas of self employment starting from small scale production, marketing, waste management, provision of domestic services and farming. State government initiatives have helped to provide low interest loans to the groups as capital. It has resulted in increasing female workforce participation among rural and urban poor and better living condition.

Karumalloor village also had a strong network of Kudumbashree groups. They were active in paddy cultivation, poultry and cattle rearing, fish farming, small scale high tech farming etc. Floods damaged many of their assets and affected their operation.

4. Kudumbashree and Livelihood restoration

4.1. Subheading 3.1

With the active participation of community and state agriculture department, Kudumbashree has spearheaded the fast recovery of this sector. Within a month of the flood when the study was being conducted, framers had already started the next crop season. Kudumbashree groups were seen preparing farm land, transporting farming materials in small pickup vans and setting up poultry farms. Without waiting for any government agency or external aid they started their rehabilitation work.

However lack of proper insurance has increased the economic loss in both agriculture and animal husbandry. Creating more local markets can help in the development of dry cultivation.

After the flood the change in soil condition has affected the cultivation. There has also been a reduction in the water table level. The existing ponds are filled with mud and clay which has reduced the availability of water. Uncertainty of how the crop will react to the new soil condition has generated concern within the farmers.

There has also been a reduction in the milk production by the cows, This has affected the milk distribution by the societies.Also there are No compensation fixed for shed ,Feed loss and machinery damage.

Most of these Kudumbashree women come from economically weaker sections. They require small scale assistance and training to continue their livelihoods. Village level local authorities can train them in reducing the vulnerability and increasing their capacity for resilience. Local leaders from Kudumbashree could be encouraged to lead disaster

management, rescue and restoration teams. Local level planning can reduce livelihood vulnerability and help in long germ Nation Bulding.

5. References

1. Joseph, M. (2016). *Status Report on Periyar River: The Declining trend of Biodiversity and Fish Production in consequence of pollution in the Lower Reaches of Periyar River.* Thiruvananthapuram: CDS, Kerala Research Programme for Local Level Development (KRPLLD).

2. Masahiro. (2013). Regional Workshop on Climate Change and Urban Flood Management. *Comprehensive Urban River Basin Management in Japan* (p. 26). Daegu, Republic of Korea: Association for Rainwater Storage & Infiltration Technology (ARSIT).

3. Mikio Ishiwatari, Eiko Wataya, Taesun Shin, Daeil Kim, Jiseon Song, Seyi Kim. (2017). *Green Growth in Action: Promoting Green Growth Through Water Resource Management, The Case of Republic of Korea.* Washington: Korea Green Growth Partnership, The World Bank.

4. National Centre For Earth Science Studies. (2018). *Coastal Zone Management Plan Of Kerala: Ernakulam District*. Thiruvananthapuram: Ministry of Earth Sciences, Government of India.

5. State Disaster Management Authority 2016, Kerala State Disaster Management Plan

6. Mayaja, N A, and C V Srinivasa. 2017. “Land Use and Land Cover Changes and Their Impacts in Pampa River Basin in Kerala : A Remote Sensing Based Analysis” 11 (1).

7. Mcluckie, D. n.d. “A GUIDE TO BEST PRACTICE IN FLOOD RISK MANAGEMENT IN AUSTRALIA,” 1–14.

8. Murray, Anja. 2017. “Natural Flood Management Adopting Ecosystem Approaches to Managing Flood Risk,” no. February.

9. National Disaster Management Authority, Government of India (2009), National Policy on Disaster Management

Case Study Paper

Flood resilience planning for Disaster prone Panchayats.

A case of Karumalloor panchayat in Ernakulam District,Kerala

SUJA KARTHA, Professor, MCAP; INDIA

DR.PRIYANJALI PRABHAKAR, Associate Professor,CET;INDIA

Abstract

Major parts of Kerala in South India experienced one of the worst floods in nearly a century during the monsoons of 2018.More than 400 people lost their lives, one million people were displaced and the extent of damage culminated in rebuilding the State of Kerala.Kerala is one among the best governed states with a very strong local governance network.The floods and the aftermath did prove that people of Kerala could bounce back in no time though could roll back decades of development thus such a disaster could be a threat to the economy and very existence of the community.Karumallooris a Panchayat(an institution of self government in rural areas) in Ernakulam district located along the Periyar the longest river in kerala and one of the severly affected areas in the district with 75% of the area inundated during the floods in . The aim of this paper is to explore the issues in such panchayats and to identify the need and strategies for developing flood resilient communities. The methodology includes a very intensive background study of the panchayat selected as a special case leading to development of a vision and mission and finally a resilient plan for that community. The panchayat has the presence of natural drainage channels,unused and undeveloped land parcels,community cohesion, thus with high potentials of developing a proper resilient framework which includes institutions, systems and infrastructure to combat the vagaories of nature in the coming years.

Keywords

Floods, Local self-governance ,Planning, Resilience

1. INTRODUCTION

1.1. FLOODS

Flood has been considered as one of the most frequent disaster in the world. The economic loss and life damage due to flood has put more burdens on economy than any other natural disaster. It is defined as “High-water stages in which water over flows its natural or artificial banks onto normally dry land, such as a river inundating its floodplain.” When the hazards caused by flood, run over the coping capabilities of the affected population it become disaster. India also has continuously suffered by many flood events which claimed huge loss of life and economy. Flood occurs in some parts of India, particularly during the monsoon season that runs from July to September each year. Gujarat, Assam, Uttarakhand, Bihar Maharashtra, Kerala are the major states in India that are frequently affected by flood disasters.Floods occurred in Kerala during August 2018 due to the unprecedented rainfall and has been widely described as the worst in the last century, with notable comparisons to the catastrophic floods of 1924. 14 districts among 29 in the state had been put on red alert and 35 dams were opened. The flood and landslides have engulfed human lives, households

and farmlands. A large majority of the people died due to landslides caused by the floods. Further major issues faced were lack of basic necessities like drinking water, medical supplies and roads were impassable in certain areas for a long period of time.

Figure- 1 Kerala floods (Source: Generated (www.khaleej times .com 18.08.2018)

1.2.KERALA

Kerala is a state situated in the southernmost tip of India with an area of 38 sq km bordered by Karnataka in the North, Tamil Nadu to the East and South and Arabian Sea on the West and is known as Gods Own Country. The average annual precipitation in Kerala is about 3000mm.The state is blessed with two monsoons namely the south west monsoon from June to September and the North east monsoon from November to February. The maximum rainfall is during the monsoons as a result of which the heavy precipitation reaches the main rivers through various water channels.

Kerala experienced an abnormally high rainfall from the start of the south west monsoon in June 2018 to last week of August 2018.The state received almost 2500 mm of rainfall during this period. Reservoirs had reached their almost full capacity level due to the continuous rains lashing the state. Water had to be released from the dams due to heavy rainfall in the catchment areas. This led to flooding of 13 districts out of 14 in that area.35 out of the 54 dams had to be opened for the first time in the history of the state. The state was placed on a red alert by the Kerala State Disaster Management Authority as a result of the severe flooding. A number of relief camps were in operation accommodating thousands of families with the co ordination of the State government machinery, Central government and several NGOs.

1.3.KARUMALLOOR-THE STUDY AREA

Karumalloor is a panchayat located in the severely affected Ernakulam district of Kerala state, India. The Panchayath is bounded by the distributaries of Periyar River. Periyar(meaning-big river) is the longest river with the largest discharge potential in the Indian State of Kerala. Periyar is termed as the Life line of Kerala due to several reasons like it generates a significant proportion of Kerala's electrical power via Idukki Dam, flows along a region rich in industrial and commercial activity, supports a rich fishery, provides water for irrigation and domestic use throughout its course .

Majority of the areas were waterlogged and the inundation level went up to 13m from the Mean Sea Level .73 % of the panchayat area was flooded. Trucks, boats and choppers were

used for rescue as normal vehicular transportation was affected during the flood . The village consists of large tracts of paddy fields and the panchayat is mainly a rice-based agrarian economy. Flood had also caused a large amount of loss to the crops and yields. This significantly affected the livelihoods of the population depending on agriculture for their income. Hence the study on the impacts of flood and planning for the resilience of Karumalloor Panchayat is very relevant.

Fig 2 (Source: Generated from Primary survey (23-26 September 2018) based on Google maps 2018)

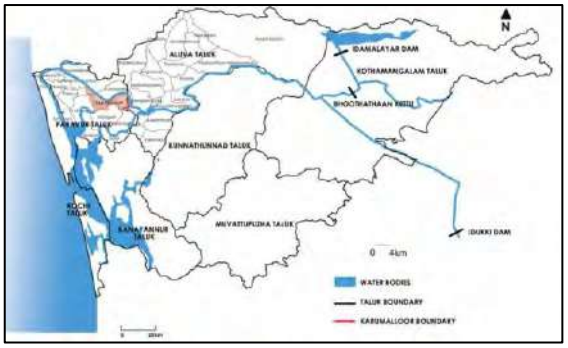
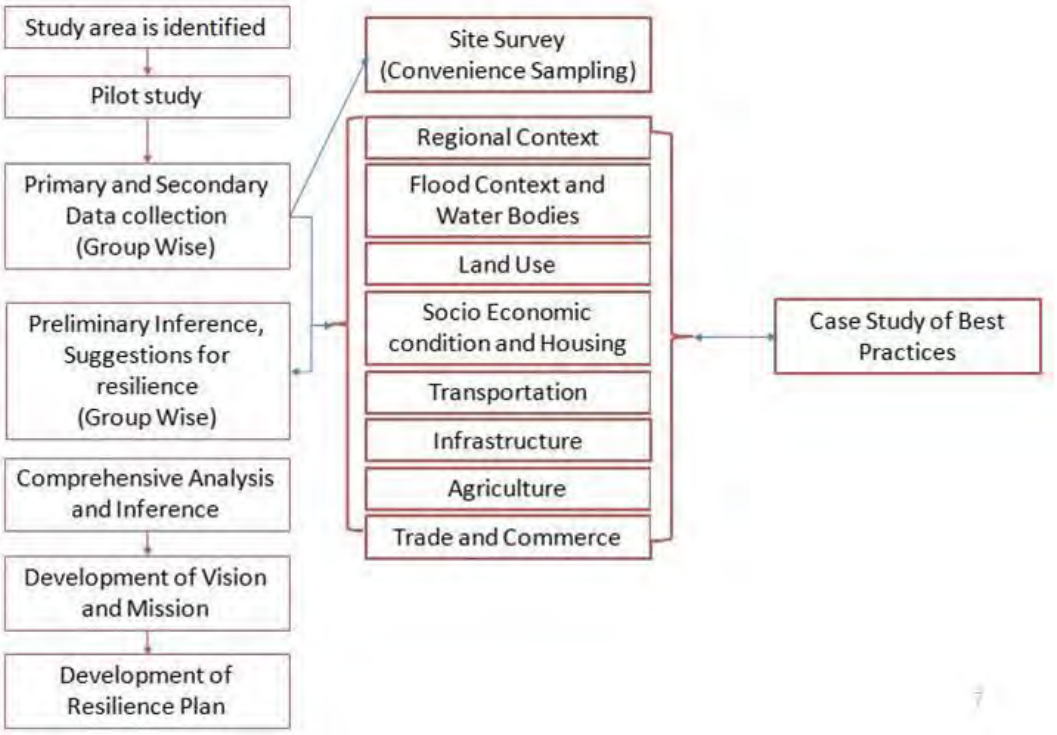


Fig 3 (Source: Generated from Primary survey (23-26 September 2018) based on Google maps 2018)

2. Research Methodology



This framework elaborates on the steps taken to develop a vision and mission to provide a structure for the proposed interventions , identifies and prioritises those solutions that will help to prepare strategies to improve the community as a flood resilient model addressing in an integrated way with environmental, social and economic objectives.

3.Regional Context of Karumalloor Panchayat

3.1 Location

Karumalloor Panchayath is located in Ernakulam district, Kerala. The area of Panchayat falls under two taluks (Aluva and Paravur taluk) of Ernakulam district. The panchayath was formed in 1953.As per Census 2011, the Panchayat is divided into 20 wards. The area of Panchayat is 21.05sq.km with a total population of 36,078. The village consists of large tracts of paddy fields. Karumalloor occupies an area of 0.7% of the total area of Ernakulam district

(3068sq.km) in which 2.25% of paddy cultivation is contributed by this panchayat.

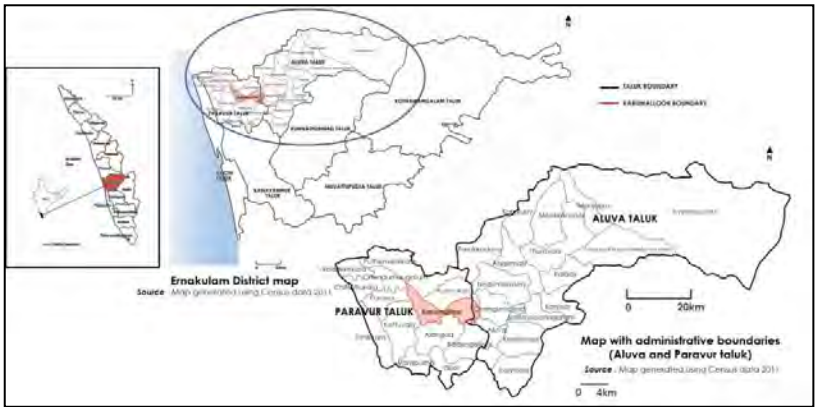


Figure 4 Location map (Source: Generated from Primary survey (23-26 September 2018) based on Google maps 2018)

3.2 Significance of Aluva town with respect to Karumalloor panchayat

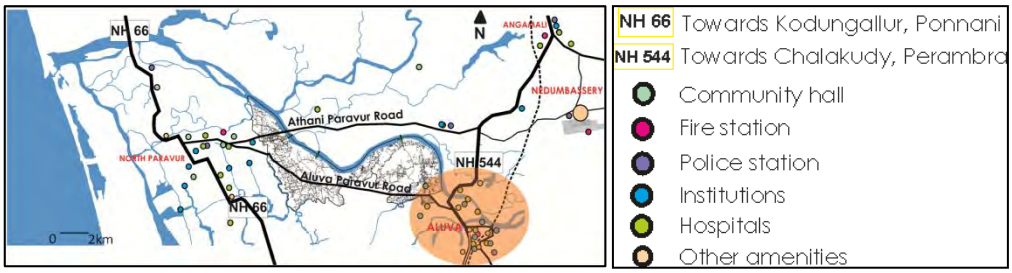


Figure 5 Importance of Aluva town with Karumalloor (Source: Generated from Primary survey on (23-26 September 2018) based on Google maps 2018)

Aluva is a municipality situated on the eastern side of Karumalloor panchayat and one of the major industrial centres of the state.It has become a key transportation hub with connection to all major forms of transportation. Based on the observations from Primary and secondary study, concentration of facilities and infrastructure is seen in Aluva as compared to North paravur on the western side. Aluva is well known for its large river banks of Periyar River.The international Nedumbasserry airport, national highway 544 and Periyar river flowing along the region are contributing to the development of the region. All the above factors in and around Aluva can trigger developmental growth thus creating increased land value, unplanned developments and high demand in Karumalloor panchayat. It is also observed that pressure is exerted on eastern side of Karumalloor panchayath as part of development. Thus Aluva an important commercial town in Ernakulam District, Kerala is set to play a pivotal role in deciding the future of Karumalloor and its precinct

3.3 Accessibility to the Panchayat.

Karumalloor Panchayath can be accessed through two national highways, NH66 towards Kodungaloor and NH544 towards Chalakudy. Two major roads pass through Karumalloor panchayath, Paravur-Aluva road and Paravur Athani Road connecting the national highways. Karumalloor is taken as Fifth Order settlement based on the parameters considered for classification in District Urbanisation report (2011) which includes Educational facilities,Health Facilities , Market , Physical infrastructure facilities , Transportation facilities ,Facilities in Agriculture and allied sector

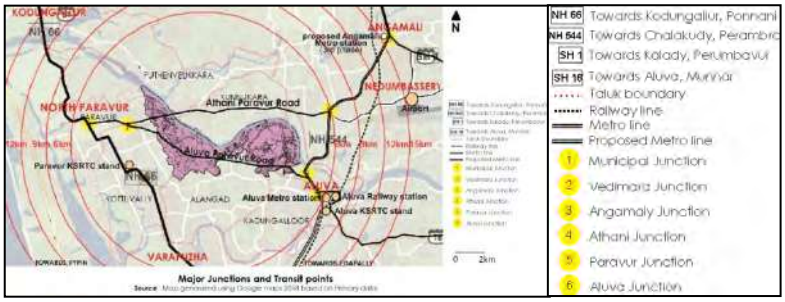


Figure 6-Junctions of Karumalloor Panchayat(Source: Generated from primary survey on(23-26 September 2018) based on Google maps 2018

4. Analysis of Physical features of the Panchayat

4.1 Demography

The total population of Karumalloor panchayat as per census 2011 is 36078 persons.According to the census 2011, the child population of Karumalloor panchayat is 10%, which is similar to the composition of state and district.The old population in panchayat is 11%. If the growth trend continues, overall work participation rate will tend to decrease. Thus the community should be prepared for self sustenance.

4.2 Land Use

The existing land use map of Karumallur (which is prepared based on the Google map data and primary site study) shows a prominent residential settlement with agrarian economic base.It can be observed that more than half of the geographical area is covered by residential land use (51.92%) followed by agricultural land use (36.15 %) including both paddy fields and dry cultivation.The residential areas and commercial areas constituting 1.11 % are developed mostly along the transportation routes and around the agricultural fields. The industrial land use constitutes only 0.46 % of the total area and is widely dispersed in the panchayath area. The public and semi-public land use constitutes 1.63 % of the total area.0.45% of the total area comes under open spaces which includes school grounds and other open play areas, parking areas and plots belonging to religious buildings. Water bodies share 8.29% of the total area including Periyar river along the boundary, private and public ponds, canals etc. The land use pattern has undergone a drastic change in terms of built up land from 2002 to 2018. The change can be also seen in the distribution of agricultural land and water bodies within the area and major development along the transportation corridors.

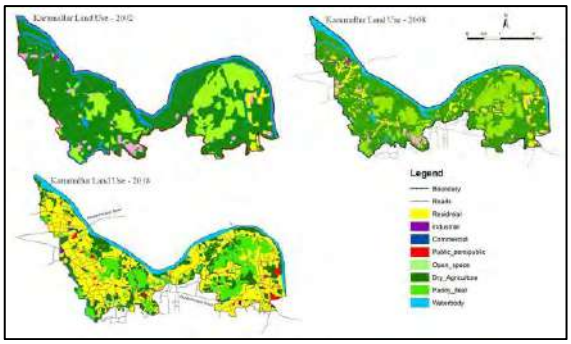


Figure 7 Change in Land Use over the years, 2002-2018(Source: Adapted from LRIS(2002), State Land use board(2008)and Generated using Google Maps ,Arcmap and primary site study)

4.3.Topography

Low lying flat land covers major portion of Karumalloor panchayat. Though periyar is flowing through the northern parts of the panchayath the area is prone to drought like situation during summer. Ground water level in many areas has come down drastically over time. The prime reason for the depletion of the ground water is assumed to be due to refrainment from traditional agricultural pratices and excessive consumption which has disturbed the ecological balance. Uncontrolled sand mining from the river bed and also the reduced precipitation in the area due to climatic changes are also identified as the reasons for the lowering of the water table in the area. Irrigation is highly dependent on the Periyar River.

4.4 Soil Permeability

Land use, topography and soil type present in an area are dependent on each other and act together in intensifying the impact and damage due to flood. Soil permeability is the important characteristic which has contributed to flood impact. Sometimes, the change in land use can indirectly cause the change in the characteristics of soil present in an area. Sand was the most common soil type in the area which had high permeability followed by sandy clay and silty loam with comparatively low permeability.

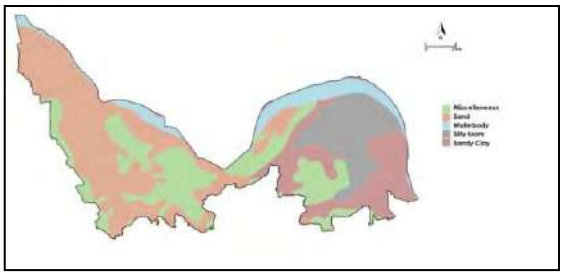


Figure 8 Change in Land Use over the years, 2002-2018(Source: http://kslublris.com/LRIS/Kerala/district.php accessed on 12th September 2018)

5.1 Analysis of Infrastructural features of the Panchayat

5.1.1 Housing

Karumalloor Panchayat has 51% of residential land use. There are 8390 census houses within the panchayath as per Census 2011. One of the main characteristics of the housing in the panchayath is the 19 housing colonies developed under Government housing schemes for the economically backward people. Government schemes like Lakshamveedu colony built under the one lakh housing scheme and four cent colony, with an average of 20 houses in each colony are the prominent ones.

5.1.2 Typology

A shift in real estate investment is visible within the panchayat between 2012 -18.The panchayat that had a predominant typology of individual houses has witnessed the development of high rise residential projects that raise the density and increase the land value.The developments of these buildings are observed on locations with an aesthetic view of Periyar river.

5.1.3 Water supply

50 %of the population are dependent on tap water from treated source for drinking water and another majority of 29% on uncovered wells. The sources were largely affected in all cases during the floods**.**

5.1.4 Roads

The roads are made with no storm water drainage system. There is reduced rainwater percolation due to bad surface treatment practices. There is total absence of rainwater harvesting facilities and culverts are blocked due to waste dumping and silting with sludge deposit on roads. Natural drainage channels are blocked due to unplanned construction of roads and buildings.

5.1.5 Drainage

48% of houses in panchayat do not have drainage connectivity for the waste water. Surveys identify issues like absence of septic tank. Lack of maintenance of the existing septic tanks is a serious threat and leads to water contamination during and after floods.

5.1.6 Solid waste management

Organic and Non-organic waste is largely being treated within individual household level. Kudumbashree a community organization of Neighborhood Groups (NHGs) of women in Kerala is involved in collection of solid waste collection in few wards where density is high while panchayath has a mechanism to collect plastic from the same wards. Post-flood, the debris and sludge were cleaned on a personal initiative basis while all household waste was collected by panchayat. The waste in areas where the panchayat had not collected was dumped into the drains or on the sides of the access roads.

5.1.7 Electricity

The entrie panchayat is electrified.During flood, the supply was affected with loss of electricity for approximately 9 days during which the residents were moved to relief camps.

Most relief camps faced power loss which made the situations worse and relief works more difficult.

5.1.8 Telecommunications

Telecommunication systems were unavailable during flood. Landline was available in few houses but mobile network was completely cut off. So the rescue operations couldn't be coordinated or managed which made the whole process delayed and difficult. The major reasons for the breakdown were the flooding of the telephone exchanges and mobile towers located in flooded areas.

5.2. Analysis of reasons of the flooding in the study region

5.2.1 **Flood inundation**

Kerala received 42% higher rainfall than average in the months of July and August 2018.2346mm of rain that poured over the state during the flood is considered to be the major reason for the flooding in several districts in Kerala (Kerala Food of August 2018).Periyar river basin which is spread over an area of 5389 sq km has received maximum rainfall in the recent times which is the prime reason for the flooding of the periyar downstream.

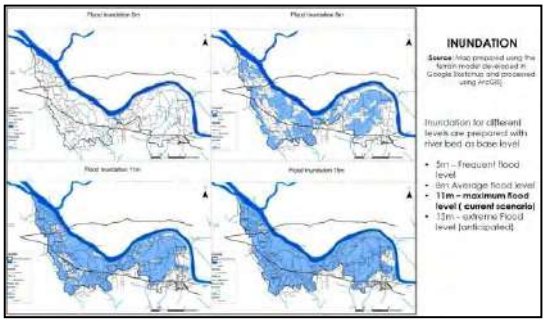


Figure 9 Change in Land Use over the years, 2002-2018-(Source: Generated using ARCGIS)

Majority of the area in the panchayath is vulnerable to flood. Flood inundation levels in the site are studied based on the site visits done and data collected on the flood water levels. From the observation and data collected from the site it is observed that the water level has risen 10.5 – 11 meters from the river bed.5m inundation scenario helps to identify the areas and infrastructure that are affected due to more frequent low risk floods**.**

5.2.2 Dams opening to Periyar River and its operation during Kerala Floods, August 2018.

Periyar sub-basin consists of about 50% of the total live storage of the State that is about 2.92 BCM. The reservoirs with substantial live storage capacity in Periyar sub-basin are Idukki, Idamalyar and Mulla Periyar.Several dams are built in the Periyar drainage basin for

power generation and irrigation purposes and most of the dams in the state were opened due to the extremely large inflow of water to the reservoirs. As per reports of Kerala Floods August 2018 , floods in Kerala was due to severe storm occurrences during the days from 8th to 9th August 2018 and later 15th to 17th August 2018.

5.3 Analysis of Social Infrastructure

Karumalloor Panchayath is dependent on Aluva and Paravur Taluk for specialised social Infrastructure which is more developed and caters to a wider segment of the population. The Panchayat provides all basic facilities for its people including primary health centre,educational institutions, banks etc.The facilities present in the panchayat has ensured the maximum aid to its people during the flood converting most of the infrastructure to act as relief camps and collection centres. During flood these offices were majorly flooded including the Grama panchayat and village office.Though few of the buildings were unaffected, these were completely isolated or were inaccessible by the authorities which made the loss more severe.During flood most of the hospitals were badly affected. Patients had to be moved to various other medical centres in safer areas. Most hospitals had high loss in terms of machinery and equipments. Karumalloor has numerous schools which are under government and also few private educational institutions including colleges and higher schools.The panchayat includes 34 anganawadis of which 18 were affected by the flood. Most schools located in safer areas were relief camps which stayed unaffected throughout the flood scenario.

5.3.1 Housing Finance

The wards with higher SC(officially designated groups of historically disadvantaged people in India) population indicate that they are located in floodplains. This conveys that the finance invested in uplifting the standard of living of the vulnerable by facilitating finance for housing has been into a flood plain. Insurance for any category of risk cover including health insurance is absent.

5.3.2 Agriculture

The conversion of paddy and wetlands to other uses had a huge impact in flood as these areas usually act as natural water storages during heavy rain. In Karumalloor, till 2008 trend for converting paddy land was prominent but after the enforcement of Kerala Paddy and Wetland Conservation Act, the area of paddy cultivation is observed to be doubled. This shows the importance of agriculture sector in the Panchayat.The active participation of community and agencies like Krishibhavan which is a government body under department of Agriculture and kudumbashree has helped in fast recovery of this sector with farmers starting the next crop in a about a weeks time after the floods. However lack of proper insurance has increased the economic loss in both agriculture and animal husbandry. Large scale female participation in farming and animal husbandry has also been observed. There is a serious change in the soil condition after the floods which have a very severe impact on the cultivation. There has also been a reduction in the water table level. The existing ponds are filled with mud and clay which has reduced the availability of water. Uncertainty of how the crop will react to the new soil condition has generated concern among the farmers.

5.4 Analysis of Precautions taken and Damage assessment

5.4.1 Warning Mechanisms

The early warning for disaster was received through announcements made by panchayat authorities for evacuation. This was conducted around 10 hours prior to the extreme flood

scenario.Warnings were given through media announcements.90% of the population affected by flood evacuated on self-initiatives. The remaining 10% who refused to move or remained isolated were evacuated in later stages or were provided with food and other supplies. Power supply could be restored only after 9 days and telecommunication was partially restored in 5 days.

5.4.2 Damage Assessment

The houses are affected in different manners in different parts of the panchayat due to varying topography.The major losses were damage to interiors, loss of furniture,appliances,structural damages etc .Few houses were unfit for occuopation after flood waters recede. Damage is being assessed on the basis of claims made by the owners.
Unfortunately no Standard tool for assessment is being used and there are no categorization of their social and economical back ground for assessing the capacity of the beneficiary.No defined time frame was also made for assessment.The relief camps that where active in the panchayat for the displaced did not meet the relief camp guidelines of NDMA(National Disaster Management Agency). The transportation network was severely affected. Connectivity was lost for almost 4 days. Majority of the areas where waterlogged and the inundation level went up to 13m from the Mean Sea Level. Trucks, boats and choppers were used for rescue as normal vehicular transportation was blocked during the flood. Bridges in the panchayat however were all safe.

5.4.3-SWOT ANALYSIS

6. THE WAY FORWARD - DEVELOPMENT OF A VISION

To develop Karumalloor as a model for flood resilient community through regional and local planning interventions in participatory/inclusive/integrated manner. Resilience is a capacity to recover from difficulties at the earliest thus building up a capability to anticipate, prepare for, respond to, and recover with minimum damage to life and property, the economy, and the environment.Specific local landuse policy options need to be worked representing the varying geographic areas in the panchayat.Some of the most important aspects include Allowing the Right to river,consideration of vulnerable settlements,identifying safer areas for

planned development/rehabilitation,proper watershed management thus empowering the panchayat to face future flood situations of any magnitude.

6.1 General strategies

Regional Context: Planned/Regulated development due to the developmental pressure exerted in Karumalloor by the neighbouring towns/cities like Aluva,Kochi etc

River Corridor: Allowing the right of way thus protecting and preserving Periyar River and rejuvenating water bodies of the panchayat by adopting water management techniques.

Land use: Redefining the land use in order to adapt for flood resilience by integrating different sectors and thus reducing the damages.

Demography and Habitat assessment: Developing sustainable housing through resilience technology and vulnerability zoning to reduce loss of people and property

Infrastructure: Developing a network that ensures external and internal connectivity and accessibility to critical infrastructure even at the time of a disaster.

Agriculture and Livelihood: Making Karumalloor a Model self-sustained agrarian community by improving agriculture practices and conserving the existing paddy fields.

Trade Commerce and Industry: Developing self-sustaining resilient community by promoting markets at local level with the help of joint actions by the residents and administrative bodies

6.2 ECO SYSTEM CONSERVATION

Promoting natural and indigenous vegetation that reduce soil erosion with water holding capacity. Wetlands present in the panchayat need to be conserved so that it can act as water storage areas during flood. No conversion of existing paddy fields to be allowed under the legal framework of paddy and wetland conservation act, 2008.No change in the soil characteristic in flood plain by further change in landuse or crops being cultivated.Land parcels areas that can help to retain water and increase the percolation of water and thus reduce run off to the Periyar River are identified to convert them into public spaces. Areas that have higher drain density and which lies near to the river edge is identified for creation of water ponds. These ponds will help to reduce out flow of water from the panchayat and increase the water retention ability of the land. This will help to increase the ground water level and it can act as a source of water for irrigation. These ponds can also be used for practices like aquaculture etc. The increasing residential density in and around the panchayat pushes a need for public spaces. These areas if properly planned can offer scenic view of Periyar river on one side and lush green paddy and other farm lands on the other side. Another major intervention is the largest watershed present in the panchayat. Network of drains and ponds could be created along with revival of existing ponds to improve the water retention capability of the land. Farm lands have to be considered as wide drainages at the time of flood and therefore creating culverts merely on the drains are not enough. Culverts have to be planned at frequent intervals so that flow of water is not obstructed in the event of a flood. Roads constructed across the drains have to be provided with culverts

to allow easy flow of water.Edges of the water bodies may be treated with proposals like Xeriscape to improve the quality of water and landscape elements like Bio-swales to concentrate or remove debris and pollution out of surface runoff water.

6.3 Roads and Internal connectivity

As the roads are spread in all zones, zone-wise strategies cannot be made in the case of transportation. So strategies are formulated for different stages of disaster management.
Elevated roads wherever necessary, improved drainage system and preventing rainwater discharge from residences to roads are few proposals that needs to be carefully planned. Improved rainwater percolation in streets and proposals to include Rain gardens, Soft edges etc. Permeable roads and collection ponds must be planned and designed to avoid water retention on roads allowing water to infiltrate through the layers into the underlying road below which will help to maintain the natural drainage flow

6.4 Strategies for response

Efficient warning system- Warning and monitoring systems that can alert crisis management agencies .
Vulnerability mapping-Assess the vulnerability of existing infrastructure, undertake measures to prevent damage and develop long-term capital investments to retrofit and/or replace the most critical emergency lifelines
Response team-Forming a response team is very crucial in emergency response planning The team leader should be able to prioritise the activities, monitor and update as and when needed to counteract situations leading to strategic decisions. A strong communication system must be included to ensure effective supervision, directives, and response controls.
Trained volunteers-Panchayat can adequately prepare/train volunteers with essential tips to assist relief machinery that is in action .
Maintaining connectivity-Telecommunication and road connectivity has to be restored as early as possible to evacuate affected people, to provide medical assistance and food supplies.
Sequential evacuation-A planned evacuation process has to be worked out to minimise loss to human as well as animal lives. A proper vulnerable area mapping, road connectivity mapping can identify possible evacuation routes, priortise and help in execution of the same in a phased manner

6.5 Strategies for Resilience

Land use management strategies are very important in planning for flood resilience. Any unplanned changes in land use pattern can intensify the impact of floods in any area. Zoning is one among the the first measure taken in order to adapt with the impact of flood.The strategy adopted for this panchayat is a proposal to divide entire area into five zones based on the present flood level, CRZ regulates areas and topography.

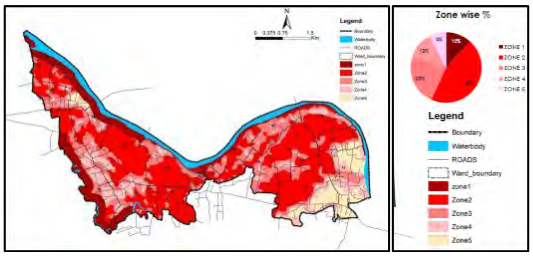


Figure 10 Zoning (Source: Generated in ARCGIS 2018 using data on flood level, topography and CRZ regulations.)

Figure 11 (Source: Generated using ARCGIS, 2018)

Flood Level 0 -5 m –It is proposed as a No development Area- Where development should be avoided due to environmental or safety concerns. Zone 1 is constituted by high risk areas which are frequently affected by flood (prone to risk in 5m flood level). This zone also includes all areas under CRZ regulation, which are 200m from river line with saline water and 25 m from other water bodies. Almost all area along the river comprising of 12% of the total panchayat area is classified under this zone.No new construction to be allowed in this zone and Coastal zone regulations (CRZ III) areto be strictly followed .Embankments like dykes/leaves can be constructed but require proper geographical or hydrological study.All natural embankments in zone I are to be retained. Area under this zone shall be developed to have landscape elements like green spaces or xeriscape/softscape with natural perennial plants that tolerate stagnated water and flooding.Encroachments of any kind are not to be allowed in this zone.

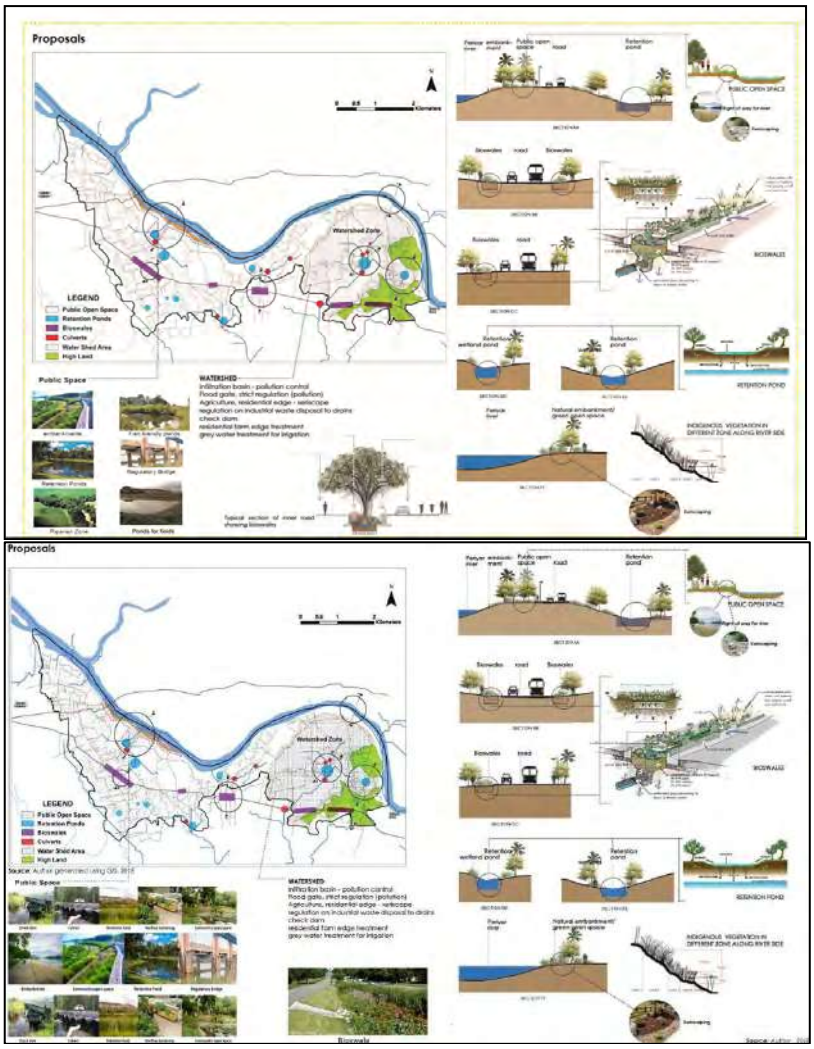


Figure 12-(Source:Author)

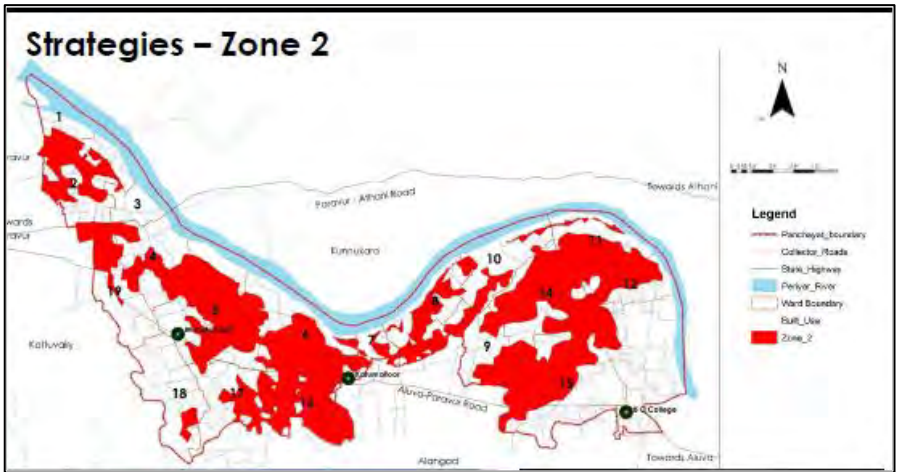


Figure 13(Source: Generated using ARCGIS, 2018)

Flood Level 5 - 8 m- Constrained area- Where development is possible, but natural features limit use of the land.

Major portion of the total area, that is approximately covering 45 % of the panchayat comes under Zone 2 which is comprised of agricultural land, both paddy cultivation and dry cultivation, and residential and industries associated with it. All areas that can be affected in flood level between 5m to 8m and topographically low lying areas comes under this zone. These areas can be categorised as moderate risk areas. Karumalloor panchayat office is an important control point which comes in this zone.Flood resilient crop cultivation are to be practiced so as to reduce the loss.Traditional/indigenous agriculture practices are to be followed strictly, which are very important for water retention.No existing agricultural plots are to be converted and further agricultural practice are to be promoted.No Relocation instead Retrofitting strategies for Resilient housing to be adopted with Incentives for affordability of retrofitting. Usage of flood damage-resistant materials for the houses can be identified and proposed.Shops need not to be relocated but should have portable water proof storage spaces to keep the goods safe during flood and for easier shifting when needed.The building structures should be made resilient to withstand flood conditions.Existing local Industries located in Zone 2(brick manufacturing units) should have transportation facilities for the movement of machineries at the time of flood .No further industrial constructions to be allowed in this zone.

ZONE 3- Flood Level 8 – 11 m -Constrained area

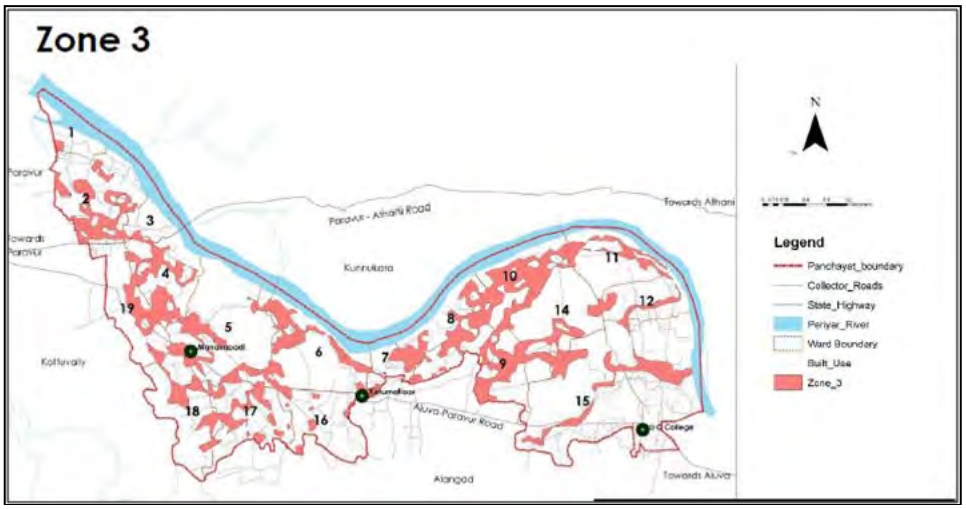


Figure 14(Source: Generated using ARCGIS, 2018)

Zone 3 is constituted by 23 % of the total area of the panchatat. Areas that can be affected in 8 – 11m flood level (which is the present flood level condition:11 m). Major land use in the zone is residential and the risk factor is low compared to zone 1 &2. Existing wells for households must be constructed with proper concrete surface casing. Rain water harvesting must be practised. Ground water infiltration techniques like bio swales along the roadside are to be constructed. Each household must have proper solid waste management and sewage treatment.

ZONE 4- Flood Level 11 – 15 m -Targeted Growth Area- Most suitable for various types of development.

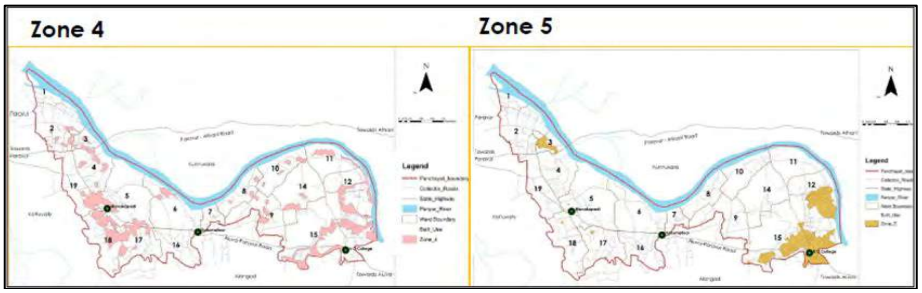


Figure 15 (Source: Generated using ARCGIS, 2018)

Zone 4 includes areas that can be affected in a situation (predicted) 11-15 m flood level which is categorised as very low risk area in case of a flood situation. Compared to Zone 1,2 & 3, this zone shows mixed land use pattern with medium to high dense development. All major control points and critical infrastructure can be relocated to this zone.Common storage space for consumables can be accomodated at every high points in this zone. Movement of goods/machineries from the flood affected areas may be shifted to these zones at the time of disaster. These storage spaces should be placed near to the relief shelters and these stored goods can be used by the people in the relief camps at the time of disaster.

Zone 5- Above 15 m Safe area- Very less possibility of getting affected in flood.

Zone 5 is the most safest area in the panchayat, in high land, which includes Manjalikunnu and UC College wards. The zone is again dense with mainly public and semi-public land use. No restrictions need to be enforced for development. Dense development is proposed to be permitted .The proximity to critical infrastructure will raise the land value in general.This zone can be considered for inclusive development for relocating the vulnerable from the flood prone area .Higher consumption of FAR in this zone needs to be encouraged.

Hazard Zoning

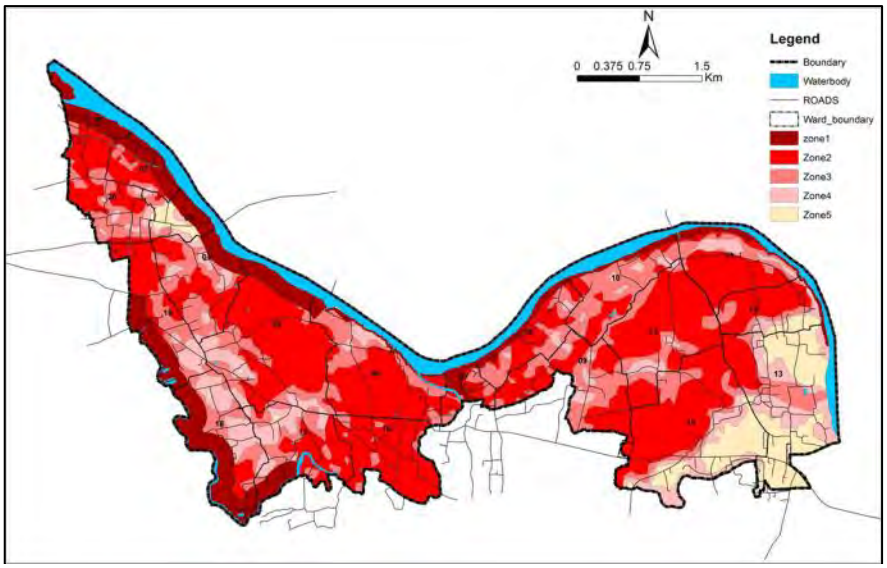


Figure 16(Source: Generated in ArcGIS using data on flood level, topography and CRZ regulations.)

Based on hazard zoning, a safe route that ensures access to critical infrastructure and relief camps is to be prepared.When the warning that the water will rise above 5m is issued, evacuation of Zone 2 should start as early as possible. Evacuation should also include the households that belongs to Zone 3 which will get isolated in this stage .Evacuation should start as soon as the warning that the inundation level will go beyond 8m is received. Remaining people from Zone 3 need to be evacuated including people from Zone 4 who will be isolated in next stage.Evacuation starts when warning that inundation level will go beyond 8m. Remaining people from Zone 4 need be evacuated.Once the inundation level crosses 15m , the only places left will be Manjali,Kottappuram and UC College-the highest areas in Zone 5. So the relief camps in other areas should be shifted to safer areas.Further development of all critical infrastructure is recommended to be in this zone including a Helipad facility to be accommodated for emergency evacuation.

7.CONCLUSION

The theoretical concept of resilience suggests the potential to enhance expectation of, preparation for, and mitigation of natural disasters. In practice however the challenges are often unpredictable. It is not always a bouncing back but more of an adaptive capacity by the affected community.Community resilience will need to build up on the existing knowledge about floods and be aware of the disastrous impact of human interventions in flood prone areas.Land use planning is one of the measures that could contribute to resilience. Building resilience and long term sustainability should be the key to a framework adopted in long term strategic planning proposal. Landuse policy decisions can be a very effective practical measure to increase the resilience of the community in a flood prone area Communities are engaged and empowered to take part in the land use planning process, so that they can effectively contribute to reducing their own risks before and after a disaster.

Local landuse decisions may have to be incorporated which are guided by State policies and decisions. Such changes/development may happen over time and incrementally but may enhance the resilience capacity and assure safer growth for the community. Communities can actively involve in strategies for risk reduction through increased awareness of their civic

responsibilities, protecting the environment, boosting up economy through indigenous traditional agricultural practices, adopting engineering/new solutions for risk reductions etc.
Unlike disaster preparedness resilient planning can go a long way in empowering the community to manage any disaster that may occur. It actually helps in reaping multiple benefits, sharing both risks and responsibility and completely help in a rethinking process.

Acknowledgements
The authors wish to thank the students of M3 Planning Studio of Department of Architecture College of Engineering, Trivandrum, Kerala, India for their valuable support in collection and compilation of data.

References

1.Balakrishnan, P. (2009). Hydrogeological and Hydrochemical studies on Periyar River Basin, Central Kerala. Kochi: Cochin University of Science and Technology (CUSAT).
2. Haritha John, MeghaVarrier. (2017, July 14). The News Minute. Retrieved October 07, 2018, from The News Minute: https://www.thenewsminute.com/article/periyar-dyinghow-south-keralas-lifeline-has-become-industrial-sewage-drain-65169
3. https://sandrp.in/themes/basin-maps/ , accessed on August 2018
4. https://cochinmunicipalcorporation.kerala.gov.in/web/guest/maps, accessed on August 2018
5. http://www.irrigation.kerala.gov.in/index.php/infrastructure/irrigation-schemes/storageschemes/
189-periyar-valley-scheme , accessed on August 2018
6. Initiative, R. C. (2013). Rotterdam Climate Change Strategy. City of Rotterdam.
7. Joseph, M. (2016). Status Report on Periyar River: The Declining trend of Biodiversity and Fish Production in consequence of pollution in the Lower Reaches of Periyar River. Thiruvananthapuram: CDS, Kerala Research Programme for Local Level Development (KRPLLD).
8. Masahiro. (2013). Regional Workshop on Climate Change and Urban Flood Management. Comprehensive Urban River Basin Management in Japan (p. 26). Daegu, Republic of Korea: Association for Rainwater Storage & Infiltration Technology (ARSIT).
9. MikioIshiwatari, EikoWataya, Taesun Shin, Daeil Kim, Jiseon Song, Seyi Kim. (2017). Green Growth in Action: Promoting Green Growth Through Water Resource Management, The Case of Republic of Korea. Washington: Korea Green Growth Partnership, The World Bank.
10. National Centre For Earth Science Studies. (2018). Coastal Zone Management Plan Of Kerala: Ernakulam District. Thiruvananthapuram: Ministry of Earth Sciences, Government of India.
11. Proof, R. C. (2010). Rotterdams Climate Adaptation Research Summaries 2010. City of Rotterdam.
12. Apollonio, Ciro, Gabriella Balacco, Antonio Novelli, Eufemia Tarantino, Politecnico Bari, and Via E Orabona Bari. 2016. “Land Use Change Impact on Flooding Areas : The Case Study of Cervaro Basin (Italy).” https://doi.org/10.3390/su8100996.
13. “BEST PRACTICES ON FLOOD PREVENTION , PROTECTION.” n.d., 1–29.“Biology Online).” n.d., 1–7.

14. Demonstrations, Supplemental, and Assessment Questions. n.d. “Soil Physical Properties,” 1–24.Dijle, River, and River Woluwe. n.d. “How to Deal with Flooding.” 202
15. Flood, Integrated, and Management Tools. 2016. “INTEGRATED FLOOD MANAGEMENT TOOLS SERIES THE ROLE OF LAND-USE PLANNING IN FLOOD MANAGEMENT,” no. 7.
16. Frmps, The, Sustainable Water Network, Differing Approaches, and Flood Risk Management. 2016. “Friends of the Earth Response to the Public Consultation on the Flood Risk Management Plan for Units of Management for the Boyne (UoMs 7), the Nanny Devlin (UoM 8) the Liffey and Dublin Bay (UoM 9) and the Avoca Dartry (UoM 10) in the Eastern River Basin District (RBD),” no. December.
17. “Land Use Planning for Urban Flood Risk Management.” n.d., 1–28. Mayaja, N A, and C V Srinivasa. 2017. “Land Use and Land Cover Changes and Their Impacts in Pampa River Basin in Kerala : A Remote Sensing Based Analysis” 11 (1).
18. Mcluckie, D. n.d. “A GUIDE TO BEST PRACTICE IN FLOOD RISK MANAGEMENT IN AUSTRALIA,” 1–14.
19. Murray, Anja. 2017. “Natural Flood Management Adopting Ecosystem Approaches to Managing Flood Risk,” no. February. On, Guidance. n.d. Land Use Planning.
20. Overview, Project. 2003. “Enriching and Protecting Communities through Flood Water Storage” 2003 (Photo 1): 1–5. “Soil Refrenz.” n.d.
21. Texture, Soil, Drainage Class, Soil Texture, Percent Clay, and Shrink-swell Rating. 2010. “Soils CDE – Interpretation Sheet (November 2010) Depth to High WT Possible Hazard or Depth to Bedrock Depth to Bedrock Soils CDE – Interpretation Sheet (November 2010),” no. November: 1–2.

Research Paper

The Stakeholders' Role in Sustaining Renewable Energy Systems in Sumba Island

Niken PRILANDITA, School of Architecture, Planning and Policy Development, Bandung Institute of Technology; Indonesia

Saut SAGALA, School of Architecture, Planning and Policy Development, Bandung Institute of Technology; Indonesia

Teresa ARSANTI, Resilience Development Initiative, Indonesia

Jeeten KUMAR, Resilience Development Initiative, Indonesia

Abstract

Sumba Iconic Island is a collective program established by the national government through the Ministry of Energy and Mineral Resources (ESDM) with various governmental and international institutions such as the National Electricity Company (PLN), Hivos, Norwegian Embassy in Jakarta, Asian Development Bank, and all level of local government from provincial, regency, municipality, district, and village level. This paper focuses on using qualitative data gained through interviews with stakeholders to find out the various operation and maintenance models of renewable energy power plants that are currently in practice in Sumba Island.

This study shows that currently there are four models of operation and maintenance for systems throughout numerous villages in Sumba. The first one describes O&M being handled by trained locals, second one is handled by the village cooperative (Koperasi), the third one is collaboration between PLN and local government units or private sector, and the last one is collaboration with the private sector and village-own company (BUMDes). The first one mentioned is the weakest one, and faced many constraints such as lack of technical skill and the local peoples' limited understanding. The other three models succeeded, to a certain extent, in sustaining the renewable energy system in the particular village.

Keywords

Operation and maintenance, renewable energy, power plant, Sumba Island

1. Introduction and Aim

Sumba island is one of the least-developed regions in Indonesia with issues revolve around poverty, minimum infrastructure as well as lack of social services. Located in the impoverished Province of Nusa Tenggara Timur (NTT), more than 30% of the island's population are in poverty according to 2016 statistical data documented by Indonesia Statistical Bureau. Transportation infrastructure and facilities are still very limited in terms of

quantity, quality and frequency of flights. Village access roads are often in poor condition, with loose stones and potholes. Roads are not all paved, or sometimes only paved with sand and stones. Roads between sub-villages are generally unpaved. Markets are generally further away and there are fewer kiosks in villages. Next, the regencies in Sumba (specifically in West Sumba) has the highest number of neglected children under 5 years old (Indonesia Statistical Bureau, 2016) which indicates the severe absence of social services there. Limited numbers of schools contributed to the high rate of illiterate particularly among women. Health facilities are mainly found in sub-district towns, due to limited availability of doctors.

One of the barriers of development in Sumba is the lack of electricity. More than up to 60% of the families in Sumba live without electricity (Indonesia Statistical Bureau, 2017). A Study conducted by Craine (2013) reported that at the national level, while 72% of the country has grid electricity from PLN, only 6% of the country is using kerosene lighting. Surprisingly, half of this 6% population are situated in NTT with approximate numbers of 50.000 – 60.000 households. Sumba has two main grid systems, Waikabubak and Waingapu. The peak load of the Waingapu and Waikabubak systems combined amount to about 5.5 MW with a 2.5MW base load. The energy demand on this sparsely electrified island is increasing in line with regional economic development and population growth. Based on PLN information, the electricity demand in Waingapu and Waikabubak has grown with 6% and 8% per year respectively.

Due to its poor condition, the island has been one of the main development agendas for the Government of Indonesia (GoI) in the last 5 years. As a way to respond to the needs for energy and electricity many entities including government institutions have tried to harness renewable energy technology as alternatives. Overall, Sumba poses as the ideal candidate for the 'fossil fuel independent pilot island.' Important renewable energy resources, such as Hydro, solar, wind and biogas are present on the island and have high potential in terms of becoming the primary energy sources for the island. The GoI through its National Electricity Company (PLN) has provided a huge number of solar lighting sets for villagers that currently do not have access to the main power grid. The villagers pay a small fee to participate in the programme and in return PLN maintains and repairs the lighting sets.

A more integrated initiative has been started involving multi background stakeholders from the government to NGO in a program called Sumba Iconic Island (SII). This program is coordinated by the Indonesian Ministry of Energy and Mineral Resources (MEMR), together with Hivos, since 2010. By maximizing the potential of renewable energy particularly on biogas, biomass, solar, hydro, and wind energy in Sumba; to date, the program has successfully produce RE installation that contributes to 20.9% out of the total of 50.9% of Sumba's current electrification ratio, covering electricity access to 4158 households and 14.868 solar powered plants (Herdiani, 2018).

The SII targeted that Sumba Island is going to be 100% electrified by 2020. However, to date, the electrification ratio has only reached 50.9% (EBTKE, 2018), from all types of systems. This number is actually has been doubled since the project started in 2010. The problem that frequently faced by the RE system installed in Sumba villages are happened in the Operation and Maintenance phase. Therefore, this paper aims to identify the O&M mechanisms

existed in RE system in Sumba, and also tries to understand the stakeholders' role, particularly in the O&M phase

2. Methodology

The method used in this paper is descriptive qualitative, we attempted to describe various O&M processes in the off-grid renewable energy systems in Sumba Island. The organizational structures for maintenance work is described chronologically based on the stakeholders' role. In particular, we focused on issues relating to the operation and maintenance of various off-grid renewable energy systems in rural areas and whether any level of synergy exists, or should exist, between public and private actors.

The field survey employed a qualitative approach as the primary means of collecting and analyzing the data. In order to gain a deep and thorough understanding of the various models of operation and maintenance in off-grid RE power plants in Sumba Island, data was gained through in-depth key informant interviews and focus group discussions, where respondents were subject to semi-structured interviews and discussions, with questions that were framed to consider about their experience and invite them to reflect on additional information that they find pertinent. Respondents include technicians, village leaders, community members, representatives of NGO/INGOs in the region, and public officials. The recorded interviews and conversations were transcribed and underwent content and descriptive analyses. The list of interviewees are further described in Table 1.

Table 1 List of Interviewees in Sumba Island

Village Name	NGOs	INGOs	Government Agencies	Private Business
Ndinjo	IBEKA	Hivos	Regional Planning and Development Agency	PT. RESCO Sumba Terang
Analewe			State Electrical Company (PLN)	
Dangga Mango				
Weepaboba				
Odi Praurata				
Weelimbu				
Kanilu				
Lete Kamauna				
Tebara				
Djela Manu				
Rada Loko				
Ramadana				

The contents of the table shows that most of the key informants are village leaders from 12 villages in West and Southwest Sumba. The village leaders were able to give us firsthand

details regarding renewable energy power plants that were constructed in their village, based on their own experiences, observations, or correspondence with other locals. Due to the close proximity between the villagers and the power plants, village leaders often converse with outside technicians or volunteers that operate or maintain the power plant. NGO/INGOs interviewees are from IBEKA and Hivos respectively. IBEKA and Hivos are responsible for developing and constructing renewable energy technology power plants throughout Sumba, including wind farms, micro hydro plants, and solar PV farms, as well as each of their corresponding off-grid power lines. Officials from the Regional Planning and Development Agency (Bappeda) and State Electrical Company (PLN) were interviewed to gain information on the inner workings of managing a renewable energy power plant and whether any regulation or statutes exist that governs or constrains such activities. Lastly, PT. RESCO Sumba Terang is a private company that has also been involved in the construction and design of several solar PV power plants, in collaboration with Hivos and BIRU among others.

3. Results and Analysis

The results of our field data collection indicates that there are four operation and maintenance (O&M) models currently in practice by multiple off-grid renewable energy plants spread throughout Sumba Island. This information was gained primarily from our focus group discussion held in the Regional Planning and Development Agency in East Sumba, attended by public officials, representatives of INGOs that play a role in the renewable energy development in the region, as well as representatives from academia and communities.

The four O&M models that are currently in place are distinguished based on who operates and maintains the power plant, as follows: (1) the local community where the power plant is located and to whom it serves; (2) locally organized cooperative, in which members of the community band together to manage the power plant as a locally owned enterprise; (3) the State Electricity Company (PLN), the state-owned enterprise that serves and provides on-grid electricity for the region; (4) private sector/developer model, which take form as national or international NGOs (Gah, 2018). The results suggest that despite the ubiquity of renewable energy power plants in the island, there currently isn't a mutually agreed policy or structure that governs the process of maintenance for the disparate models. The stakeholders for the power plants in each respective O&M model are then tasked with determining the best maintenance process for their power plants based on the assets that are accessible to them.

3.1. Operation and Maintenance by the local community

There are several local communities who operate and maintain the renewable energy power plant, namely the communities in Ndinjo, Analewe, Dangga Mango, Weepaboba, Odi Praurata, Weelimbu, Kanilu, and Lete Kamauna Villages. These villages have two accessible sources of electricity which are on-grid, connected to the state electrical grid from PLN; and off-grid, that is connected to the solar PV. The solar PV serves as an auxiliary electrical source provided through the joint efforts of the local government, village government, and

PLN. However, the same actors decided in unison that the technology is used and operated by the community, hence once the handover was completed, the process of operation and maintenance are handled by the community.

Based on our observation, there are at least two sub-models of operation and maintenance practiced by the communities. First, the sub-model in which maintenance processes were directly conducted by the solar PV end-user. Second, the sub-model in which maintenance processes are handled by an appointed local that was subsequently trained as a technician by PLN staff and aided by a local handyman that serve to repair the solar PV of the village. However, the case of village technician or local handyman that handle the O&M process is only implemented in 2 out of 8 villages that we visited, namely in Odi Praurata and Kanilu Villages. There were 2 O&M technicians in Odi Praurata, these technicians were trained by PLN staffs when they handed over the solar PV to the community (Yulius, 2018). Meanwhile in Kanilu village, the 2 local handymen were chosen due to their experiences (Wilem, 2018).

There are both similarities and differences of O&M process between the villages that have the first and second sub-model of O&M. The similarity between these two O&M sub-models is that the end users operate and maintain the solar PV independently on their own during its average lifespan of 2 years. Meanwhile, the difference lies on the maintenance aspect when the solar PV is damaged. The maintenance processes of the two sub-models community O&M, when the solar PV is damaged, are different. The maintenance process of the first sub-type of community O&M is handled by the end-users themselves. Meanwhile, the community relies on the technician's assistance on the second sub-type of community O&M. The community tends to bring the damaged solar PV to the technicians or local handymen to be fixed.

These two sub-models of community O&M have similar problems since most of the O&M process is handled by the end-users. These problems are (i) the lack of local community's capacity; (ii) the financial issues; and (iii) the lack of security (Gah, 2018). First, the lack of local capacity leads to the unsustainable O&M process within the community. As an example, the community directly utilizes and connects the solar PV into the phone battery. Because of that, there lies the possibilities for the phone battery to explode, be damaged, and harm the solar PV itself. Another example, especially in the first sub-model of O&M, a tendency to either leave the damaged solar PV alone or fix the damaged solar PV without appropriate knowledge of the end-users is high. Therefore, the damaged solar PV can't be fixed properly and further increase the problems within the solar PV. In consequence, the community tends to abandon then throw away the damaged solar PV and decide to re-use the Pelita. Second, the financial issue also affects the community not to repair any damaged solar PV because the community should pay for the service that is provided by the technicians. The community has not been able to structure and manage the budgeting. Last, the problem regarding the security. Several parts of the power plants are found missing because there is a lack of security. As the renewable energy power plant is managed by the community, the possibility that the power plant is being left without any monitoring system is high. Therefore, it could increase the possibilities that lead to the theft of the power plant (Gah, 2018).

3.2. Operation and Maintenance by Cooperative

Cooperative acts as the entity that operates and maintains the renewable energy power plant. Based on our interview with IBEKA, one of the cooperatives that manages to work on the O&M process is Kenyulururi Cooperative. Kenyulururi Cooperative is in charge for the daily operation of Kamanjara Micro Hydro Power Plant (MHPP) in Moubokul. This MHPP was constructed on November 12, 2017 by Ibeka (Institut Bisnis dan Ekonomi Kerakyatan), a social business entity with engineering focus. It has been operated for 9-10 months (per March 2019). The installed capacity of this MHPP is 95kW (65kW based on Ibeka website) and it supplies electricity for 106 households in Moubokul Village. The daily operation of this MHPP is handled by the Kenyulururi Cooperative as it hires the operator to ensure the daily operation of the MHPP. However, shall any part of this MHPP is damaged, the operator will report to Ibeka and Ibeka will further replace the broken part. Ibeka still holds the responsibility for the MHPP as the asset has not fully transferred to the village government (Petrus, 2018).

Regarding the information from Bappeda, the O&M process that is controlled by the collaboration with the cooperative could be classified as quite successful. One of the reasons of the quite successful O&M Process is the cooperative conducted the training support in collaboration with the Ministry for the technician to operate and maintain the renewable energy power plant. Hence, in the event that the transfer assets has been conducted and the cooperative has to manage the whole O&M process, the cooperative has already been prepared, through the training, to handle the O&M process (Gah, 2018).

3.3. Operation and Maintenance by PLN

The third model of O&M is handled by PLN, a state electricity company in Indonesia. PLN is the main actor that administers the electricity supply business in adequate amount and quality. PLN could provide the electricity supply from renewable energy power plant for the end-users by constructing the power plant or transferring the assets from the previous holder. Subsequent to the ownership of renewable energy power plant by PLN, PLN will control the O&M process of its assets. Besides that, PLN had run the assets belonged to third parties such as MHPP in Waekelo Sawah, MHPP in Kamanggih, Billa Cenge Solar Power Plant (SPP), and Bodohula Biomass Power Plant (BPP) (DAGI Consulting, 2018).

MHPP in Kamanggih could be referred to as one of the examples how PLN manages the O&M process. MHPP in Kamanggih was built in 2011 by Ibeka in cooperation with Hivos. Once the power plant was officially operating, the O&M process was handled by Jasa Peduli Kasih Cooperative. Subsequent to the 2 years O&M process handled by the cooperative, in 2013, the management of this MHPP was handed over to PLN after the interconnection cooperation agreement was being signed. The cooperative is now selling the electricity not to the end-users directly, but to the PLN with the rate of Rp475/kWh. PLN handles the management of MHPP including the maintenance, distribution of electricity, and bills due from household users. PLN is also hiring technicians to operate the MHPP in Kamanggih. Every month, the cooperative will submit the billing to PLN in relevance with the electricity usage per month and will earn the income from the electricity sales (Bakti Foundation, 2016). Despite of the existing collaboration, there is one big challenge occurs in the O&M process, namely the transfer of assets between the asset owner and PLN. If the transfer of

assets hampers the whole process of cooperation, there might be possibilities that PLN will stop the O&M process, as happened in the case of MHPP Wakaleo Sawah (DAGI Consulting, 2018). But overall, based on the statement from Bappeda, PLN has conducted the O&M process well in the professional way (Gah, 2018).

3.4. Operation and Maintenance by Private Sectors

The last model of O&M is handled by the private sector in collaboration with BUMDes. In the case of East Sumba, the solar PV installation, with 11 microgrid solar panels, has electrified 5 villages, namely Tawui, Lailunggi, Praimadita, Tandula Jangga, and Praiwitu Village since April 2018. The solar PV has the total capacity of 492 kWp and be able to supply the electricity for 852 households and 57 public facilities (MCA-Indonesia, 2018). The project is funded by the United States of America under the grant from MCA-I.

The collaboration between the private sector and BUMDes is working under the certain scheme, (i) the BUMDes in each village establish the joint BUMDes (BUMADes), (ii) the joint BUMDes creates a company in the form of PT (Perseroan Terbatas/Limited Liability Company, (iii) the company owned by these BUMDes is collaborating with the project developer, PT. Mikro Kisi Sumba (MKS). The profit sharing from the scheme is 51% for the BUMDes and 49% for the project developer (Gah, 2018). In order to ensure the sustainability aspect of this project, the 5 established BUMDes in the villages (52 management members) had received the management and entrepreneurship training (MCA-Indonesia, 2018). PT. Mikro Kisi Sumba acts as the holder of WUPTL (Wilayah Usaha Penyediaan Tenaga Listrik). For the O&M process and main distribution network are handled by PT. Listrik Vine Industri, meanwhile the minor O&M is handled by the BUMDes. Besides that, Hivos has also established a renewable energy service company, PT. RESCO Sumba Terang that is focusing on the O&M process for the renewable energy facilities built by Hivos and funded by MCA-I (DAGI Consulting, 2018). Based on the statement of Bappeda, the private sector O&M process is well conducted by developer. It has also increased the participation rate of BUMDes, village government, and the community to preserve the renewable energy power plant (Gah, 2018).

4. Discussion and Concluding Remarks

Based on the information gathered through interviews, focus group discussion, and direct observation, there are currently four O&M models existed for communal renewable energy system in Sumba Island. The first model which solely relies on the local community, both the end user and the appointed local technician, faced huge challenges in maintaining the system. The lack of capacity of the local community and financial issues are consistently came up in the models that use local community for the system's O&M. Whereas the other three models are able to sustain their O&M phase up until present time.

It is worth pointing out several limitations in our study, particularly those that are present in the methodology. Firstly, the analysis is limited in both scope and time. The number of respondents through whom we were able to acquire data were not sufficient to represent all off-grid renewable power plants in Sumba Island and their respective technologies. The time they were afforded was also limited due to their other obligations at the time. Secondly, due

to the disproportionate number of technologies represented by the respondents, we therefore contrived to categorize all manner of RE technologies like solar, wind farms, micro hydro, and biogas, among others, under one umbrella term: renewable energy power plants. We recognize that by doing so, we inadvertently generalized issues or complexities unique to a certain set of technologies for the sake of simplicity.

This early study has shown that in order to sustain the O&M phase of renewable energy system in Sumba, the involvement of the third party is still needed. Furthermore, since the capacity of the local community is relatively low, the regular training is not sufficient to enhance their skill. There is a need for a more intensive training to prepare the locals for this phase. The result also shown that it is possible for the local community to do the O&M phase for sustaining the RE systems in their village as long as that the collaboration with other party is well established.

5. References

Bakti Foundation. (2016). BaKTINews Memahami KTI dengan Seksama. Makassar, Indonesia: Bakti Foundation. Retrieved from http://bakti.or.id/sites/default/files/files/baktinews/BaKTINews126.pdf

Dagi Consulting. (2018). Monitoring & Evaluasi Program Sumba Iconic Island 2018. Jakarta: Dagi Consulting.

EBTKE. (2018, October 25). Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi. Retrieved from Revitalisasi Program Sumba Iconic Island Sebuah Solusi Atas Sumba: http://ebtke.esdm.go.id/post/2018/10/25/2040/revitalisasi.program.sumba.iconic.island.sebuah.solusi.atas.evaluasi?lang=en

Gah, Y. (2018, March 27). Secretary of East Sumba Regency Bappeda. (RDI, Interviewer)

Herdiani, I. A. (2018, April 02). Head of ANEKA EBTKE Cooperation Section. (T. R. Arsanti, N. Prilandita, S. Sagala, J. Lovett, K. Li, & Y. Prambudia, Interviewers)

MCA-Indonesia. (2018, April 11). Millenium Challenge Indonesia. Retrieved from Akses Listrik Bersig 500 kWp untuk Desa-Desa Terpencil di Sumba Timur: http://www.mca-indonesia.go.id/id/our_news/press_releases/new_access_to_about_500_kwp_of_clean_energy_for_remote_villages_in_east_sumba-1268

Petrus. (2018, March 26). Technician of IBEKA. (J. Kumar, RDI, Interviewer)

Wilem. (2018, March 23). Head of Kanilu Village. (T. R. Arsanti, & R. M. Nurdiandra, Interviewers)

Yulius. (2018, March 23). Head of Odi Praurata Village. (T. R. Arsanti, & R. M. Nurdiandra, Interviewers)

Research Paper

GREEN AND BLUE INFRASTRUCTURE TO REGULATE THERMAL COMFORT IN HIGH DENSITY CITY PLANNING- A CASE OF NAVI MUMBAI, INDIA

ADINARAYANANE RAMAMURTHY, Associate Professor and Head- Department of Planning, School of Planning and Architecture Vijayawada, Andhra Pradesh; India

ANUSHA ROY, Master in Environmental Planning and Management- Department of Planning, School of Planning and Architecture Vijayawada, Andhra Pradesh; India

Abstract

Cities create an environment that is clearly distinct from their surrounding areas. Urban structures alter the surface energy budget, modify the vertical profile of various atmospheric properties, interact with both local and regional circulation, and introduce anthropogenic heat. As a result, the climate conditions in the urban environment significantly differ from their rural system. Sustainability in planning is a topic of high interest among urban planners, urbanist and policy makers yet lack of scientific knowledge in the field leads to low impact in evolving urban planning decisions. Urban climatic map, as a tool provides a visual and spatial information platform using Geographic Information System (GIS). Increase in vegetation and water surfaces, known as green and blue infrastructure (GBI), is of particular interest due to their multiple functionality and benefits for the urban environment, such as increasing urban biodiversity and improving air quality in case of urban vegetation.

The urban climatic, environmental and planning parameters, as well as their impact, are considered to synthesize and comprehensively evaluate the physical urban environment with regard to thermal load and dynamic potential. The parameters considered to evaluate Thermal load include: Topography; Population Density; Land Surface Temperature; Air Temperature and Dynamic potential are: Normalized difference Built up Index; Normalized difference Vegetation Index; Normalized difference Water Index and Prevailing Wind of the study region. Study concludes with planning decisions to develop urban climatology-based map for GBI to enhance cooling effects and thereby undertaking measures to regulate thermal comfort in the city through green and blue infrastructure.

Keywords

Urbanization; GBI; Thermal load; Dynamic Potential; Urban Climatic Map; Sustainable Built Environment

1. Introduction

1.1. Background

World has seen an increased gathering of its population in urban areas, since 1990. This trend is not new, but relentless and has been marked by a remarkable increase in the

absolute numbers of urban dwellers from a yearly average of 57 million, between 1990-2000 to 82 million by 2018. In 1990, 43 per cent (2.3 billion) of the world's population lived in urban areas; by 2015, this had grown to 54 per cent (4 billion) (UN Habitat, 2016). By 2050, global population is projected to increase to around 9.8 billion. It's estimated that more than twice as many people in the world will be living in urban (6.7 billion) than in rural settings (3.1 billion). It's projected that 68 percent of the world's population will live in urban areas (Roser, 2018).

Such urban expansion is not only wasteful in terms of land and energy consumption, but increases greenhouse gas emissions. It has also led to the alteration of ecological systems in many cities over the past two decades (UN Habitat, 2016). Urbanization directly contributes to deforestation of large chunks of tree cover for accommodating the ever-increasing population. This leads to decrease in the services provided by the natural system. Urban structures alter the surface energy budget, modify the vertical profile of various atmospheric properties, interact with both local and regional circulation, and introduce additional sources of heat (e.g. anthropogenic heat). As a result, the climate conditions in the urban environment significantly differ from their rural counterparts (Di Luca, 2015).

In view of above it is inevitable to have a sustainable planning strategy for high density cities. Sustainability in planning is a topic of high interest among planners yet lack of scientific knowledge in the field leads to low impact urban planning decisions. Urban climatic map (UC map) as a tool provides the visual and spatial information platform using GIS (Ar. Ebin Horrison, 2011). Increase in vegetation and water surfaces, known as green and blue infrastructure, is of particular interest due to their multiple functionality and benefits for the urban environment, such as increasing urban biodiversity and improving air quality in case of urban vegetation (Früh, 2016).

1.2. Research Concern

The high-density cities contribute by various factors in increasing the thermal stress in the city. For a sustainable built environment, it is important for planners to strategize the city planning to achieve thermal comfort. At the same time, climatic conditions at city level have to be collaborated with plan making. Climatic concerns in urban planning and design can impact on the thermal performance of urban areas, help reduce energy consumption and dependency on fossil fuels, decrease emissions, provide energy and cost efficiency, and contribute to cleaner and more comfortable environments(GEDİKLİ, 2018).This research is an attempt to understand how urban climate maps can be operational to arrive at plausible decisions in urban planning, thereby undertaking measures to regulate thermal comfort in the city through green and blue infrastructure.

Keeping the aforesaid knowledge in mind, the researchers have chosen Navi Mumbai as study area for further investigation.

2. Urban Climate Dynamics

2.1. Urban Climate Dynamics

There is a general understanding that — "A different climate is produced by the built environment in urban areas – the urban climate". Today, the term "urban climate" also encompasses the change in the natural composition of the air through anthropological

influences. Every structure has an influence upon the individual climatic elements. Large built-up areas divorce themselves in a climatic sense from their surrounding landscape. The significant causes contributing to the production of a separate urban climate lie in the far-reaching alteration of the heat budget and the local wind field. This heat can be either stored or emitted from any urban area from the building volume, topography, population density and land uses. The intra-urban air temperature variations due to the urban forms and surfaces can be termed as Thermal Load. A key problem of urbanization is the Thermal Load it generates due to buildings and artificial/man made surfaces (ARUP, 2006). This thermal load can be minimized with the availability of wind and cold air mass exchange in particular localities of urban areas. The availability of green and blue spaces in any city can catalyse the cooling effect which can thereby reduce the thermal load of the city (K.R. Gunawardena, 2016).

2.2. Physical Criterion for Developing Urban Climatic Map

The urban climate of the city can be characterized with a balanced consideration of —negative effects, i.e. the Thermal Load (e.g. building bulks) and —positive effects, i.e. mitigation factors to reduce Thermal Load (e.g. green spaces) and promote Dynamic Potential (e.g. air ventilation). Table 1 depicts the all the input layers required to generate the Therma Load and Dynamic Potential of the study area.

Table No. 1 Overview of GIS layers for Urban Climate Analysis Map

S.No	PHYSICAL CRITERION	EFFECT ON TEMPERATURE	INPUT LAYERS
1	Thermal Load	Positive	1. Topography 2. Population Density 3. Land Surface Temperature 4. Air Temperature 5. Normalized difference Built up Index (NDBI)
2	Dynamic Potential	Negative	1. Normalized difference Vegetation Index (NDVI) 2. Normalized difference Water Index (NDWI) 3. Prevailing Wind

Source: Compiled by the researcher based on literature review, 2019.

2.3. Thermal Load Map

By adding the specific classification values of the above 6 layers based on weightages given to each parameter determined by the regression and correlations with respect to Land Surface Temperature (Topography, Population Density, Land Surface Temperature, Air Temperature, Normalized difference Built up Index (NDBI)). The classification values for the composite layer of Thermal Load are derived and the result generated is presented in figure 1, which indicates the rank wise temperature values in the system. The Higher ranks shows areas with low temperature.

It has been observed that darker shades of red and orange shows the higher intensity of thermal load in certain location of the study area. It can be clearly seen how the areas near to the water body and green spaces are relatively having lesser thermal load compared to

the other areas. Further, Figure 1 reveals that areas with higher built up show shades of darker yellow and orange which is comparatively warmer.

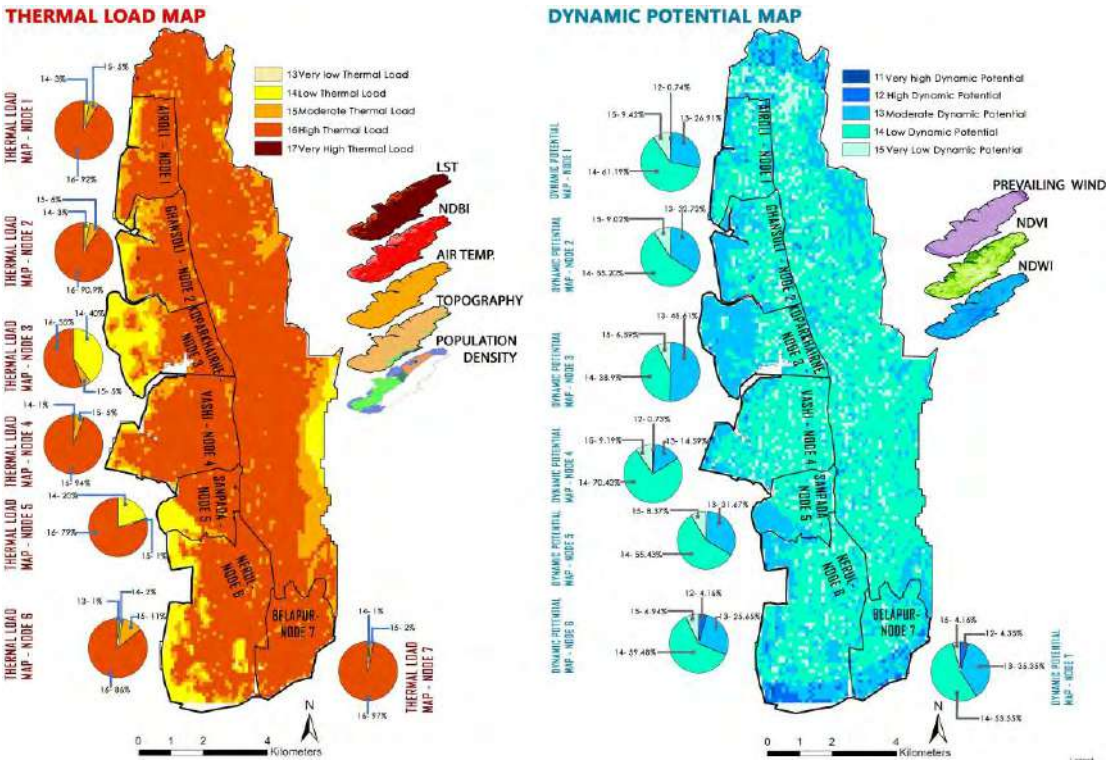


Figure 1 Thermal Load and Dynamic Potential Map for Navi Mumbai, 2018

Source: Map generated by the researcher based on the thermal load and dynamic potential parameters, 2019

2.4. Dynamic Potential Map

The parameters which are in negative correlation with temperature, which can better mitigate the heat load of the city are added together based on the weightages depending on the correlations and regressions to prepare the dynamic potential of the city and results were generated through map and presented in Figure 1, which indicates the rank wise temperature values in the system. The higher ranks indicate low temperature values in the system.

It has been observed that the areas near to the Creek and ponds are comparatively cooler than the inner city. Areas with decreasing cooling effect can be attributed to the lesser extend of Green and Blue infrastructure in those areas. The northern and the southern part experiences much cooler temperature which can be due to creeks on South and North as well prevailing winds which have more velocity, in the study region.

2.5 Urban Climate Analysis Map

The thermal load and dynamic potential values are synergised through the function of raster calculation in GIS to generate the Urban Climate Analysis map (Shown in Figure 3 - left). This results in 9 classes, however, for the purpose of planning information needs, the 9 classes are simplified and collated into 4 classifications as shown is Figure 3 (right). This map acts as

an information and evaluation tool which integrates the climate and planning factors and guides the planners by providing an urban climate-based planning network.

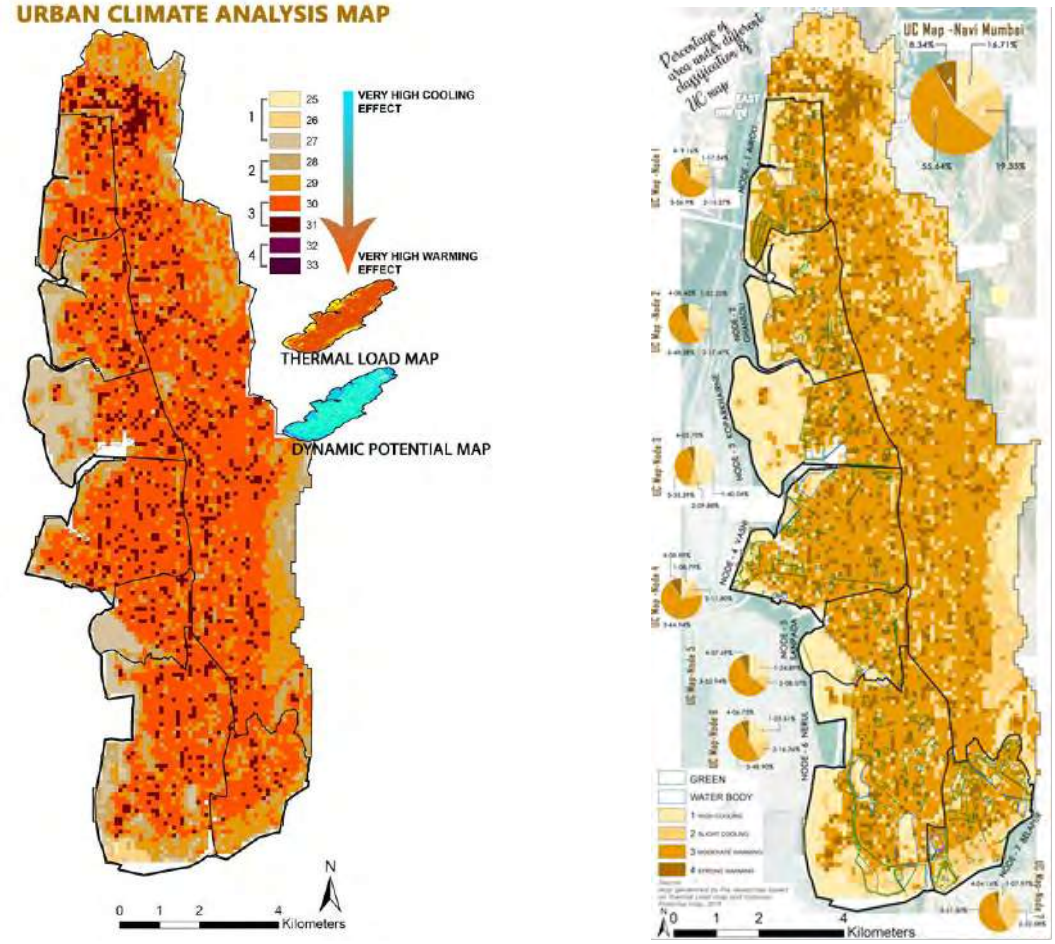


Figure 3 ***(left)*** **Urban Climate Analysis Map and** ***(right)*** **Final Urban Climate Analysis Map for Navi Mumbai, 2018**

Source: Map generated by the researcher based on Thermal Load map and Dynamic Potential map, 2019

It can be seen from the Urban Climate analysis map shown in Figure 3, which in the entire city, there are small patches of dark brown pixels which experiences a higher temperature due to the land use in those areas. At the same time areas near to green and blue infrastructure of the city are comparatively cooler. Thus, through planning decisions, we can incorporate these effective spaces into the core city area which can help in creating a comfortable built environment to sustain. Through the climate analysis map, the bottleneck areas can be identified clearly and the influential parameters pertaining to the same can be understood. This can help in taking planning decisions to make those areas more liveable with respect to the minimizing the effect of higher heat load in the areas. The climate map indicates the status of urban climate environment and the probable issues seen under it. It clarifies the challenges for spatial planning. This map can further give a clarification on how urban climate map is affecting other systems in the city.

3. Planning Tools and Techniques

3.1. Climate Analysis Tool

ArcGIS software was used as a tool to process data acquired from Landsat 8 imagery of USGS portal, as it is the best tool that can turn datasets into useful information. ArcGIS helped in generating computer-based mapping and analysis which could make significant contributions in the areas of geographic planning and environmental science. Specifically, with respect to the green and blue infrastructure and the climatic parameters were integrated with ArcGIS to develop Urban Climate map for the study area.

3.2. Statistical Techniques

Statistical techniques like correlation, regressions, ranking and weighted sum were also used to establish the linkages between various control parameters which decide the dynamic urban climatic environment of the study area.

3.3. Simulation Tool

In order to analyze the climatic environment of the study area, grassroots level administrative boundary has been considered for further detailed investigation i.e, Node; Node-4 was selected based on the fact that it has the least dynamic potential of the study region. A simulation was done to understand the outdoor thermal comforts. To perform the simulation, a 3-D model of the node was drafted with specifications of building height, type of land cover and type of plantation. This was integrated with the climatic parameter experienced in the node which includes temperature, relative humidity and prevailing wind. The simulation model helped in identifying the hot spots in the node which included roads and market area of the node. Thereby, planning interventions were made by improving and adding the Green and Blue infrastructure in the node.

4. Results and Discussion

4.1. Grassroot Level Urban Climate Analysis

The parameters for thermal and dynamic potential of each node were analyzed to understand the Urban Climate experienced in each node. It is clearly evident from Table -2 that out of all the nodes, Node – 3, i.e, Koparkhairne has less percentage of thermal load but due to the more percentage share of dynamic potential in the area, it is able to bring down the temperature of the area as a result, 40 per cent of the area lies under “1” in UC Analysis map which represents a lower temperature region. Node 2,6,7,5 and 1 which are Ghansoli, Nerul, Belapur, Sanpada and Airoli respectively, lies from Lower to moderate to high temperature region because of the distribution of the thermal load and dynamic potential of the area. In these areas the cumulative sum of lower and moderate temperature is almost 50 per cent of the total area. Out of all the nodes, Node- i.e, Vashi experiences a higher thermal load and at the same time the dynamic potential does not have a strong impact to counter the heat ingress due to thermal load.

Table 1 Comparative analysis of thermal load and dynamic potential for all the nodes

S.No	NODES	THERMAL LOAD					DYNAMIC POTENTIAL					UC MAP VALUES			
		13	*14*	*15*	*16*	*17*	*9*	*12*	*13*	*14*	*15*	*1*	*2*	*3*	*4*
1	AIROLI	0	3%	5%	**92%**	0	0	0.74%	**26.91%**	**61.19%**	9.42%	**17.34%**	**15.27%**	**56.90%**	9.16%
2	GHANSOLI	0	3%	6%	**90.90%**	0.10%	0.00%	0.29%	**32.72%**	**55.20%**	9.02%	**22.25%**	**17.47%**	**48.28%**	8.42%
3	KOPAR KHAIRNE	0	**40%**	5%	**55%**	0	0.13%	0.22%	**45.61%**	**38.90%**	6.59%	**40.04%**	9.88%	**35.59%**	5.70%
4	VASHI	0	1%	5%	**94%**	0	0.003%	0.73%	14.59%	**70.43%**	9.19%	8.79%	11.80%	**64.94%**	8.99%
5	SANPADA	0	**20%**	1%	**79%**	0	0.002%	0.45%	**31.67%**	**55.43%**	8.37%	**24.89%**	8.37%	**52.94%**	7.69%
6	NERUL	1%	2%	11%	**86%**	0	0.20%	4.16%	**25.65%**	**59.48%**	6.94%	**23.51%**	**16.36%**	**48.90%**	6.75%
7	BELAPUR	0	1%	2%	**97%**	0	0.00%	4.35%	**35.35%**	**53.55%**	4.16%	7.97%	**32.58%**	**51.30%**	4.16%

Thermal Load Nomenclature -	Dynamic Potential Nomenclature -	UC Map Nomenclature -
13- Very Low Thermal Load	9- Very High Dynamic Potential	1- Very Low Temperture
14- Low Thermal Load	12- High Dynamic Potential	2- Low Temperture
15- Moderate thermal load	13- Moderate Dynamic Potential	3- Moderate Temperture
16- High Thermal Load	14- Low Dynamic Potential	4- High Temperture
17- Very High Thermal Load	15- Very Low Dynamic Potential	

Source: Compiled by the researcher based on node wise analysis of UC Map, 2019

4.2. Observations and Findings

For each node, thermal map, dynamic potential map and their respective urban climate map was generated. It is observed that the nodes experience a strong thermal load in the built – up area, but, at the same time, within the built-up spaces, where the green and blue infrastructure are present, a considerably lower temperature is observed. A very strong cooling factor can be seen in the system which can convert the higher temperature areas to lower or moderate temperature zones thereby, establishing a major share of lower and moderate temperature in the system. Therefore, the areas with stronger dynamic potential are able to influence the thermal load of the system resulting to lower temperature in their respective area. When climate Analysis map is integrated with land use map, the results of climate analysis map gets well synchronized with specific land use allocations of the study area. Further, the cooling intensity of the study area lies under the green and blue spaces designated land uses in the system. Therefore, the node wise study results reflect the real system of the study area.

The map produced by overlaying the boundaries of urban green and blue infrastructure with urban climatic map clearly shows that most of the areas with green and blue infrastructure, experiences a lower temperature (subjected to the characteristic of the Green and Blue infrastructure) thereby, highlighting the potential of green and blue infrastructure to enhance the cooling effect in the system. It is evident that the areas with denser green and blue infrastructure experiences lower temperature compared to other areas.

5. Recommendation and Conclusion

5.1. Planning Intervention and Policy Guidelines

Navi Mumbai is regarded as one of the modern and planned cities of India and hence it has been designed to efficiently manage the urban challenges (CRISIL, 2012). However, various influence of the increased urbanization has altered the climatic condition of the city over the years. It is observed that areas with green and blue infrastructure experience a low thermal stress and high dynamic potential. Therefore, the planning intervention focuses on promoting Green and Blue infrastructure throughout the study area. An urban green and blue infrastructure network is made up of many elements that together facilitate movement through the city landscape. It is estimated that for every 100m^2 of vegetation added to a

park, it can affect 1°C decrease in air temperature. Shashua-Bar and Hoffman (2000) investigated that the green space effect contributes to about 0.5°C cooling of the air temperature comparing to the shading effect. The analysis of the study area typically indicates key points for physical linkages, where an important connection exists or where connection has to be established. Therefore, the researchers have made an attempt to connect the various green and blue infrastructures in the study area to create a flow of benefits obtained from the services rendered from the GBI in the system. This study, thereby, suggests sector wise measures for a climate responsive planning for the city by exploring the optimal planning intervention, which can help to enhance GBI in the system. Based on the findings of this research study, researchers identified four strategic planning interventions as presented in the sequel and recommended to enhance cooling intensity and to promote sustainable built environment of the study region.

(i) PROTECTIVE

- Location of mangroves and ponds in the study area and taking protective measures to sustain the benefits of the resources in the system.
- Prohibition of dumping debris into mangroves and ponds.
- Declare Mangroves area as protected zone.

(ii) DEFENSIVE

- Planting saplings in the areas which has lost the mangrove cover due to encroachment.
- Fencing the new mangrove sapling from high tide.
- Dense Plantation of green cover in the open land separating each nodes.

(iii) OFFENSIVE

- Installing vertical mesh across the cross section of storm water drain to prevent leaves falling into the drains to be disposed off to the creek.
- Collecting the leaves fallen on the surface and making green manure for plants
- Planting trees such as water willow along the drain to increase the green cover in the study area.

(iv) OPPORTUNISTIC

- Planting tree saplings in the vacant land.
- Parking spaces to be covered with a slab where rooftop vegetation can be installed to keep the area cooler at the same time provide shad to the vehicles.
- Rooftop plantation over the railway station.
- Extensive plantation along the sides of the expressway running through the city.
- Skywalks to be developed into a public arena with vegetation and water body for both improving the GBI in the system as well as creating social spots in the city.

(v) RESILIENCE

- Compulsory Rooftop plantation for any new construction.
- Plantation along either side of the highway.
- Rooftop plantation over railway stations, skywalks and parking lots.

(vi) POST PROCESSING

- Research on the climate resilience of the system through simulations with the existing and proposed measures for the improvement of the system.
- Developing the most viable economic measures for resilience in the system.
- Result analysis and display to the public at large.

5.2. Application of Planning Intervention in Node: 4- 'Vashi'

Vashi (Node - 4) was the first node developed by the planning authority of Navi Mumbai, as a result it is one of the most saturated nodes of the study area. Moreover, the dynamic potential of Vashi is less compared to the other nodes of the study area. Therefore, it has been considered for a detailed implication of the planning mechanism. Figure 4 identifies the protective, offensive, defensive and opportunistic area of the node. The existing Green and blue infrastructure have a total area of 1.6 Km^2. The proposed area for green and blue infrastructure development is 1.4 Km^2. Thereby, increasing the existing total green infrastructure to 3 Km^2 which will provide a stronger dynamic potential of the area.

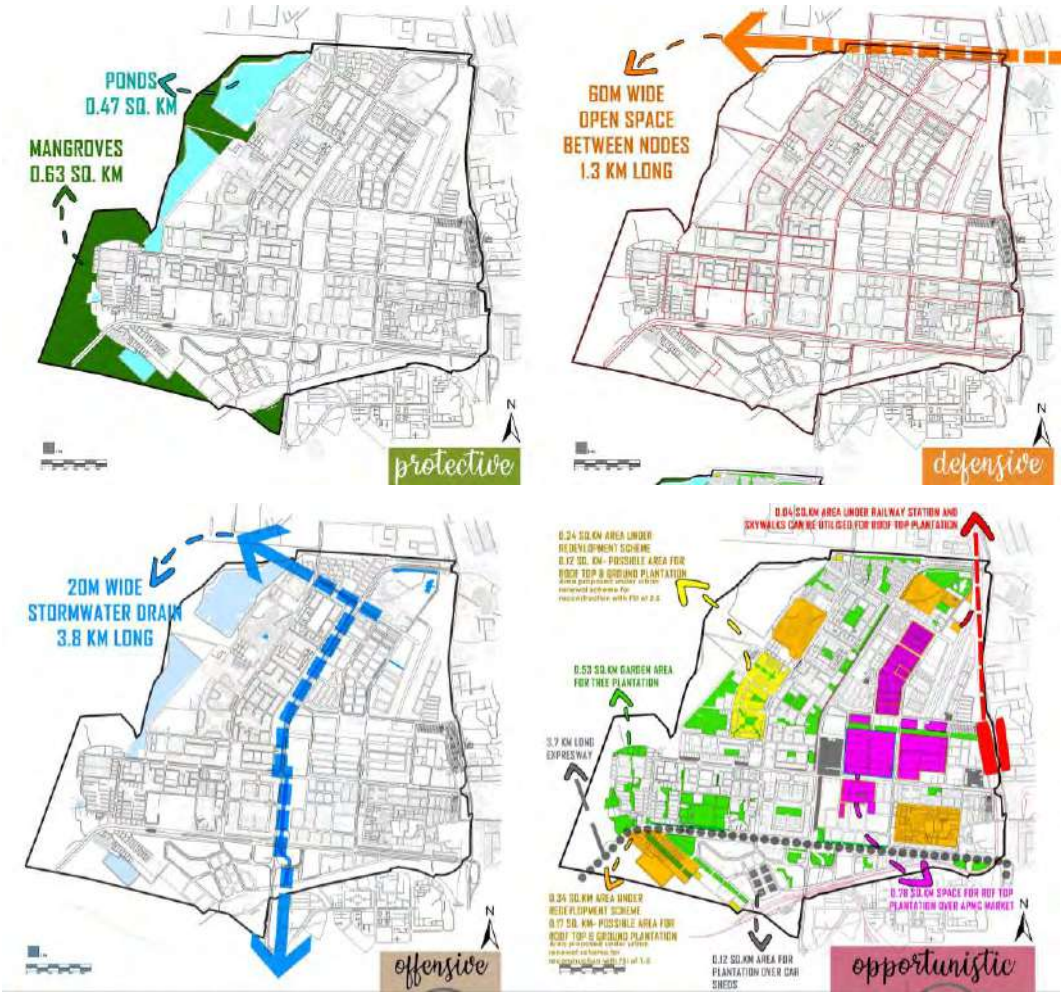


Figure 4 Planning interventions for Node – 4

Source: Generated by the Researcher, 2019

The planning interventions were made by improving and adding the Green and Blue infrastructure in the selected node of the study region. The results with intervention showed a dip in temperature by 2^{o}C for the entire node as shown in Figure 6.

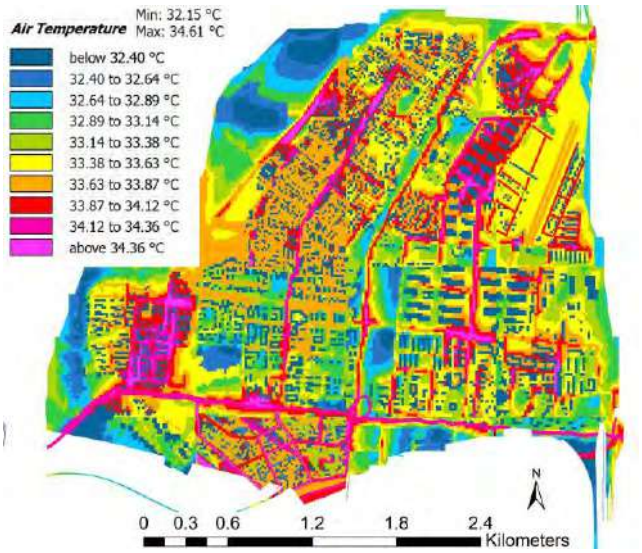


Figure 5 Existing temperature of the node without interventions

Source: Map generated by Researcher based on temperature, relative humidity, prevailing wind, green and blue spaces and building height of the selected node for 9th May 2019 using ENVI-met.

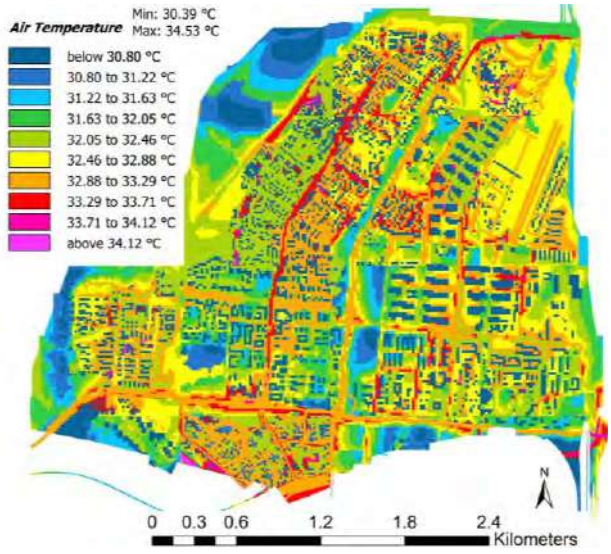


Figure 6 Temperature Difference experienced in the node after interventions

Source: Proposal Map generated by Researcher based on temperature, relative humidity, prevailing wind, green and blue spaces and building height of the selected node for 9th May 2019 (2:00 pm) using ENVI-met.

This research study conclude with the intervention includes 30 M plantation on the nodal boundary, 4 M wide plantation on both the des of the drainage network flowing in the node, 0.78 KM2 rooftop plantations over APMC market. 3 M wide plantation around the periphery of existing gardens, 0.04 KM^2 rooftop plantation across the railway station, 0.02 KM^2

plantation on the sides of the expressway, 0.12 KM^2 rooftop plantation over parking spaces, preserving and protecting the existing mangrove cover and water body and 0.30 KM^2 rooftop plantation over proposed redevelopment area. These planning interventions have facilitated in reducing the temperature of the node by 2^o C in the study region. The results of this research study witnessed that Green and Blue infrastructure plays a vital role in regulating thermal comfort and therefore, it is recommended to have city planners/policy makers to focus on optimal planning interventions, which will pave the way to achieve sustainable living environment in the transforming urban system.

6. References

Ar. Ebin Horrison (2011) Urban Climate mapping for supporting urban planning in Chennai. International forum of Urbanism. 6. Singapore. Common Ground Publishing.

ARUP. (2006). Urban Climatic Map and Standards for Wind Environment. Hong Kong: CUHK.

CRISIL. (2012). Internal Review Document- Impact Assessment Study. Navi Mumbai: NMMC.

Di Luca, A. (2015). Effects of city expansion on heat stress under climate change conditions. PloS one, 10(2), e0117066. doi:10.1371/journal.pone.0117066

Früh, M. Ž.-A. (2016). Modelling the potential of green and blue infrastructure to reduce urban heat load in the city of Vienna. Climatic Change, 14.

GEDİKLİ, B. (2018). Approaches to Climate Change In Spatial Planning And Design: International And Turkish Experiences.

K.R. Gunawardena, M. W. (2016). Utilising green and bluespace to mitigate urban heat island intensity. Elsevier, 16.

L. Shashua-Bar, M.E. Hoffman (2000) "Vegetation as a climatic component in the design of an urban street - An empirical model for predicting the cooling effect of urban green areas with trees, Elesevier, Energy and Buildings 31 (2000) 221–235, (May).

Roser, H. R. (2018, September). Urbanization. Retrieved from Our World in Data: https://ourworldindata.org/urbanization

UN Habitat. (2016). World Cities Report 2016 - Urbanization and development. Kenya: UN Habitat.

Case Study / Project

Sinking, Growing, Resilient:
a Multidisciplinary Approach to Climate Adaptation in Semarang, Indonesia

Jackson ROLLINGS, Travis BUNT, Rizqa HIDAYANI, Peter LETITRE,
Sander CARPAIJ, Despo THOMA

Abstract

In 2018, the Netherlands Enterprise Agency kicked off Water as Leverage, a program aiming to bring water-based solutions to address climate and urban risk in three Southeast Asian cities: Chennai, Khulna, and Semarang. The '˜ONE Resilient Semarang' team - a group of designers, engineers, economists, ecologists, art activists, and academics - was tasked with developing design-driven, bankable project ideas following an initial phase of research, analysis, stakeholder engagement, and on-the-ground coalition-building with agencies and institutions. In this presentation, members of four partnered organizations on ONE Resilient Team (One Architecture & Urbanism, Kota Kita, Deltares, and Wetlands International) will bring multidisciplinary perspectives to Semarang's current catch-22: it is a city economically dependent on the same extractive coastal industries that exacerbate its subsidence and flood risk, projected for even more drastic urban densification and economic expansion in the coming years. Instead of developing one-off infrastructure proposals for the city, ONE Resilient Team instead chose a more holistic approach centered around a widespread reorientation of water use across the entire city, from coast to upland, from Kendal to Demak - altogether comprised of potentially hundreds of projects.

The embedded goal is to address challenges in a programmatic manner, potentially sparking transformational, bottom-up and top-down change in processes and governance. With the combined disciplines of urban design, community-based planning, water / coastal engineering, and ecological restoration, ONE Resilient Team's conceptual proposal aims to find integrated solutions to the combined water related risks of climate change and socio-economic growth by drawing from expertise across sectors and backgrounds from across the globe. This presentation will seek to address these issues through the prism of four disciplines among many more represented within the team, asking how resilience can operate beyond an individual project as a guiding development principle for climate-vulnerable cities and landscapes.

Research Paper

EXPANDING AN UNDERSTANDING OF URBAN RESILIENCE IN THE REALM OF ADAPTATION PLANNING

Natalie ROSALES, CONACYT-El Colegio Mexiquense; Mexico

Abstract

As cities have become more central to development, resilience, risk assessment and prevention instruments have gained greater importance in urban planning considerations. By using the case study of Mexico City's Climate Action Programme, this piece of work contests the way in which resilience has been embedded in urban adaptation planning. Grounded on a planning evaluation based approach to analyze on which methodologies, tools, and frameworks have been used, and which key actions and strategic lines to building resilient cities are contemplated, this descriptive research incorporates urban-regional metabolism dynamics and environmental data such as carrying capacity, into Mexico city climate change scenarios and vulnerability analysis matrix. By doing so, the article introduces new ideas that can: i) move from risk management to uncertainty oriented planning; ii) understand vulnerability in the context of equitable sustainable development, while highlights the opportunities transformative resilience offers to enable transformations towards sustainable urban futures

Keywords

Transformative resilience, urban planning, urban resilience, sustainability indicators

1. Resilience as a new framework for planning the cities

In the face of such challenges as growing inequalities, natural resources depletion, peak oil, climate variability, extreme weather events and global economic challenges, the arrival of resilience as a concept within the social sciences to inform political rhetoric, as well as a heuristic and operational tool, has positioned it as a new paradigm and a banner (Lampis, 2015).

The concept has crossed disciplinary discussions becoming a thinking approach, which investigates how interacting systems of people and nature can best be managed in the face of disturbances, surprises, and uncertainty (Biggs et al., 2015). It has also been progressively embedded into policy-oriented discussions, mainly focused on climate and global environmental change (Lampis, 2015). In this way, more and more we hear about resilience as an applicable concept to prevention strategies, community empowerment, collaborative initiatives, economic recovery, urban planning strategies, and so on. In fact, the term has been a great catalyst for community management and adaptation planning focused on

identifying specific measures and processes that can address the uncertainties of climate change through action and implementation. Thus we find that at the local level, an increasing movement to build resilient communities has grown over time aiming to "anticipate[s] problems, opportunities, and potentials for surprises; reduce[s] vulnerabilities related to development paths, socioeconomic conditions, and sensitivities to possible threats; respond[s] effectively, fairly, and legitimately in the event of an emergency; and recover[s] rapidly, better, safer, and fairer" (Hearn, 2008).

Following these tendencies the concept has arrived in the urban arena and the efforts to build resilient cities have increased, generating new perspectives and urban planning frameworks to tackle the enormously complex interactions between different (non-scalar) components of socioecological systems, which include governance networks, economic systems, resource flows, social dynamics and the structure of the built environment (Resilience Alliance, 2007). Among these new approaches, stands out the following three: disaster risk reduction (DRR); social vulnerability; and urban political ecology.

1.1. Resilience and climate change adaptation and disaster risk reduction (DRR) approach

Recent discussions on sustainability connect global warming and climate change, and their association with resilience. Becoming a widely debated issue in urban sustainability and risk management literature. The planning resilience approach rooted in risk and uncertainty argues that change will occur, and as unexpected shocks are not able to prediction. Therefore, cities must strengthen their capacity to handle and deal with external threats such as natural disasters (hurricanes, floods, and earthquakes), the depletion of natural resources (oil, water) and shocks (Abhas, et al., 2012).

In this regard, the notions of building resilience refer to the ability of human settlements to withstand and to recover quickly from any plausible hazards. However, also from an economic standpoint, it stresses the importance of recovering from crises, not only by reducing risks and damages from disasters (i.e., loss of lives and assets), but also strengthening the ability to quickly bounce back to a "stable state" (UN HABITAT, 2016).

This vulnerability/resilience paradigm which calls on building resilient and intelligent urban environments, who are able to "anticipate" future shocks, has been driven by international institutions like the World Bank, UN-Habitat, the European Commission, ICLEI, and has mostly replaced a hazards approach in the social sciences (ICLEI, 2012).

As such, there are different initiatives focused on developing city stakeholder's capacity to address the challenges, uncertainty, and unpredictability of all types of change and disturbance. Including natural hazards, such as the Resilient Cities Project from the OECD; the United Nations International Strategy for Disaster Risk Reduction (UNISDR) launched its 2010-11; the Worldwide Disaster Reduction Campaign explicitly including the issue of 'resilient cities'; ICLEI's Resilient Cities initiatives; UN-Habitat City Resilience Profiling Programme; Rockefeller Foundation's 100 Resilient Cities project, just to name a few.

Nevertheless, even when, much of the literature and practices focus on this approach, resulting in disaster reduction and a better understanding of hazard, there is increasing recognition that a more complex part of the equation lies in the way in which societies are organized (Mitchell, 1999).

1.2. Resilience and the critical perspectives approach

The social vulnerability approach

From a critical theoretical framework, there is an essential body of knowledge that investigates and evaluates the social, institutional, and policy roots of urban ecosystem resilience to understand the nonlinear relationships and interacting systems (Campanella, 2006). These studies have focused on how different urban ecosystems can adapt, adjust, renew and transform in response to trauma, national economic and demographic challenges, and global climate change, highlighting an important issue: resilience is the counterpart of vulnerability (Campanella, 2006)

Under this point of view, the social vulnerability approach emphasizes that there are specific social, political and economic processes and structures that lead to vulnerable conditions. So, risk varies not just according to the hazardous agent, as it is distributed unequally among the impacted population and communities. Therefore, advancing resilient actions in anticipation of risk, in reaction to impacts, or recovery from the effects, requires four factors: (1) knowledge of the hazard; (2) accurate perception of the risk; (3) understanding available alternatives; and (4) resources and flexibility. These factors most of the time are out of control of the population as they depend on more significant economic and social forces (Wilbanks, 2008).

In this regard, this social vulnerability approach helps to explain how communities that operate as groups with a sense of collective cohesion and identity, deal with adversity and stress and gain or lose functioning and strength as a result of trauma and disaster (Campanella, 2006).

The political urban ecology approach

Researchers supported by a critical school of thought, remind us that "cities are fundamentally natural, as human and no human residents compose their population, formed from earth material, and supported by ecological processes which are always due to politicization. Whether in the flow of water through the city, the uneven distribution of trees in its landscapes, or the environmental hazards imposed upon its citizens" (Robins, 2012). So, two concepts that have entered urban political ecology in its encounter with resilience approaches are the metaphor of urban metabolism and the notions of environmental justice.

Urban metabolism can quantify not only the dependencies cities have on external resources and how this relation can affect their adaptive capacity. Also, aiding to understand the way in which powerful actors and interests bend and funnel natural materials and forces to increase rents, develop properties, fuel growth, empowering or disempowering communities.

On the other hand, the concept of environmental justice points out that exposure risks are significant and unquestionably associated with historically dis-enfranchised groups (Cutter, 1995). This idea predicated on the well-known fact that disempowered communities (especially racial minority groups and the urban poor) have been located in and around technological and natural hazards (lead smelters, garbage incinerators, or power plants).

These two epistemological assumptions argue that understanding how urbanization operates in metabolizing nature and in the creation and distribution of risks, vulnerabilities, and opportunities among urban dwellers, are imperative for addressing resilience at the

urban scale. So, in order to build resilient communities there is a need for a deeper understanding of public responses to these challenges, and how planning can support synergistic relationships between resilience and environmental (The Bartlett Development Planning Unit, 2016).

Based on these different approaches, the debate about resilience has become central to urban sustainability, so risk assessment and prevention instruments have gained greater importance into urban planning considerations. In particular, the adaptation and disaster risk reduction (DRR) approach has been introduced as a useful framework to tackle the environmental, social and economic risks posed by climate change in cities.

Nevertheless, even when this use of the concept, represents an advance in contemporary planning frameworks, the focus on urban risk management, which has dominated the incorporation of resilience in planning practice, tend to restricts assessment and strategies to anticipate short-term disturbances, such as hazard or disaster recovery; while leaves aside vulnerability, environmental justice, and the capacity of urban systems to adapt, in the wider context of urban sustainable transitions.

In order to illustrate this, the following section will then focus on urban resilience strategies and approaches implemented in Mexico City's planning instruments.

The aim is to chart the contours of a critical assessment, exploring the use of the concept, the shortcomings of the principles adopted and how can we move forward to use this heuristic tool as a part of a comprehensive urban sustainability strategy.

This analysis is grounded on a planning evaluation based approach, and it is divided into three parts: i) a study on which evaluation frameworks, methodologies, tools and key and strategic lines to building cities resilience are contemplated; ii) a quantitative and qualitative analysis that incorporates urban-regional metabolism dynamics and environmental data such as carrying capacity, into the climate change scenarios and vulnerability analysis matrix, in an attempt to forecast future scenarios and define some priorities to increase socio-ecological sustainability and resilience; and iii) a proposal to move from risk management to uncertainty oriented planning.

2. Planning framework for building urban resilience in Mexico City: The Climate Action Programme

Mexico City experienced a fast population growth leading the city spread to vast geographic expansion. This rapid change imposed pressures on urban eco-systems by creating new demands for land and more ecological services; increasing demand for urban infrastructure and services. The tensions due to the rapid growth and undersupply turn into water scarcity, traffic congestion, energy consumption, air pollution, and the appropriation of green areas for development.

At the same time, socio-economic and institutional factors have driven poor people –with a relatively little latitude of choice for house construction- into building houses on steep hillsides, making ecosystems more vulnerable to degradation.

Therefore, the issue of various environmental contingencies, by the hand of the recent intensification of meteorological events due to climate change, has increased cities

vulnerability, giving centrality to issues such as sustainability, and more recently, urban resilience.

In the last years, Mexico City, as an international actor, has positioned itself in the national and global contexts as one of the cities which is driving resilience projects, due to the assumed leadership on the climate change agenda promoted since the COP 16 held in Cancun. So, the debate around resilience concerning climate change has become one of the new narratives permeating the City's different legal planning instruments.

Also, the city has joined the program 100 Resilient Cities (100RC) from the Rockefeller Foundation and has received funding by $ 200 million to boost various programs and resilience strategies since 2015. Additionally, the government has allocated 10% of its budget, representing nearly 17,000 million pesos to boost resilience strategies. This initiative comprises four vulnerabilities areas and stress caused by disasters. i) Financing innovative technology infrastructure; ii) land use; iii) social and community resilience (Quintero, 2016).

Under this context, the main effort to incorporate resilience into planning instruments, identified is the Climate Change Action Programme 2014-2020.

2.1. Mexico City Climate Action Programme and the notions of urban resilience

Mexico City's Climate Action Program (PACCM, in Spanish) for 2014-2020 is a planning tool that integrates, coordinates and promotes actions to reduce the environmental, social and economic risks posed by climate change while simultaneously promoting the welfare of the city's population through strategies contained in the Local Climate Action Strategy (ELAC, in Spanish).

Regarding adaptation, the PACCM aims to increase the city's resiliency as well as the population's adaptation capacities, particularly for the 5.6 million people most vulnerable to extreme weather events, such as flooding. To achieve these goals, the PACCM includes specific actions for each of the strategic priorities that make up the Climate Action Local Strategy shown in Figure 1. These priorities seek to maximize synergies between adaptation and mitigation, in order to increase the cost-effectiveness of implemented actions to make them more attractive to potential funding bodies and other decision-making entities.

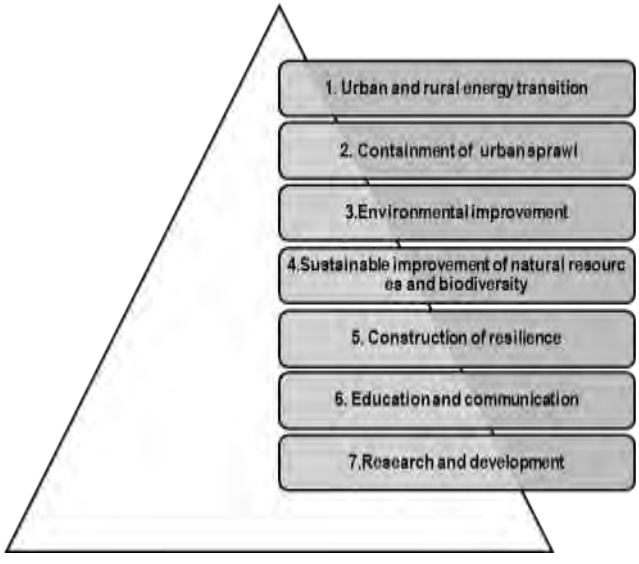


Figure 1. PACCM strategic priorities. Source: Authors elaboration based on Climate change Programme

As can be seen, building resilience to face the adversities of the process of mitigating and adapting to climate change is a particular objective and consequently one of the main components of the Climate Action Programme.

The term resilience is conceptualized as "the ability of citizens to absorb shocks and reorganize while undergoing climate change through decentralization of activities, the diversity of economic sources, decoupling between economic development and emissions CIS, the integration of the city with natural ecosystems, social cohesion and redundancy" (Gobierno de la Ciudad de México, 2014).

Accordingly, with this definition, the programme sets four attributes of an urban system to be resilient (Molina et al., 2013):

- Decentralization. Which refers to spatial dispersion of the critical activities in the city, to allow that in case of a disturbance in an area of the territory, the rest of the city can continue running smoothly.

- Diversity. Economic growth should decouple GHG emissions and integrate environmental concerns. Urban centers should be more efficient and less polluting.

- Flexibility. Ability to face disasters. It may be an administrative type, in infrastructure, economic activity.

- Redundancy. It refers to the duplication of the key and essential city services. The city must continue operating by using alternative networks, before collapsing.

Build upon this theoretical framework (resilience in reference to climate change adaptation), the plan departs from a diagnosis of the current situation of the city, focusing on two main aspects; exposure to multiple risks (extreme rainfall resulting in floods or landslides, droughts, heat waves) and poverty and inequality that contributes to high concentration of vulnerability in marginalized groups. So, vulnerability, as a key concept is a compound consequence of the fragility of the urban systems, the capacity of internal agents - including poverty, social marginalization- and other factors such as exposure to the impacts of climate change.

In this regard, by using indicators of exposure, sensitivity and adaptive capacities, the action programme indicates that the periphery is more vulnerable to climate change. Iztapalapa, Cuajimalpa, Xochimilco and Alvaro Obregon have an outstanding range of medium-high to very high; in contrast to the central areas which have low levels of vulnerability.

Strategies and recommendation for building resilience are placed at the broader context of adaptation to address the specific vulnerabilities to climate change which focuses on five issues:

- Urban and rural energy transition:

Energy efficiency

Renewable energy

- Containment of urban sprawl:

Urban planning instruments

Intra-urban green spaces

Infrastructure mobility and transport

- Environmental enhancement:

Reduction of emissions

Integrated waste management

Integrated management of water resources

- Management of natural resources and biodiversity conservation:

Native species and wildlife

Soil conservation

- Building resilience of the city:

Prevention and mitigation

In this line, the action programme promotes prevention and risk mitigation focusing on creating an environmental and economically active population despite destabilizing events, such as natural disasters caused by extreme behaviour on the elements of weather, environmental degradation, and economic and social crisis. Therefore adaptive mechanisms for building urban resilience are associated with the vulnerability of the population, damage to infrastructure (road, hydraulic, electric) and public health. Also, are associated with the improvement of the administrative, organizational capacity to move from prevention to mitigation of risk.

In this regard, key actions to build resilience refer to designing:

Up-to-date Hazard and Risk Atlas

Prevention Program (hydro-meteorological hazards)

The study, evaluation, and relocation of human settlements situated in risk areas

Early warning system to monitor and forecast hydro-meteorological condition of the metropolitan area

A preventive measure system in case of extreme weather events

Training and dissemination of prevention strategies related to climate change, to strategic sectors

Monitoring and prevention vector-borne integrating information

Prevention diseases program

An Environmental Fund for Climate Change

The strategy also explicitly recognizes the fact that building urban resilience to climate change cannot be achieved through ‘one-time' activity or ‘one-off' projects. Integration of multiple interventions at different scales and across different sectors is a must over time. Also, it emphasizes the role of external actors in catalysing and enabling responses, working with and through internal agents, and influencing where investment in changes to urban management is required.

For instance, it promotes an integrated approach which incorporates three topics: Urban planning, mobility, and environmental enhancement. The programme also remarks that mitigation actions should demonstrate co-benefits in the adaptation actions, and vice versa, seeking a positive impact on environmental and social development.

2.2. Analysis of the adaptation planning framework

Mexico City's adaptation planning framework helps illustrate how resilience undertakes within the aims and practices of contemporary planning instruments; what are the advantages and shortcomings of the principles adopted, and how can we rethink the concept of resilience within this planning frameworks to guide sustainability transitions. Table 1 synthesizes methodologies, tools, and evaluation frameworks.

ISSUE	DESCRIPTION
Urban resilience approach	Building resilience is at the broader context of the adaptation strategy that addresses the specific vulnerabilities to climate change. The planning instrument considers that a city can become more resilient concerning adapting to and ensuring the restoration of basic services, as well as social, institutional and economic activities. Concepts related: The framework focuses on the relationship between vulnerability and climate change. It considers exposure to risk, sensitivity, adaptive capacities, and internal agents. Vulnerability understood as a compound consequence of the fragility of the urban systems, the capacity of internal agents - including poverty, social marginalization, and other factors such as exposure to the impacts of climate change.
Methodologies and evaluation tools	**Methodology** The planning instrument combines investigation, data, and analysis to diagnose vulnerability. Overall the framework provides a robust analytical foundation for understanding vulnerability to climate change which then informs the identification and implementation of mitigation and adaptation actions, seeking synergies and co-benefits. **Methods for analysis consider:** Climate change scenarios Greenhouse compounds inventory emissions, which incorporates black carbon and fluorocarbons. A planning evaluation system which makes the plan (measurable, reportable and verifiable) every action has specific monitoring and impact indicators. It has an online tracking platform which provides information for

	decision-making, in a timely and effective manner. Indicators to measure vulnerability include: exposure to risk, sensitivity, adaptive capacities

Table 1. Analytical table

Based on this, it is possible to determine that this planning instrument combines investigation and data collection providing a robust analytical foundation for understanding vulnerability to climate change. In this manner, can be argue that the action plan in operational terms, is useful for understanding resilience in the broader framework of climate change and urban risk management, as it helps to identify:

- What are the hazards? What are the impacts?
- Who (which agent) or what (sector,) is going to be affected by which aspects of climate change?
- Specific sources of vulnerability and capacities associated with specific groups of agents and systems concerning specific change processes
- What needs to be done to address the impacts of climate change?

Still, as argued before, the focus on this climate adaptation planning and urban risk assessment approach, leaves out important issues that should be taken into consideration to forecast future scenarios and define some priorities to increase socioecological sustainability and resilience. First, an important matter related to resilience is concerning the degree to which cities can tolerate alteration is the level of exhaustion of natural resources. This matter deserves a high priority, as it represents a future shock that can affect environmental vulnerability entering the city in a condition of hysteresis. This concept relates a process of degradation which is not reversible by merely eliminating disturbances and may lead to new states (Westoby et al., 1998).

Cities as complex systems have multiples states, and the path back from a disturbance is often different than the path forward, some impacts may be considered irreversible, and may lead to new states. So, resilience does not always require that the system will return to its previous state or equilibrium but instead can adapt and transform into a new state that will allow it to survive further and future change (Folke, C. et al., 2010).

In this sense, Arefi (2011) argues that cities share these resilience abilities and are the subject of a various range of changes (Arefi, 2011).

Therefore, it is essential to use, as analytical tools, ecological concepts that will present a clear idea of the critical attributes of the urban system: adaptive capacity, self-organization, and transformability (Eraydin, 2013). This includes, natural resources availability, carrying capacity, ecological balance, environmental assessment scenarios, **(Rosales, 2017).** In addition, a resilient strategy should not be based only on mitigating and adapting to climate change, it should incorporate how to carry out incremental adjustments to move the city towards a circular metabolism and sustainable urban futures.

Second, resilience is, a powerful concept as it encompasses a better understanding of the complex interactions between the different components of socioecological systems including resource flows (production, supply and consumption chains; built environment (ecosystem services in urban landscapes); social dynamics (human capital and inequity); and governance networks (institutional structures and organization); their strengths and weakness. Therefore an underlying aspect interwove among these components is the notion of risk and vulnerability, which is not only related to exposure, sensitivity and adaptive capacities of a population but also with the specific social, ecological, political and economic processes that lead into vulnerable conditions (Campanella, 2006).

These multifactorial conditions have a particular interest in assessing resilience because vulnerability can be shifted onto disempowered populations (such as urban peripheries, and rural and peri-urban environments), or gained at the expense of adjacent cities (regional or national) or smaller (district level) systems (Chelleri & Olazabal, 2012).

Understanding the way how cities grow and metabolizes nature through infrastructure, not only reinforces an unequal distribution within regions, urban-rural domains, but also can lead to the empowerment of al-ready powerful and advantaged groups, while disempowers marginalized individuals and groups (Heynen, N., M, Kaika., & Swyngedouw E., 2006) can serve as a starting reflection point to determine opportunities and threats of urban systems to become more resilient and sustainable.

Therefore, indicators that better reflect the complexities of urban flows in relation to resilience, such as the metabolic flows of cities and regions (Rosales, 2018), which are a key component to understand the vulnerability matrix in the wider context of a sustainable development, should be incorporated.

In an attempt to illustrate how these oversights of the climate adaptation planning can be overcome, and properly carry out a resilience assessment, the next section will incorporate urban metabolism and sustainability environmental indicators into the analysis.

2.3. An assessment framework for the use of resilience in urban planning

Understanding urban-regional metabolism dynamics for climate adaptation and mitigation scenarios

In 2012, Mexico City consumed approximately 14 million MWh, which represents 7% of annual national energy consumption. The city's location is in a basin, where there are not intensive processes of electricity generation, oil activities or heavy manufacturing. So, only 20% of electricity is generated within the area, while the rest comes from the National Interconnected System (SENER, 2009). These issues imply that the city needs to design a strategy to be prepared to possible sustainability crises, such as energy shortages, pointing out as well, the imperative to move the city towards alternative (back-up) and diverse energy supply sources.

In the same year, the city produced 31.842 million tons CO2 equivalents emissions which, 80% derives from energy consumption in the form of fossil fuels and electricity, mainly from the transport sector while solid waste is the second factor which contributes to emissions generation (Molina et al., 2013).

Modelling scenarios estimate that in 2020 CO2e will increase to 34.5 million tons, and by 2025 about 37 million tons of CO2e, while the PACCM 2014-2020 will contribute to the

reduction of 8 million tons of CO2e and 2 million tons (Gobierno de la Ciudad de México, 2014).

These facts raise questions that both policymakers and planners need to consider. For example, material flows such as solid waste, which is also a significant contributor to emissions, would imply that building strategies for a resilient city need to set goals for dematerialization (consumption of fewer materials) and how to carry out incremental adjustments to move the city towards a circular metabolism.

In regard to disturbances, the scenarios methodology to project and predict the future risk associated with the climate change impacts, shows that according to the climate evolution patterns for Mexico City in the short (2030) and medium term (2050) possible future shocks could come from: a) The agricultural cycles by changes in the seasonality of temperature and rain; b) The creation of new habitats for the development of pest or disease vectors; c) Changes in biological diversity biomes and; d) Shortage of water resources.

Regarding to natural resources, even if water scarcity has always been a red spot for sustainability in Mexico City, water shortage factor of risk is not considered, in the current model as an environmental vulnerability which could drive changes in the system at multiple scales (for instance, an ecological region). So, if additionally to climate change scenarios we incorporate environmental indicators to understand the urban –regional metabolism dynamics, we can have a broader picture of imbalances in the urban system to forecast possible short and long-term disturbances that will help to adjust in the face uncertainty, designing prevention and adaptation strategies to manage this scenario.

For instance, water stress indicators can reflect the total volume of water extracted concerning the average natural water availability. In the case of Mexico City, water stress in the region is 120% (SEMARNAT, 2010).

Water supply has increasingly come from farther away. So the transfer of water extends about 130 kilometers. In addition to this long distance, Mexico City location in a valley implies that water must be pumped a thousand meters, equivalent to the burning of 3.4 million barrels of fuel per year (Tudela, 1991).

This information, therefore, not only confirms the strong dependency on external sources of water supply but also raises questions about the marked vulnerability to water availability, revealing how this relates to the contribution to green gas emissions; and the levels of environmental impact of the city.

The notions of resilience is related to the capacity to cope with disturbances, alternative stable states of complex systems and a dynamic balance. From this perspective, resource availability of the city to supply urban population demands, and ecological balance are also, two important factors to consider.

Bearing in mind that the predicted Biocapacity of the Earth estimation is 01.8 global hectares per capita (World Watch Institute, 2007), and the following results from the quantification of Mexico City carrying capacity (166, 031 Ha).

LAND USE	Has
Fossil energy absorption *has been related to forest surfaces (172.22 km2) and reforested areas (4 km).*	*17,622*
Built area *Local capacity to support urban infrastructure has been correlated with total built area, which corresponds to urban and industrial land use*	*59,192*
Cultivable area *for food production is related to the agricultural area*	*37,184*
Pastures *are associated with grassland, desert scrub and secondary vegetation.*	*34,527*
Forest	*17,222*
Water *and the category sea (water) is related to water bodies*	*284*
TOTAL	*166,031*

Table 2 Local Source: Authors elaboration based on (INEGI, 2010)

Mexico City to be ecologically sustainable would need about 15,906,631 ha. Ergo, the City has an ecological deficit of 15,740,600 ha because its population surpasses its carrying capacity in 90%, entering in a condition known as ecological overshoot.

These facts reinforce the importance to consider the availability of resources and urban metabolism dynamics, in order to assess its adaptive capacity, self-organization, and transformability. Mostly those related to water bodies to supply the demand, and food self-sufficiency regarding the low production due to the limited agricultural amount of space available. In particular, because climate change can exacerbate impacts affecting agriculture systems and water shortage. So, integrating food security and urban water cycle as analytical elements into urban planning should be established as a critical aspect of any comprehensive urban resilience strategy.

Understanding the vulnerability of urban systems in the context of an equitable and sustainable development.

While it is true that the city has a water shortage, due to the levels of exhaustion of the resource, and the fact that in the Metropolitan Area of Mexico water supply systems have been operating beyond their limits. This situation depends on the specific social-economic condition of the area in such way that unequal access to resources and disparities in the provision of infrastructure affects mostly the population in the southeast areas (Iztapalapa, Tláhuac, and Xochimilco), which have the lowest income levels.

Accordingly, to the Climate Change Action Program, the degree of exposure to the risk in the city varies from low to medium where the vulnerable population localizes on the south (in the delegations Tlalpan, Magdalena Contreras, Álvaro Obregón and Cuajimalpa). Mainly, characterized by irregular human settlements patterns, where the steep slope is very prone to washouts by the presence of water erosion.

Vulnerability
Critical
Iztapalapa, Alvaro Obregon, Tlalpan, Tlahuac, Xochimilco y Milpa Alta
Medium
Azcapotzalco, Coyoacan, Cuajimalpa,Gustavo A. Madero, Iztacalco,La Magdalena Contreras y Venustiano Carranza
Above average
Benito Juarez, Cuauhtemoc y Miguel Hidalgo

Table 3 Degree of exposure to risk of the population in the city. Source: (Gobierno de la Ciudad de México, 2014)

Following the assessment model, when adding the effects of climate change such as 1) Growth in water demand. 2) Increased degradation in catchment areas. 3) Reduced water quality and recharge, among others, it is possible to foresee the way in which some parts of the city will increase their vulnerability.

As the table 2 shows water availability in the different municipalities of the city, already present critical levels of consumption in those settlements with the lowest welfare conditions, while higher income sectors consume over 80% of the water provision available.

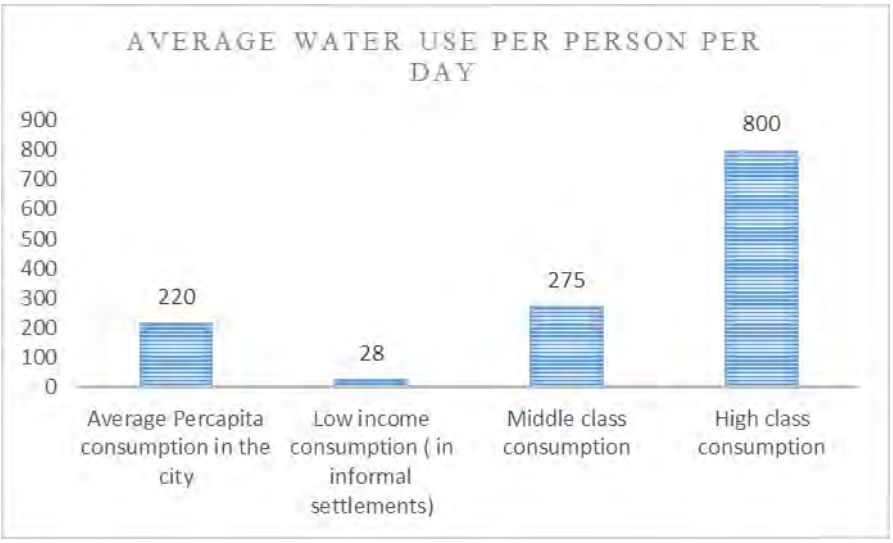


Figure 2. Water consumption inequities. Source: authors elaboration based on (López, 2006)

These contradictions that extend beyond the city limits, due to the way city metabolizes nature, not only reinforce an unequal distribution of metabolic flows within but also generates vulnerability in nearby areas.

For instance, water scarcity impacts ecological systems at a bioregional level. The average production of wastewater in the sub-region in 2012, amounted to 1.66522 million m3. From this, only 78% of channels treatment plants. The water waste re-usage has come up to only 4 %. Then, 22% of the negative externalities of Mexico City are transferred to other regions, displacing environmental risk and vulnerability to rural areas such as the Mezquital Valley (Rosales, 2013).

This better understanding of why people and places are affected differently, and how the growing inequalities in the cities constrain or trigger this conditions of risk and vulnerability in the urban space, and among regions point out critical issues concerning environmental justice at different scales, that should be also incorporated into planning.

Understanding resilience in a wider context. Adaptive capacity, self-organization, and transformability

One of the main aspects that underlies the conceptualization of resilience in the case study presented, is related to the capacity to cope with disturbances and return to a stable state. Nevertheless, as Timon McPhearson argues "…given the often enormous inequities in our cities, we need to be thinking about resilient of what, to what, and perhaps especially, for whom?"… (McPhearson, 2014).

As planner, and inhabitant of Mexico city, I can argue that the city has become a resilient entity, while remains highly vulnerable to factors such as social inequality, uncontrolled growth of urban sprawl, informal settlements, natural resources scarcity, and ecological systems degradation.

The poor and vulnerable are continually being resilient, under the disturbances and changes due to socio environmental dynamics, as that is how they live their lives. In this way, the city has achieved a precarious balance that maintains the urban system "functionality" despite its environmental crisis and its ecological overshoot.

So, one of the questions which raises this case study, is do we really want to maintain this fragile equilibrium and the status quo, or what we need is a new state, and a city resilience transition strategy acting in the interests of the poor and vulnerable and highly degraded environmental systems.

A comprehensive urban redevelopment strategy changing internal and external processes and socio environmental dynamics can provide the means to shift the growth trajectory of the city towards a more equitable, environmentally sound and therefore sustainable direction (Agyeman, 2013). But, how can we move towards this direction?

3. Rethinking adaptation planning

The theory of resilience can support the conceptualization and development of tools, to help understanding the city as a complex socio-ecosystem and manage urban sustainability

transitions, by providing a long-term perspective based on the three key concepts: learning, adaptation, and transformation (Walker & Salt, 2006).

This broader perspective implies going beyond the use of resilience and disaster risk reduction assessment and climate change adaptation.

This latter interpretation based on resilience as a dynamic process involving recover from disturbances, but also to carry-out incremental adjustments (adaptations) and; exploring and expanding the capacity to innovate and transform (Holling, 1973), can then, become the frog leap to move planning adaptation framework towards a more comprehensive and integrated approach to face sustainable transformations.

This process, according to Olsson, requires: (1) preparing for change, (2) navigating the transition, and (3) building the resilience of the new trajectory of development (Olsson et al., 2006).

The question then is, how can this transformative notions of resilience be introduced in existing adaptive planning? This article argues that the shift can be done by a) moving from risk management to uncertainty oriented planning, b) Understanding vulnerability in the context of an equitable, sustainable development; and as a result, c) embedding resilience as a heuristic device in planning models.

3.1. Moving from risk management and climate adaptive planning towards urban resilient transition: uncertainty oriented planning

Moving from vulnerability risk analysis to urban resilience transitions call for understanding urban- regional metabolism dynamics; the degree to which cities can tolerate alteration and perturbances before reorganizing; dealing with uncertainties; conceptualizing what transformations are needed; setting targets and ways of transiting towards sustainability processes and scenarios, and new rationality in planning.

This focus on change and uncertainty, challenge mainstream planning models, based on the two dominating paradigms, rational, comprehensive, and communicative planning, which have dominated the practice. First, because often look at past trends and known problems instead of dealing with uncertainties (Jabareen, 2012). Secondly, because adaptive planning frameworks, which emphasize maintaining the resilience status of the city, do not appear to be contributing sufficiently to the achievement of resilience at the broader context of the sustainable paradigm.

Thus, resilience planning should integrate risk management, adaptive planning in the broader frame of planning for urban sustainability.

As illustrated with Mexico City case study, this integration requires a systemic view for understanding the different processes or components and the way how they interact with each other. For instance, the dependency that cities have on external resources such as food, water, products and energy; and the adaptive capacity of the city to respond to threats related to resource crises or climate/natural disaster events.

These should be complemented by a science policy interaction that can help to design appropriate strategies for a resilience city transition, such as slow exploitation, goals for dematerialization (consumption of fewer materials) and decarbonization (consumption of less carbon).

4. Concluding remarks

Urban resilience transition demands new strategic approaches to planning frameworks, methodologies and evaluation tools. This challenges not only conventional planning models but also states the importance of evaluating the way resilience has been revisited and embedded in contemporary planning. Therefore, it is essential to bring our analytical gaze to the theory and planning practices which attempt to target an urban resilience transition, comprehensively, to promote more suitable and effective proposals towards the construction of sustainable cities.

The analysis of Mexico City Climate Change Programme helps illustrate the incorporation of resilience within the aims and practices of contemporary planning instruments. Also, what the advantages and shortcomings of the conceptual approaches adopted and the proposed strategies are.

In this regard, one of the critical points of the discussion of this article is that evidently, resilience has been, mainly, incorporated in instruments based on DPRS approach resulting on climate adaptation planning.

Even though the above approach is an advance into integrating economic, environmental and social aspects with mitigation and adaptation into planning, there has been a narrow use of the resilience concept.

Urban resilience transitions necessitate going beyond identifying and predicting the impacts of climate change spatially to overcome disaster situations, vulnerability or possible impacts.

Resilience as a heuristic device has the potential to forward sustainable transformations, instead of preserving the status quo of the stable condition on which the city and their inhabitants have found an equilibrium grounded on ecological overshoot, poverty, sprawl, inequality, and threats to human and ecosystem health.

Embedding transformative resilience into planning frameworks offers excellent possibilities to understand the interactions among metabolic flows, the environment, social dynamics and governance networks. As well as the conceptualization of strategies to manage urban sustainability transitions which encompasses: exploring the capacity of urban systems to cope with short-term disturbances and long-term changes; stretch resources to meet the increased demand for shelter, water, secure food security and energy in scenarios of scarcity; adapting to new scenarios; and enable transition of new trajectories of change.

In sum, the value of incorporating resilience into planning should lie on the way this heuristic concept can help us to face transformations towards social, economic and ecological sustainable systems.

5. References

Abhas K. Jha, Todd W. Miner, and Zuzana Stanton-Geddes. (Eds). (2013). *Buinding urban resilience: Principles , tools and parctice.* Washington: The World Bank. Y en texto se tendría que citar (Abhas, et al., 2013).

Agyeman, J. (2013). *Introducing Just Sus-tainabilities: Policy, Plannig, and Practice.* Ney York: Zed Books.

Arefi, M. (2011). Design of resilient cities, reflections from a studio. In L.-S. Tidib (Ed.), *Companion to urban desgn* (pp. 674-685). Abingdon: Routledge.

Biggs, R., Schüter, M., & Schoon, M. L. (2015). *Principles for building resilience: Sustaining ecosystem services in social-ecological systems.* Cambridge: Cambridge University Press.

Campanella, T. (2006). Urban Resilience and the Recovery of New Orleans. *Journal of the American Planning Association, 72*(2), 141 — 146.

Chelleri, L., & Olazabal, M. (2012). Multidisciplinary perspectives on urban resilience: a workshop report. (1st ed.). Bilbao: Basque Centre for climate change.

Cutter, S. (1995). Race, class, and environmental justice. Progress in Human Geography. In P. Robbins, *Political Ecology* (págs. 107–118).

Eraydin, A. (2013). "Resilience Thinking" for Planning. In Eraydin & A., Tasan-Kok, T. (Eds). Resilience Thinking in Urban Planning.

Folke, C., S. R. Carpenter, B. Walker, M. Scheffer, T. Chapin, and J. Rockström. (2010). Resilience thinking: integrating resilience, adaptability and transformability. *Ecology and Society* 15(4): 20. Retrieved from http://www.ecologyandsociety.org/vol15/iss4/art20/.

Gobierno de la Ciudad de México. (2014). *Programa de Accion Climatica de la Cidad de México 2014-2020.* Ciudad de México: Gobierno de la Ciudad de México.

Gunderson, L., Kinzig, A., Quinlan, A., & Walker, B. (2011). Resilience: leading transformational Change. *Ecology and society, 16*(2).

Hearn, B. (2008). *Community resilience: A social justice perspective.* Florida: Community and Regional Resilience Initiative.

Holling, C. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics, 4*, 1–23.

ICLEI. (2012). *Resilient Cities 2012: Congress Report. Bonn.* Germany. ICLEI.

INEGI. (2010). *Usos del suelo y vegetación del Distrito Federal.* Aguascalientes: INEGI.

Jabareen, Y. (2012). *Planning the resilient city: Concepts and strategies for coping with climate change and envirenmental risk. In Cities.* Retrieved from http://dx.doi.org.ezp.sub.su.se/10.1016/j.cities.2012.05.004

Lampis, A. (2015). *Resiliencie & cities*. Critical thoughts on an emerging paradigm [Entrada en blog]. UGEC VIEWPOINTS. Retrieved from (https://ugecviewpoints.wordpress.com/2015/10/08/resilience-cities-critical-thoughts-on-an-emerging-paradigm/)

López, F. M. (2006). Niveles de dotación de agua y drenaje en la Zona Metropolitana de la Ciudad de México. En A. G. Aguilar (Ed.), *Las grandes aglomeraciones y su periferia regional* (pp. 143-179). México: Porrúa, UNAM.

McPhearson, T. (2014, June 08). *The nature of cities. The Rise of Resilience: Linking Resilience and Sustainability in City Planning* Retrieved from http://www.thenatureofcities.com/2014/06/08/the-rise-of-resilience-linking-resilience-and-sustainability-in-city-planning/

Mitchell, J. (Ed.). (1999). *Crucibles of Hazard: Mega-Cities and Disasters in Transition.* Ney York: United Nations University Press.

Molina, M., *Belausteguigoiti*, J. Velasco, G., Becerra, L., & Carreras, I. (2013). *Propuestas estratégicas para el desarrollo sustentable de la Megalópolis del centro de México.* México D.F.: Centro Mario Molina para Estudios Estratégicos.

Heynen, N., M, Kaika., & Swyngedouw E. (2006). *In the nature of cities: urban political ecology and the politics of urban metabolism.* London and New York: Routledge Taylor & Francis Group.

Olsson, P., Gunderston, S. R., Carpenter, P., Ryan, L., Lebel, C., Kolke, C., & Holling, S. (2006). Shooting the rapids:navigating transitions to adaptive governance of socio-ecologycal systems. *Ecology and Society, 11*(1), 18. Retrieved from http://www.ecologyandsociety.org/vol9/iss4/art2/

Quintero, L. (2016). CDMX estrenará plan de resiliencia en septiembre. *El economista*, p. 12.

Resilience Alliance. (2007). *Urban Resilience Research Prospectus: A Resilience Alliance Initiative for Transition Urban System Towards Sustainable Futures.* Resilience Alliance.

Robins, P. (2012). *Political Ecology.* New York: Wiley-Blackwell.

Rosales, N. (2013). *"Nuevos desafíos de la planificación urbana: pautas para la instrumentación de los principios de sostenibilidad y su aplicación al caso de la Ciudad de México".* Madird: Instituto Universitario de Ciencias Ambientales, Universidad Complutense de Madrid.

Rosales, Natalie (2017). "How can an Ecological Perspective be used to Enrich Cities Planning and Management?", *Urbe - Revista Brasileira de Gestão Urbana.* 9(2), 314-326

SEMARNAT. (2010). *Balance del agua.*
http://app1.semarnat.gob.mx/dgeia/informe_resumen/07_agua/cap7.html.

SENER. (2009). *Prospectiva del Consumo ener-gético 2009.* Mexico: Retrieved from: http://sie.energia.gob.mx/. The Bartlett Development Planning Unit. (12 March 2016). *Environment, justice, urbanization and resilience.* [Blog]. The Bartlett Development Planning Unit. Retrieved: (https://www.ucl.ac.uk/bartlett/development/research/research-clusters/environmental-justice-urbanisation-resilience)

Tudela, F. (1991). *El laberinto de la complejidad. Hacia un enfoque sistemico del ambiente y la gestión de los servicios en América Latina.* Ciudad de México: El Colegio de Mexico.

UN HABITAT. (2016). *Resilience*. Retrieved from http://es.unhabitat.org/temas-urbanos/resiliencia/)

Walker, B., & Salt, D. (2006). *Resilience thinking: Sustaining Ecosystems an People in a Changing World.* Washington: Island Press.

Wilbanks, T. J. (2008). *Enhancing the Resilience of Communities to Natural and Other Hazards: What We Know and What We Can Do. Natural Hazards Observer.* 32(4), 10-11

World Watch Institute. (2007). *La situación del mundo 2007. Nuestro futuro urbano. Informe anual sobre el progreso hacia una sociedad sostenible.* Barcelona: Ed. Icaria.

Case Study / Project

Relict Ecosystems in Urbanized contexts.

Challenges and opportunities to renature cities, ecological restoration, and biodiversity enhancement through planning for sustainability.

Natalie ROSALES

Abstract

How can planning assist cities to transit from natural resources consumer and waste producers that impact the environment, into natural spaces that enables ecological processes that support life, sustains flora and fauna, enhance biodiversity, and promote sustainable development values? This paper argues this can be done through comprehensive planning strategies that promote a regional and urban environmental development project that enhances renaturing cities from an ecological restoration base. By presenting a case study on a protected area, located in Morelos, Mexico, now embedded into an urbanized context, this explorative research reflects on the challenges and opportunities of relict ecosystems to trigger leverage: renature cities, ecological restoration, biodiversity enhancement, and urban metabolism retrofit. The paper analyzes in a relational manner the challenges ecosystems which formerly ranged over a vast expanse, but are now narrowly confined in urbanized contexts face: informal settlement on core protected areas; environmental pollution, as natural elements such as rivers have become the dump of urban flows; biodiversity loss. The methodology is based on different concepts, methods, and techniques, coming from urban environmental disciplines, which have been conveniently integrated. A body of relational matrices has been developed, to analyze the urban and environmental variables as a whole. This methodology allows us to qualify and to quantify the local and regional environmental impact of cities on protected areas and offers a quick assessment of urban sustainability, which includes metabolic flows.

The vision of environmental services, river restoration, urban biodiversity enhancement, are also considered into the study. As a result of the analysis, the paper envisages the opportunities to renature cities by linking relict ecosystems in a way that urban development strategies can assist recovering the structure and functionality of ecosystems, and through this ecological restoration increase urban biodiversity, environmental conservation, and protection, and give cities esthetic naturalness. By doing so, this piece of work shed light on new ideas that can break down silos between urban and environmental planning and get to a more holistic and sustainable perspective approach to city-making.

Research Paper

SYSTEMS APPROACH: CLIMATE CHANGE, GLACIER MELT AND DEVELOPMENT PLANNING OF THE HIMALAYAN REGION

Sakkeri Ramya, Indian Institute of Technology Roorkee, India
Prof. V. Devadas, Indian Institute of Technology Roorkee, India

Abstract

Experience over the last decade has demonstrated a gradual rise in global temperatures, which coupled with the unpredictable precipitation patterns (rainfall & Snow/ glacier melt are considered as important hydrologic process in the Himalayan basins), are expected to seriously affect the melt characteristics and further increase pressure on available water resources (both quantity and quality). The situation is being exacerbated intensified by the increasing water demands from agriculture, industry and rising population. However, current investigations reveal that there is a lack of a general framework for assessment. The major responsibility of the planning community is to adopt rational planning approach addressing the complexity of the system, yet it is appearing that the models used at various stages are not well developed to keep the same pace. This demands the acknowledgment and a better understanding of the dynamic inter-linkage and interdependence of the complex systems and sub-systems (namely physical, social, economic, ecology, environment, infrastructure, and institutional subsystems) using system dynamics technique.

The aim of this paper is to develop a methodology for assessing the climate change and its impact on a region by demonstrating the inadequacy of sectoral and silo-based planning approaches to address the complex sustainable development challenges whose interdependencies and inter-linkages transcend individual sectors and administrative borders. Further, this paper attempts to present the review of research done on the use of an integrated approach by using system dynamics technique in the context of evolving development plans. It concludes with extending the knowledge to support climate change adaptation and mitigation decisions to achieve sustainable development at the regional scale.

Keywords

System dynamics, Sustainable development, Engineering village, Water resources

1. Introduction

As per Inter Governmental Panel on Climate Change Assessment Report (2007) , more than 1/6th of world population depend on snow-melt or glacier fed rivers and the galciers are expected to continue to melt as the temperature rise. Changes in recent climate and associated impacts on natural and human systems have been reported widely (IPCC, 2014; Azhoni, Jude and Holman, 2018). Himalayan glaciers are sources of freshwater reserves providing headwaters for 10 major river systems in Asia – a lifeline for almost one third of

humanity. Glaciers supply freshwater to 500 million people in Himalaya- Hindu- Kush region and 250 million people in China (IPCC). The system of water resources for sustainable development is a large, complex and nonlinear system and development of social economy can be seriously restricted by potential shortage of water resources (Winz, Brierley and Trowsdale, 2008; Chen and Wei, 2014). The situation is being exacerbated intensified by the increasing water demands for agriculture, industry and rising population. However, current investigations reveal that there is a lack of a general framework for assessment.

The present review paper aims to consolidate the state of the art in climate change, glacier melt and development panning. This study identifies the key knowledge gaps for successful implementation of adaptation strategies. This review paper brings together current literature on climate change, glacier melt and applications of system dynamics with the aim of identifying characteristics that enable decision makers in sustainable development planning of a region. It is divided into five sections. Section 1 has identified the need for consolidating the current knowledge on climate and argues the relevance of this review in the current discourse on climate change adaptation particularly for sustainable development. After the brief introduction to the aim and significance of the review in Section 1, Section 2 brings together the current status of literature. Section 3 identifies the remaining gaps in the empirical literature. Section 4, framework to achieve sustainable development is discussed in detail. Finally, conclusions are drawn with key climate change mitigation and adaptation measures in Section 5.

2. Current state of the literature

The authors performed a systematic analysis of literature on Climate change, glacier melt and development planning (Figure 1), through the following steps: (i) Search for scientific publications on the Engineering Village platform (COMPENDEX and INSPEC) using a set of key words, such as System dynamics; Climate change, and Controlled terms as Water resource; Sustainable development; Planning; (ii) Initial search resulted 2,04,377 records (excluding duplicates) between the years 1884 and 2020, including all document types viz., Journal articles, conference proceedings, dissertations, etc., (iii) Later, to avail the most updated literature on this subject the search was limited to past decade, i.e., between 2009 and 2018, including 1,43,387 records; (iv) further, the authors conducted a search limiting to journal articles only (66,417 records), as they represent a more mature research on this subject with stronger methodological background; (v) To refine the results the search was limited based on controlled vocabulary, such as socio-economic effects, environment factors, climate mitigation, glacier melt; (vi) Content analysis of 614 article abstracts was conducted to validate whether it focused on the role of system dynamics in the sustainable development process, as well as identify the dimension(or dimensions) it is centered on. The authors read full text when in doubt in order to understand its focus; (vii) Exclusion of articles that do not focus on the subject (208 records were excluded) (viii) Categorization of literature (406 records) was done based on focus sector based linkages involved in climate change resilient/sustainable development planning process; (ix) Informetric analysis of literature for 406 records was conducted to observe the trends in literature, identify top journals (Figure 3), determine classification code based on word frequency (Figure 3), and analyse the dispersion of articles in previous years and also with respect to publishers Figure 3. For this purpose, authors employed a software, the VOSviewer, which is often used in

bibliometric, scientometric, and informetric studies; (x) Critical analysis according to defined categories; Currently, the bibliometric, scientometric and informetric analysis are the three main metrics to quantitatively analyze the scientific literature (Qiu, J., R. Zhao, S. Yang, 2017). Santos et al., (2019) explains that bibliometric analysis focuses on the quantitative analysis of the published articles, such as, number of publications per year. On the other hand, scientometric studies quantify the researchers' achievements, such as citation analysis. In contrast to the aforementioned, the purpose of informetric analysis is to obtain additional information, such as word frequency and dispersion of literature.

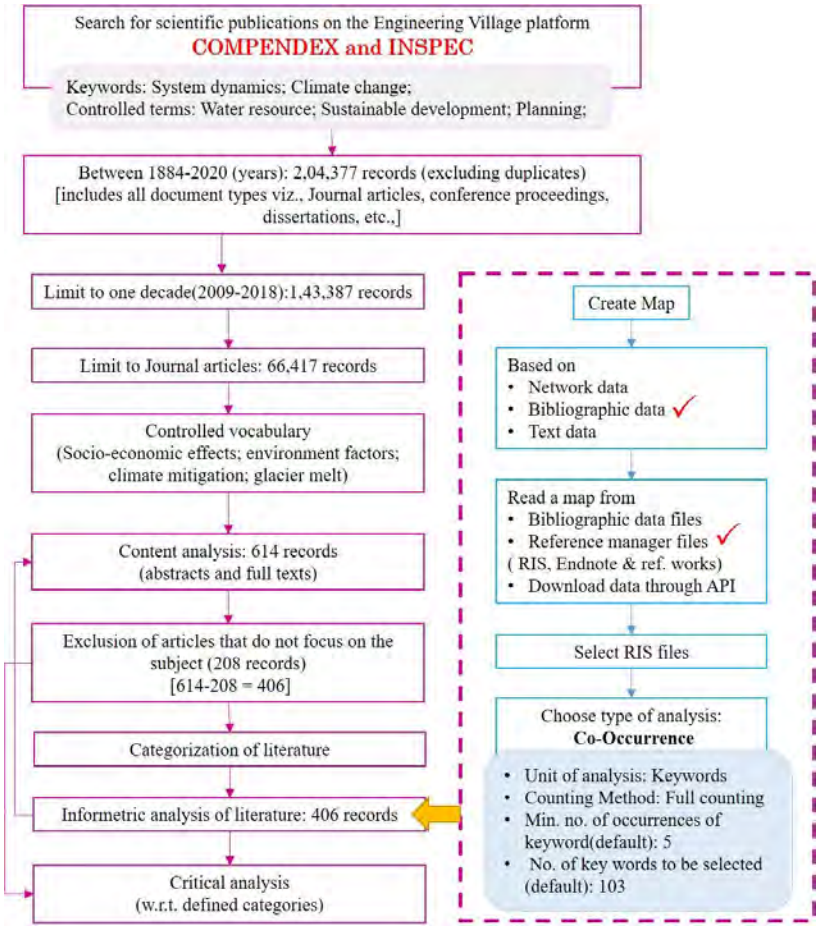


Figure 1: Methodology adopted for a systematic analysis of literature on sustainable development planning and system dynamics

In this study, informetric analysis as carried for the 406 records that are obtained after exclusion of articles that do not focus on subject. The information obtained from informetric analysis was later validated by a content analysis, in which gaps and trends were identified. It is observed that the articles are largely concentrated on the three major pillars of sustainable development, such as environment, economic and social dimensions. However, it is important to note that there is a possibility that an article can fall under more than one category too (Figure 2). Further, it is observed that publications on this subject registered an exponential growth, with 77.5% of the articles being published in the last five years (Figure 2). A total of 1308 authors were identified contributing for 406 published articles. As high as 60 articles are from Journal of cleaner production followed by sustainability with 52 articles, energy policy with 12 articles (Figure 3). Also, Elsevier publications accommodates for 34% of the total articles reviewed and is followed by Emerald, MDPI, Springer, Wiley, etc., (Figure 3).

The articles largely focused keywords (top 5) are socio-economic effects, sustainable development, environment factors, climate mitigation and government policies (Figure 4).Lastly, Figure 5 shows the network analysis and cluster analysis of the top words used by the authors in the Keywords.

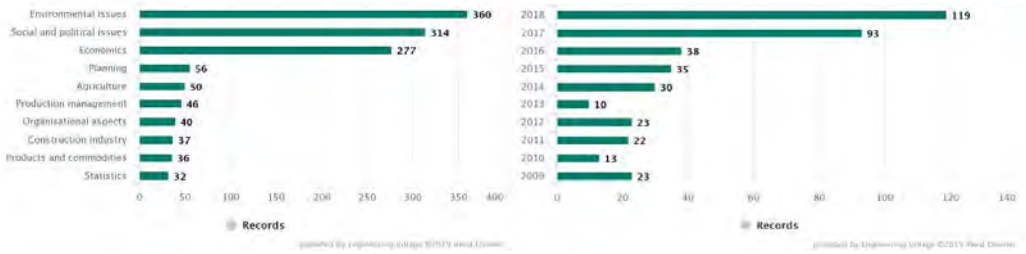


Figure 2:Graph showing articles count based on classification code (left) and year of publication (right)

Figure 3:Graph showing articles count based on journal title (left) and publisher (right)

Selected	Keyword	Occurrences	Total link strength
☑	socio-economic effects	406	898
☑	sustainable development	393	884
☑	environmental factors	306	675
☑	climate mitigation	127	313
☑	government policies	72	224

Figure 4: No. of Occurrences and total link strength of top 5 keywords identified

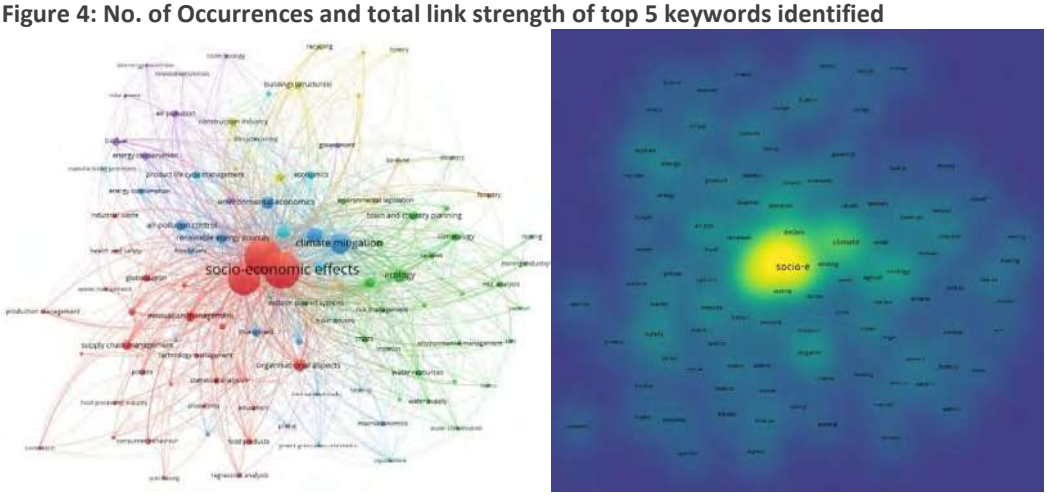


Figure 5:Network analysis (left) and cluster analysis (right) of the top words used by the authors in the Keywords.

3. Remaining gaps in the empirical literature

Climate change has been the focus of much research and analysis for more than a decade now. However, it is observed that the difficulties still exists in understanding the major processes of climate change despite the considerable knowledge of the broad characteristics of the climate. Despite the global implications of the problem, the overwhelming majority of the researchers involved worldwide in studying the problem and its possible solutions are from industrialized countries, and participation of lesser-industrialized countries has been limited (Kandlikar and Sagar, 1999).

According to Miller, Stumm and Stoffel (2012), "Glaciers across the region are generally shrinking but regional and temporal variation exists, and there is little to corroborate statements pertaining to accelerated rates of melt". This research is under taken to draw a defining line under such statements and set the research objectives towards better understanding the processes driving this melt, how climate forces change, and the potential impacts of increased / reduced melt water from glaciers and snow on future water resources under climate change scenarios. This compels climate change researchers not only to study each individual component of the climatic system but also focus on integrated modelling approach to enhance significant advances in understanding the indefinable and complex process of climatic change that enables the future planning initiatives within the region to consider the inter relationships among all the sub systems (seven) that could play a key role in achieving sustainable development.

The comprehensive study of literature reveals that researches have been conducted in the field of sustainable development planning by considering only one or two subsystems, and lack an integrated approach, which considers all seven subsystems of the system together. Some of the key recent studies done by various researchers /organizations are discussed here (Table 1). Also, the authors identified a gap in literature pertaining to the integration of the climate change, Glacier melt, water resource management and sustainable development planning by using system dynamics technique; however, literature on the aforementioned has grown considerably in recent years, which indicates that system dynamics technique is increasingly being used as a reliable method for sustainable development practices.

4. Framework to achieve sustainable development

Framework for development plan formulation by using system dynamics technique has been developed based on rational planning approach (Figure 6). System dynamics is a method of learning complex processes. System dynamics approach considers holistic view to analyze the functional aspect through the spread and backwash effects in all sub-systems of the system. Sterman (2000) states that System Dynamics is fundamentally interdisciplinary and is concerned with the behaviour of complex systems. System dynamics is grounded in the theory of nonlinear dynamics and feedback control developed in mathematics, physics, and engineering. As these tools are used to understand the behaviour of human as well as physical and technical systems, system dynamics draws on cognitive and social psychology, economics, and other social sciences. Also, system dynamics models are built to solve important real world problems.

Table 1: Focus of studies according to type of linkage and identification of the research gap from the literature reviewed

Type of Linkage	Focus of Studies	Sources	Research Gap
Impact of climate change on glaciers	Glacier Melting and Growing Crises	(Singh and Singh, 2013);(Kaltenborn, Nellemann and Vistnes, 2010);(Miller, Immerzeel and Rees, 2012);(Chandrappa, Kulshrestha and Gupta, 2011)	An Integrated Approach considering these linkages
Impact of climate change/ glacier melting on water resources	Integrated regional water management planning; assessing regional vulnerabilities and measuring regional impacts	(CDM, 2011); (Sharma and Sharma, 2008);	
	Rainfall, temperature and catchment hydrological responses	(Watts *et al.*, 2015); (Rajesh Bhakar, 2012);(Jansson, Hock and Schneider, 2003);(Prasad *et al.*, 2009);(Zeng and Cai, 2014);(Miller, Immerzeel and Rees, 2012)	
	Evaluation of Snow melt Runoff	(Panday *et al.*, 2014);(Singh and Jain, 2003);(Fujita and Sakai, 2014);(Duethmann *et al.*, 2015);(Omani, Srinivasan and Smith, 2016);(Prasch, Mauser and Weber, 2013);(Khan *et al.*, 2015);(Kumar, Singh and Singh, 2007);(Arora, 2010);	
Impact of water resources on sustainable development of the region	Physical (Climate, topography, landuse, soil type)	(Rahman *et al.*, 2015);(Nepal, Flügel and Shrestha, 2014);(Tadele and Förch, 2007)	
	Social (Demography, Health, Education, Occupation, Culture/customs)	(Cox, 1987);(Mittal, Tripathi and Sethi, 2008)	
	Economic (Resources, GSDP/NSDP/Percapita income, Sectors of economy, Finance)	(Bajracharya, Shrestha and Shrestha, no date);(Kaltenborn, Nellemann and Vistnes, 2010);(Singh and Pallavi, 2015); (Harender Raj Gautam, 2012)	
	Ecology (Flora & Fauna)	---	
	Environment (Pollution, Water resources, Forestry)	---	
	Infrastructure Physical (Electricity, Water supply, Sewerage, Transport, Energy); Social (Education Health, Recreational,etc) Economy(Banks,co-operations, Markets/SEZ's);	Physical: (Asian Development Bank, 2014); Social:--- Economy: ---	
	Institutional (Local self-Government, DRDA, MoUD, Regional planning board, MoEF, CWC, CPCB/SPCB, Planning Commission)	----	
Source: Compiled by the authors			

Like many other disciplines, system dynamics has witnessed various changes in its philosophy, strategy, and technique, in the course of its ongoing evolution. In accordance to the problem statement or need of the study, the sub-systems considered in each case differs. The framework developed in this paper is an improvised version from its first application by one of the authors. He has employed System Dynamic technique in different doctoral research theses and masters' theses in supervision of one of the author's at Department of Architecture & Planning, Indian Institute of Technology Roorkee and are presented as follows: Salim (2004) worked on Integrated development plan of Thiruvananthapuram City, Kerala with main focus on population; housing; health, education and energy sub-systems. Similarly, others like Das (2006) prepared Tourism development plan for Bhubaneshwar and Cuttack Region, Orissa by considering tourism and tourism related infrastructure as the catalyst for the development of the region, with focus sub-systems as Population and population density; roads and its networks; railways; hotels and number of beds; land and land-use. Sonar (2006) worked with Information technology as the focus theme for Pune City, Maharashtra by considering sub-systems , such as population and population density; transportation (road lengths); power; commercial area; housing (household units); human resources; information technology industries. Zia (2007) in her work considered the Solid Waste Management (SWM) and required infrastructure for SWM as catalyst for the development of the Kanpur city. The sub-systems considered are: Population and population density; household waste generation, industrial waste generation, commercial and market waste generation, collection, transportation, treatment and disposal; environmental stress, infrastructure requirement in formal sector and manpower requirement in informal sector. Chauhan (2009) used optimal transportation system for the development of the city involving sub-systems, such as Population and population density, household vehicle ownership, residential-parks and playground transportation land-use, vehicular population, modal split and transportation demand. The work of Pipralia (2010) was based on hypothesis that optimal municipal financing management will deliver good services to the city. It was observed from the literature that no work was attempted by employing system dynamics in this line. Sub-systems considered for financial management of Jaipur city are: Population; domestic water supply; waste water; solid waste management, developed urban, residential area, road length and road density; infrastructure network and investment cost; urban finance. Kumari (2015) focused on regional development of Patna Region by increasing the standard of living, involving following sub-systems: Population and population density, sex ratio, literacy rate and IMR (infant mortality rate); area under HYV (high yielding variety) crop, net irrigated area, and rate for fertilizer consumption; electrification of villages, pollution level and road length; use of farm machinery and pesticides; production of cereals, pulses, vegetables, fruits, flowers, milk, egg, meat, fish; GDP from agriculture and allied activities, industrial sector; GDP and per capita income; and sector-wise planned and non-planned expenditure. Energy Management plan for Jaipur city was developed by Kumar (2016) by considering the optimal energy management as catalyst for the development of the system with sub-systems such as, Population, energy generation from sewage waste water, energy generation from municipal solid waste, energy generation from solar photovoltaic system, electricity consumption for domestic buildings, household domestic purpose, commercial purpose, industries, street lights, mixed usages, agriculture purpose, domestic cooking purpose, transportation, total registration of vehicles. Rawal (2016) worked on transportation system of Kanyakumari district by considering sub-systems such as: Population and vehicle growth

model, road network gap index, road network capacity gap index, overall road network level of service, hierarchical road network level of service, GDP and employment, transportation investment, carbon emission gap, fuel consumption gap, transportation area unused or wasted, MSME, tourism growth, District attractiveness index. Land Management plan for Jaipur City was developed by Nigam (2016) using City development index and considered Population, land-use, housing, finance, tax collection, infrastructure (physical and economics), land related institutions, urban environment sub systems. Regional development plan for Lucknow city was developed by Gupta (2017) considering all three pillars of sustainable development concept. The sub-systems involved are Population, health index, education index, housing index, infrastructure index, land-use, crop production, livestock and milk production and horticulture.

The methodology developed in this paper involves stages as follows: Initially the problem is identified through either literature review or theories/concepts or by knowing the current condition/existing scenario of the region through various stakeholders and then a goal is formulated accordingly. Parameters concerning climate change, glacier melt, and sustainable development planning are thereby identified, and the quantitative and qualitative data for the identified parameters is collected by using primary and secondary surveys. Further, data analysis is carried out by applying analytical methods/ techniques that leads to identification of control parameters of the system (region). The identified control parameters are further distributed among seven sub-systems, namely, Physical, social, economic, ecology, environment, infrastructure and institutional. A qualitative/conceptual model is developed, which is represented in the form of causal-loop diagrams with a defined system boundary. Later, qualitative simulation model represented as stock flow diagram is developed by using the following stages: (1) Formulation of base year system dynamic model;(2) Model validation (evaluate and test model); (3) Evolving projected year system dynamic model; (4) Application of the model under different alternative conditions. Results obtained from the analysis are studied in detail, and in case the obtained results are unsatisfactory or contain any error then go to data analysis stage to rectify the error or change the analytical method/technique adopted in accordance to problem statement requirement. Once the results obtained are found satisfactory, then the findings are to be synthesised to evolve plausible solutions and implement the suggested recommendations. Finally, the key indicators/control parameters are tracked and the progress is evaluated in accordance with the problem statement.

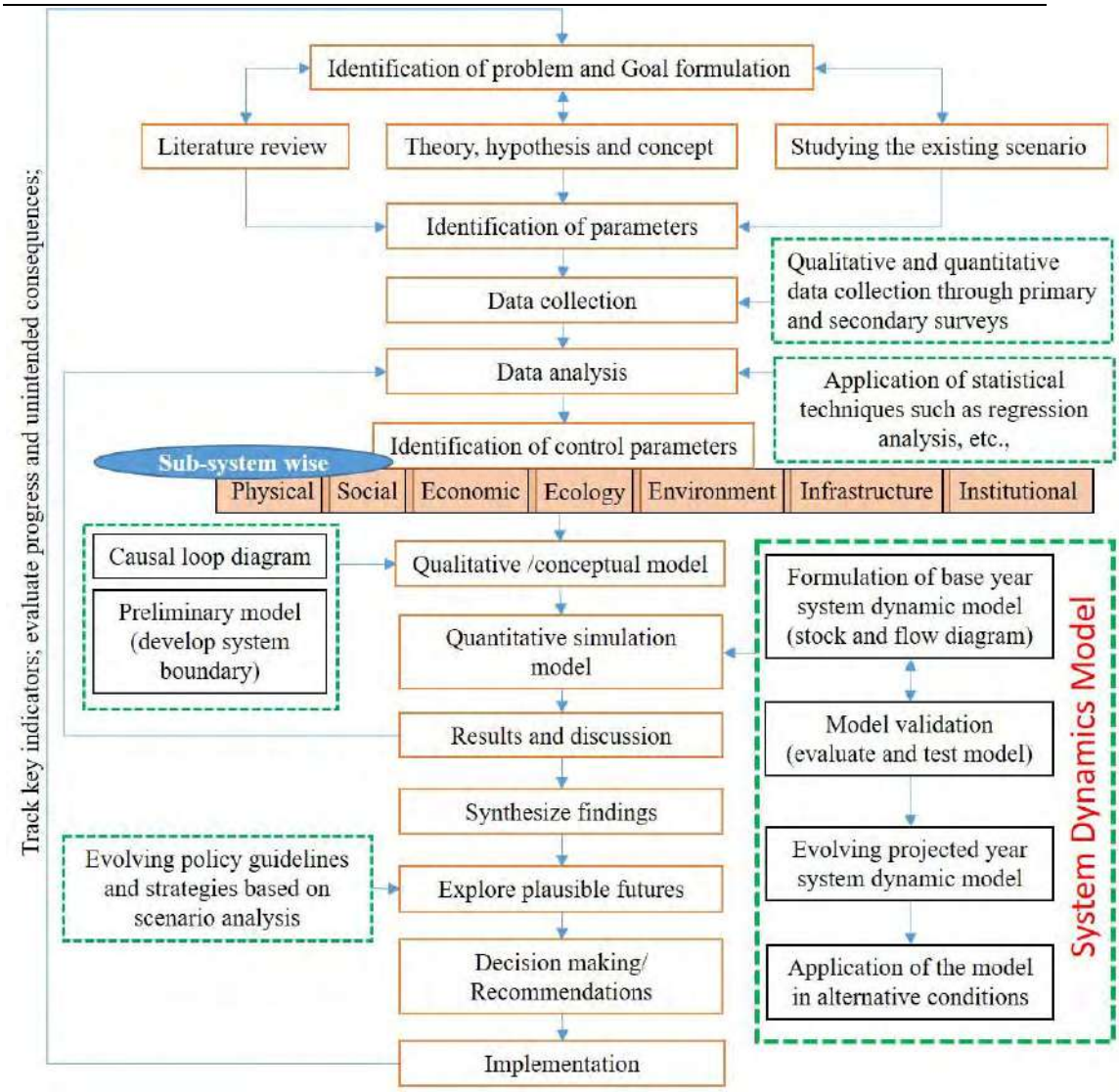


Figure 6: Framework for development plan formulation using system dynamics

5. Conclusion

The present paper studies literature on the role of system dynamics in evolving the sustainable development plan from a perspective of climate change and glacier melt that has not been covered by the existing reviews. Instead of focusing on the application of system dynamics technique in different project phases, the authors' goal was to understand the evolution of literature on this subject and its development according to dimensions of sustainability. The authors were able to successfully answer the research question by conducting an informetric analysis of literature and by classifying it based on the content analysis of 406 journal articles published between 2007 and 2018. The gaps and trends were identified accordingly. It is observed that the articles are largely concentrated on the three major pillars of sustainable development, such as environment, economic and social dimensions. Further, it is observed that publications on this subject registered an exponential growth, with 77.5% of the articles being published in the last five years. A total of 1308 authors were identified contributing for 406 published articles. As high as 60 articles are found from the Journal of cleaner production followed by sustainability with 52 articles,

energy policy with 12 articles. Also, Elsevier publications accommodates for 34% of the total articles reviewed and is followed by Emerald, MDPI, Springer, Wiley, etc., The articles largely focused keywords (top 5) are socio-economic effects, sustainable development, environment factors, climate mitigation and government policies. Lastly, carried out the network analysis and cluster analysis of the top words used by the authors in the Keywords. Despite the comprehensive review performed in this research, the methodology followed by the authors has a few limitations. The Engineering village (COMPENDEX and INSPEC) was the only search engine used in the research. Furthermore, only peer-reviewed journal articles i.e., with a stronger methodological background were reviewed, while books and conference papers were disregarded. At last, the obtained results reflect the keyword selection, meaning that the articles that did not contain any of these keywords were not considered. However, the word selection was carefully addressed so that it included (nearly) all works on this subject. In summary, the main challenge and gap identified by the authors is that there is a lack of an Integrated planning approach considering the linkages between climate change, glacier melt, water resources and development planning. In order to address the aforementioned challenge, a framework for development plan of a region have been suggested in this paper. In conclusion, the climate change adaptation and mitigation decisions/interventions to achieve sustainable development at the regional scale includes, reducing sources of greenhouse gases or enhance the "sinks" that accumulate and store these gases; Stabilize greenhouse gas levels in a timeframe sufficient to allow ecosystems to adapt naturally to climate change; Energy efficiency; greater use of renewable energy; and longer growing seasons or increased yields in some regions to reduce the vulnerability to the harmful effects of climate change.

6. Acknowledgement

This work has used annotated bibliography from Ph.D. research works done by Dr. A. Salim, Dr. D.K. Das, Dr. S. K. Sonar, Dr. H. Zia, Dr. M.K. Chavan, Dr. S. Pipralia, Dr. R. Kumari, Dr. N. Kumar, Dr. T. Rawal, Dr. P. Nigam and Dr. N. Gupta under the supervision of one of the authors (Prof. V. Devadas) at the Department of Architecture and Planning, Indian Institute of Technology Roorkee. Authors thank the Indian Institute of Technology, Roorkee for providing necessary resources, such as Ph.D. theses, lab facilities, engineering village database for doing this study.

7. References

Arora, M. (2010) 'Estimation of Melt Contribution to Total Streamflow in River Bhagirathi and River DhauliGanga at Loharinag Pala and Tapovan Vishnugad Project Sites', *Journal of Water Resource and Protection*, 02(07), pp. 636–643. doi: 10.4236/jwarp.2010.27073.

Asian Development Bank (2014) *India: Support for the Implementation of the National Water Mission by State Governments in India : Scoping Study for a National Water Use Asian Development Bank*.

Azhoni, A., Jude, S. and Holman, I. (2018) 'Adapting to climate change by water management organisations: Enablers and barriers', *Journal of Hydrology*. The Author(s), 559, pp. 736–748. doi: 10.1016/j.jhydrol.2018.02.047.

Bajracharya, S. R., Shrestha, M. and Shrestha, A. B. (no date) 'Impact of Climate Change on Water resources and livelihood in the HKH region : Introduction ': doi: 10.13140/RG.2.1.1330.0082.

CDM (2011) *Climate Change Handbook fo Regional Water Planning*, *U.S. Environmental Protection Agency, California Department of Water Resources, U.S. Army Corps of Engineers*.

Chandrappa, R., Kulshrestha, U. C. and Gupta, S. (2011) 'Coping with Climate Change', *Agriculture*, pp. 213–224. doi: 10.1007/978-3-642-19674-4.

Chen, Z. and Wei, S. (2014) *Application of System Dynamics to Water Security Research*, *Water Resources Management*. doi: 10.1007/s11269-013-0496-8.

Cox, W. E. (1987) *The role of water in socio-economic development*, *United Nations Educational, Scientific and Cultural Organization (UNESCO)*. doi: 10.1017/CBO9781107415324.004.

Duethmann, D. *et al.* (2015) 'Attribution of streamflow trends in snow and glacier melt-dominated catchments of the Tarim River, Central Asia', *Water Resources Research*, 51(6), pp. 4727–4750. doi: 10.1002/2014WR016716.

Fujita, K. and Sakai, A. (2014) 'Modelling runoff from a Himalayan debris-covered glacier', *Hydrology and Earth System Sciences*, 18(7), pp. 2679–2694. doi: 10.5194/hess-18-2679-2014.

Harender Raj Gautam, H. L. S. (2012) 'Environment and Rural Issues', *Kurukshetra : A Journal on rural Development*, 60(8), pp. 3–5.

IPCC (2014) *Summary for Policymakers*, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. doi: 10.1017/CBO9781107415324.

Jansson, P., Hock, R. and Schneider, T. (2003) 'The concept of glacier storage: A review', *Journal of Hydrology*, 282(1–4), pp. 116–129. doi: 10.1016/S0022-1694(03)00258-0.

Kaltenborn, B. P., Nellemann, C. and Vistnes, I. I. (2010) *High mountain glaciers and climate change - Challenges to human livelihoods and adaptation*, *United Nations Environment Programme*. Available at: http://www.grida.no/_res/site/file/publications/glacier/himalayareport_screen.pdf.

Kandlikar, M. and Sagar, A. (1999) 'Climate Change Science and Policy in India: an integrated assessment of North-South divide', *Global Environmental Change*, 9, pp. 119–138.

Khan, A. A. *et al.* (2015) 'The Himalayan cryosphere: A critical assessment and evaluation of glacial melt fraction in the Bhagirathi basin', *Geoscience Frontiers*. Elsevier Ltd. doi: 10.1016/j.gsf.2015.12.009.

Kumar, V., Singh, P. and Singh, V. (2007) 'Snow and glacier melt contribution in the Beas River at Pandoh Dam, Himachal Pradesh, India', *Hydrological Sciences Journal*, 52(2), pp. 376–388. doi: 10.1623/hysj.52.2.376.

Miller, J. D., Immerzeel, W. W. and Rees, G. (2012) 'Climate Change Impacts on Glacier Hydrology and River Discharge in the Hindu Kush – Himalayas A Synthesis of the Scientific Basis', *Mountain Research and Development*, 32(4), pp. 461–467. doi: 10.1659/MRD-JOURNAL-D-12-00027.1.

Miller, J., Stumm, D. and Stoffel, M. (2012) *Glaciers , Snow melt and Runoff in the Himalayas - Report on the outcomes of a Trans-Himalayan workshop held at ICIMOD in*. Kathmandu, Nepal. Available at: http://www.eu-highnoon.org/media/default.aspx/emma/org/10786702/Workshop_report_FINAL_050312.pdf.

Mittal, S., Tripathi, G. and Sethi, D. (2008) *Development Strategy for the Hill Districts of Uttarakhand*, *Indian Council for Research on International Economic Relations*.

Nepal, S., Flügel, W.-A. and Shrestha, A. B. (2014) 'Upstream-downstream linkages of hydrological processes in the Himalayan region', *Ecological Processes*, 3(1), pp. 1–16. doi: 10.1186/s13717-014-0019-4.

Omani, N., Srinivasan, R. and Smith, P. K. (2016) 'Glacier mass balance simulation using SWAT distributed snow algorithm - Hydrological Sciences Journal -', 6667(August). doi: 10.1080/02626667.2016.1162907.

Panday, P. K. *et al.* (2014) 'Application and evaluation of a snowmelt runoff model in the Tamor

River basin, Eastern Himalaya using a Markov Chain Monte Carlo (MCMC) data assimilation approach', *Hydrological Processes*, 28(21), pp. 5337–5353. doi: 10.1002/hyp.10005.

Prasad, A. K. *et al.* (2009) 'Melting of major Glaciers in the western Himalayas: Evidence of climatic changes from long term MSU derived tropospheric temperature trend (1979-2008)', *Annales Geophysicae*, 27(12), pp. 4505–4519. doi: 10.5194/angeo-27-4505-2009.

Prasch, M., Mauser, W. and Weber, M. (2013) 'Quantifying present and future glacier melt-water contribution to runoff in a central Himalayan river basin', *Cryosphere*, 7(3), pp. 889–904. doi: 10.5194/tc-7-889-2013.

Qiu, J., R. Zhao, S. Yang, and K. D. (2017) *Informetrics: Theory, Methods and Applications.* Springer Singapore.

Rahman, K. *et al.* (2015) 'An independent and combined effect analysis of land use and climate change in the upper Rhone River watershed, Switzerland', *Applied Geography*. Elsevier Ltd, 63, pp. 264–272. doi: 10.1016/j.apgeog.2015.06.021.

Rajesh Bhakar (2012) *Center for Studies in Science Policy School of Social Sciences Jawaharlal Nehru University Research objective*.

Santos, R. *et al.* (2019) 'Automation in Construction Informetric analysis and review of literature on the role of BIM in sustainable construction', *Automation in Construction*. Elsevier, 103(November 2018), pp. 221–234. doi: 10.1016/j.autcon.2019.02.022.

Sharma, B. R. and Sharma, D. (2008) 'Impact of Climate Change on Water Resources and Glacier Melt and Potential Adaptations for Indian Agriculture *', in *Change*, pp. 86–101.

Singh, B. R. and Singh, O. (2013) 'A Study About Realities of Climate Change: Glacier Melting and Growing Crises', *Climate Change - Realities, Impacts Over Ice Cap, Sea Level and Risks*.

Singh, M. and Pallavi, P. (2015) 'Reservoir induced impact on Agricultural patterns and Livelihood practices : A case study of Pratapnagar block in Tehri dam rim area', 5(8), pp. 1–8.

Singh, P. and Jain, S. K. (2003) 'Modelling of streamflow and its components for a large Himalayan basin with predominant snowmelt yields', *Hydrological Sciences Journal*, 48(2), pp. 257–276. doi: 10.1623/hysj.48.2.257.44693.

Sterman, J. (2000) *Business dynamics: systems thinking and modelling for a complex world.* McGraw-Hill, Boston.

Tadele, K. and Förch, G. (2007) 'Impact of land use/cover change on streamflow: the case of Hare River Watershed, Ethiopia', *symposium (LARS), Arba Minch, Ethiopia*, pp. 80–85.

Watts, G. *et al.* (2015) 'Climate change and water in the UK - past changes and future prospects', *Progress in Physical Geography*, 39(1), pp. 6–28. doi: 10.1177/0309133314542957.

Winz, I., Brierley, G. and Trowsdale, S. (2008) 'The Use of System Dynamics Simulation in Water Resources Management', *Water Resources Management*, 23(7), pp. 1301–1323. doi: 10.1007/s11269-008-9328-7.

Zeng, R. and Cai, X. (2014) 'Analyzing streamflow changes: Irrigation-enhanced interaction between aquifer and streamflow in the Republican River basin', *Hydrology and Earth System Sciences*, 18(2), pp. 493–502. doi: 10.5194/hess-18-493-2014.

Research Paper

DETERMINING URBAN FLOOD VULNERABILITY USING AN INDICATOR BASED APPROACH

Tanaya SARMAH, Indian Institute of Technology Kharagpur; India
Sutapa DAS, (a) Indian Institute of Technology Kharagpur; India and
(b) Indian Institute of Engineering Science and Technology Shibpur; India

Abstract

With increase in urbanisation and climate change, urban flood (UF) is becoming more frequent and intense – surpassing other types of flooding in terms of death and damage to critical infrastructure (CI) buildings. Guwahati, gateway to the eight states of north-east India, is prone to recurring UF – three to four times annually. The lack of an urban drainage network has added to the suffering of the residents. A major portion of the building stock are non-engineered and many new constructions are without UF compliance. Considering that the population and buildings are at risk, this research aims to develop a comprehensive UF vulnerability index (UFVI) as a combination of two indices – human vulnerability index (HVI) and building vulnerability index (BVI). Modified on various concepts of vulnerability assessment for hazards in the developing world, the UFVI has been proposed considering inherent hardships related exclusively to UF. For this purpose, in a prior survey conducted in the 31 municipal wards of the city, relevance of the HVI was checked by choosing residents as survey respondents and the BVI will be conducted based on the concept of rapid visual screening (RVS) of buildings. The HVI stratified the population into five tiers ('very high' to 'very low') and the BVI is expected to stratify the CIs similarly. These two indices will be combined in HAZUS-MH platform to obtain the UFVI ward-wise. This paper puts forward a theoretical explanation of the method that will be incorporated once the BVI is developed and while combining HVI and BVI to develop the UFVI. The composite UFVI that will be obtained will contribute to long-term actions for improving resilience of the existing population and CIs of the city against UF.

Keywords

building vulnerability, critical infrastructure, HAZUS-MH, human vulnerability, urban flood

1. Introduction

Disasters, such as earthquakes, floods, landslides and fires, significantly affect the community and infrastructures. Most of these phenomena are characterised by short action, but their impacts on buildings and other tangible structures, persist for years (Karimzadeh *et al.*, 2014). Some recent disasters in India (e.g. Cyclone Fani 2019, the Kerala floods 2018, the

Uttarakhand flash floods 2013, etc.) or in rest part of the world (e.g. the 2011 Tohuku earthquake in Japan, the 2010 Haiti earthquake, the 2008 Sichuan earthquake in China, etc.), resulted in huge damage to people, buildings and critical infrastructures (CI) (Bach *et al.*, 2013; Upadhyaya, 2018; Senapati, 2019).

Urban floods (UF) are among the most recurring hazards, impacting human lives and causing economic damage throughout the world. (Jha, Bloch and Lamond, 2012) has compiled various case studies from Argentina, Germany, Mozambique, and Indonesia, where UF is an annual issue. And with the onset of climate change, it is apprehended that UF risks will not subside in the future, but its increasing intensity and frequency will threaten many more regions of the world (Jonkman and Dawson, 2012). Casualties and damages are also increasing globally due to (a) haphazard, rapid and unplanned urbanization and (b) the impacts of global change on climate – heavy rains and run-off conditions because there is a direct relationship between urbanization and hydrological characteristics – decreased infiltration, increase in run-off, increase in frequency and flood height (Alaghmand *et al.*, 2010). This scenario implies that urban areas suffer from a comparatively high flood risk due to their high population density and many CIs to cater to this population. Out of the existing body of disaster studies, UF is a comparatively new topic but showing exponential growth in its occurrence in several urban areas of India experiencing rapid development (Sarmah and Das, 2018b).

Different methods to assess or determine hazard, risk and vulnerability to UF have evolved in recent decades (Hartanto *et al.*, 2011; Xia *et al.*, 2011; Gichamo *et al.*, 2012). CIs can be interrupted by a variety of threats. Hence the vulnerability assessment of these buildings and the dependency of the population on these CIs are essential to "build back better" (Bach *et al.*, 2013). In this context, if CIs are affected by flood, it has to be resilient enough to still function or be quickly restored to normalcy (Mcbain, Wilkes and Retter, 2010). Focussing on this, the present study has tried to combine a human vulnerability index (HVI) and a building vulnerability index (BVI) – both developed by the authors in a prior work – to form a composite UF vulnerability index (UFVI) to understand the criticality of UF on the people and buildings in the city of Guwahati – the financial capital of north-east India. Disaster in these north-eastern states has a broader significance because it is graded as seismic zone V of India (Rajendran and Rajendran, 2011) and is situated in the flood prone valley of the indomitable Brahmaputra River. Guwahati, the largest urban area of the region, narrowly connects the seven north-eastern states to the mainland via road, rail and airways. Any critical issues in Guwahati can hamper this connectivity and the lifeline of the entire north-east region will be cut-off (Sarmah and Das, 2018a) thus causing disruption to transport, power and telecommunication and as a result damage to life.

2. Literature Review

This section outlines the direct impacts of UF on the primary receptors – people and buildings (more precisely CI) – and the integration of these two for a holistic UF management scenario.

2.1. Human Vulnerability

UF poses a serious challenge to the lives of people, especially the urban poor of the rapidly growing urban areas in developing countries (Jha, Bloch and Lamond, 2012). These people residing in the informal settlements or slums are frequently at highest risk of UF. (Du *et al.*, 2010) mentioned that more deaths occur during a UF or flash flood event as compared to slower riverine floods. Different authors have noted different death causing reasons in the developing countries such as Bangladesh, Vietnam, etc. In 1990 the United Nations Development Programme (UNDP) along with economist Mahbub-ul-Haq and Nobel Laureate Amartya Sen defined human development in a comprehensive way through the concept of Human Development Index (HDI) (UNDP, 2006), where life expectancy, education and per capita income were used as indicators to rank countries into four tiers ('very high', 'high', 'medium', 'low'). In the same vein, over the years many researchers have developed several context-specific customised indices (Cutter, Mitchell and Scott, 2000; Khan and Salman, 2012; Ghislandi, Sanderson and Scherbov, 2019). As a response to the large and unexpected shock brought by any disaster people's behaviour changes in relation to the magnitude and negative shock and it has been studied how people with different socio-economic backgrounds (the poor), age (the elderly and the youngest members) and gender (the women folk) cope with the losses (Sawada and Shimizutani, 2008; Jha, Bloch and Lamond, 2012). Against this background the authors in a prior study has tried to deal with the losses that communities suffer during and after UF by developing an index depicting human vulnerability.

2.2. Building (Critical Infrastructure) Vulnerability

CIs are often interconnected systems that are so essential to our day-to-day life that any interruption to these services can cause significant disturbance to societies (Bach *et al.*, 2013). Different countries have adopted different definitions of CIs according to their respective requirement. In the United States (US), "CI is defined as systems and assets, whether physical or virtual, so vital to the US that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters" (Riedman, 2016). Similar definitions have been adopted by Australia, Germany and the European Union. United Kingdom has categorised the CIs according to their uses in UF vulnerability as essential CI, highly vulnerable, more vulnerable, less vulnerable and water compatible development (CPNI, 2016). India till date has no official definition for CIs.

The direct impacts of UF on the buildings affect the basement floors, underground utilities, corrodes metal elements and overall affect the structure that will require repairs and refurbishment (Riedman, 2016). The indirect impacts include the loss of business processes (Jha, Bloch and Lamond, 2012). Hazards can however affect CIs in various ways. In 2005 hurricane Katrina made the drinking water infrastructure in the city of New Orleans inoperable due to power outage in the excessive wind and flood water inundation followed by contamination issues for a prolonged period (Bach *et al.*, 2013). In 2011 river and flash floods in Brazil combined with landslides posed serious risks when the key infrastructures such as electricity, running water and phone lines were affected (Jha, Bloch and Lamond, 2012). India's capital city Delhi suffered from severe water crisis in 2012 where most middle-class households did not have a dependable source of clean water due to extreme heat waves (Bach *et al.*, 2013). Against this background, in an ongoing study by the authors, has

tried to deal with the losses that CIs suffer during and after UF by developing an index depicting building vulnerability.

Current methods of UF vulnerability assessment of buildings are lengthy and detailed processes. It is measured in terms of depth, duration or quality of water, among which the first one is the most common. These are further used for evaluating the cost of damage (Jha, Bloch and Lamond, 2012). (Godfrey *et al.*, 2015) assessed the vulnerability of different building typologies to multi-hazard using depth-damage curves from existing literatures, though very few publications describe the derivation of the depth-damage function in detail. (Kelman, 2002) gave an overview of damages by "slow-rise" flood water based on the depth and duration. (Pistrika, Tsakiris and Nalbantis, 2014) developed a depth-damage curve for an area in Athens, Greece, by using actual flood data and compared the same to the functions of other areas with similar conditions; whereas (Martina *et al.*, 2015) used a synthetic approach to develop a damage model for the buildings of Italy.

Of the many vulnerability assessment methods, Rapid Visual Screening (RVS) is a quick, simple and inexpensive method without performing any structural calculations or instrumentations. Based on sidewalk visual survey a data form is filled up to determine the probable damages caused by a disaster to a structure. Though RVS is mostly used for seismic assessment (IRC-NRC, 1993; JBDPA, 2001; Jain *et al.*, 2010; FEMA, 2015), RVS sheets can be customised based on the context (Lang, 2002) and can be used for other disasters such as cyclone (Dutta and Mukhopadhyay, 2012; Mukhopadhyay and Dutta, 2012). RVS is used to find out if a particular building requires simple precautionary measures during a hazard or it requires detailed investigation. In this manner a homogeneous region can be selected and accordingly ratings can be done to find the recovery measures specific to that area. Moreover, because the synthetic depth-damage curve estimates the potential damage of a building and RVS indicates the level of retrofitting under the disaster, both uses similar principles and hence can be logically combined. (Jha, Bloch and Lamond, 2012) has suggested five restoration steps for buildings which get flooded but remain structurally sound – assess damage, clear and remove standing water and decontaminate, determine appropriate treatment, drying phase and repair phase.

2.3. Linkage between Human and Building Vulnerability

Taking human and infrastructure vulnerability as a whole is an integrated approach to UF management. Most of the losses caused by disasters are due to interaction between the physical environment and the social-demographic features. Determining and considering both the factors enables the identification of points which are highly vulnerable in various aspects, giving a holistic idea of the disaster and the affected area (Yucel and Arun, 2012). Adequate operation and maintenance of the CIs with continuous communication with the people to keep them prepared are two major principles for integrated UF management (Jha, Bloch and Lamond, 2012). Furthermore, the CI itself can become a hazard, as failure of one can have cascading effect on other buildings or even injure people. UF damage to CI is a considerable concern as it affects the ability of the people to respond during the event and recover after it. The UF hazard map of the study area of Guwahati city created by the authors in a prior study, along with the two indices and plotted on map, is a valuable aid to decision-making. The composite index created will also be plotted on map because they are visual tools for communicating the hazard situation (Jha, Bloch and Lamond, 2012).

Approaches such as vulnerability assessment or vulnerability index will help the city to be resilient and reduce the recovery time, allowing business-as-usual to continue.

Human and building vulnerability have been linked by different approaches ranging from global models such as Prompt Assessment of Global Earthquake for Response (PAGER) operated by United States Geological Service (USGS) or local (case-based) models such as HAzards United States – Multi Hazards (HAZUS–MH). HAZUS–MH is applicable for estimating potential losses due to earthquakes, floods and hurricanes, on a regional basis (FEMA, 2015). This hazard analysis tool was developed by the Federal Emergency Management Agency (FEMA), United States in 1997 and over the years has undergone many modifications. It graphically illustrates the identified high-risk locations, in ArcGIS, due to different hazards. Users can then visualize the spatial relationships between population and buildings with the geographic conditions for the specific hazard being modelled.

(Singh, 2005) used HAZUS to estimate building damages (structural and non-structural) and assessed that there is a strong relation between the damage and the number and severity of casualties. An area where buildings are of poor quality and has high concentration of people, there the vulnerability is very high. The author used both the top-down (HAZUS based) and bottom-up (community based) approaches to determine the building and population loss estimation. On the other hand, (Petal, 2004) put forward that although HAZUS categorises buildings and population into four tiers of damage each, it does not give the variation in casualty rates across the building types; but relationship between building damage and casualties can be calculated using seven parameters. In another study on Dehradun city, India, (Gulati, 2006) found that there is a direct relationship between the damage to buildings to the number of people affected. HAZUS, as a tool developed in the United States, its applicability was checked for analysing the buildings and population in the Indian scenario, by (Gulati, 2006), and found that it did not give very realistic results when ward-wise data was considered. But the method gave good results in the city level evaluation. Thus it was inferred that HAZUS method needs modifications so that it gives more accurate results in the Indian context.

3. Methodology

The proposed methodology (Figure 1) aimed to combine the two indices – HVI and BVI – which define the UF hazard profile of Guwahati city and to develop a composite UFVI using HAZUS – MH. After Guwahati became the state capital in 1971, there has been a manifold rise in its population (38.6% decadal growth from 1971) (MHA, 2011). The Guwahati Municipal Corporation (GMC) underwent divisional changes from 34 wards in 1974, 60 wards till 2013 and at present constitutes of 31 wards.

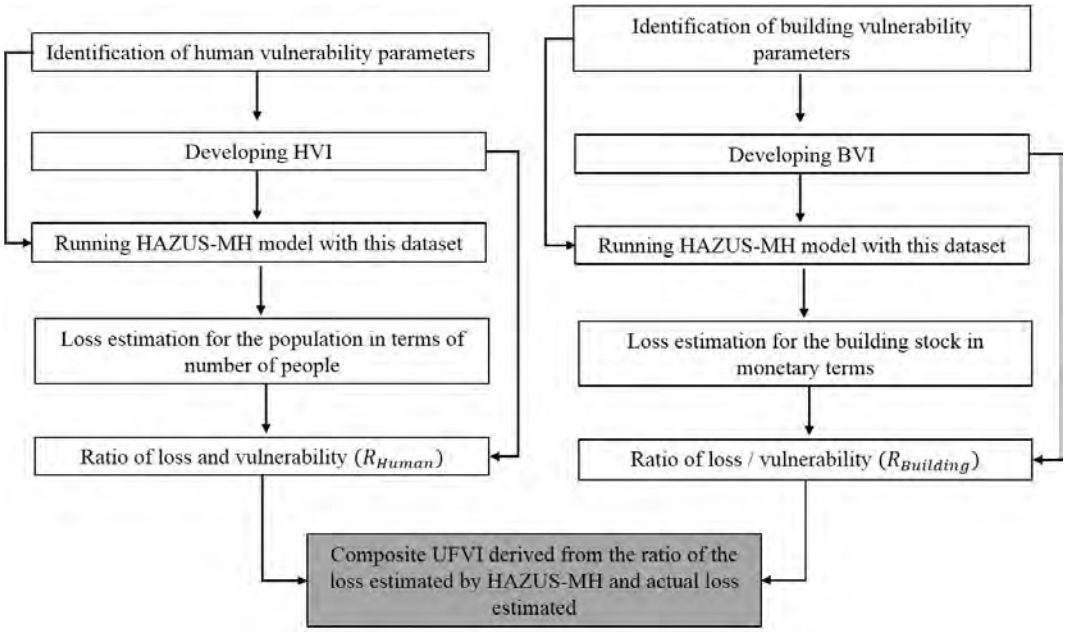


Figure 1: Proposed methodology

In a prior study conducted by the authors, an UF hazard map was developed for the city by taking opinions from experts working on UF. Using analytic hierarchy process or AHP (Saaty, 2008), they compared seven causative factors of Guwahati UF using the conventional 9-point scale (1= equal importance; 9= extreme importance). These factors collated from detailed literature review were – contour and slope; rainfall distribution; soil type; choking of natural drainage; land-use; population density; road network. These seven thematic layers were created using remote sensing data and geo-informatics system to derive the final hazard map of Guwahati. Accordingly, 31 wards were divided into five hazard groups, namely, 'very high' (9 nos.), 'high' (7 nos.), 'medium' (10 nos.), 'low' (3 nos.) and 'very low' (2 nos.). Further, in order to find the vulnerability of the population, ward-wise questionnaire survey was done by taking feedbacks from the residents living with the recurring UF. The questionnaire was developed based on the HDI and other vulnerability indices and modified to suit the current context. It had questions grouped under six key constructs namely, household, education, health, income, dependency on public infrastructure (drinking water, sanitation, waste disposal) and some special conditions during UF. The responses recorded were scored accordingly and HVI was calculated for all the 31 wards. The range between the maximum possible HVI to the minimum possible HVI was equally divided under five HVI groups. The 'very high', 'high' and 'medium' zones had 7 wards in each. And the 'low' and 'very low' zones had 5 wards in each. The result was fairly different from UF hazard map of Guwahati city developed by the authors. It defied the general custom to take flood hazard as flood vulnerability.

In a second study conducted by the authors, the CIs located in the 216 sq. km. of GMC area were surveyed for UF vulnerability assessment using RVS. The sample survey consisted of reinforced cement concrete (RCC) buildings, confined masonry buildings and the typical Assam-type (Ikra houses). This sampling was done from GMC tax records. A combined list of CIs was collated from a list noted by the city local bodies and various literatures. The same was modified to suit the Indian context in the UF scenario (CIs vital for rescue-recovery, essential and others). The authors developed a RVS sheet for assessing the performance of

three types of common building typologies against UF. Each of the parameters contributing to building vulnerability has a 'score modifier' which determines which parameter has a positive or negative influence on the 'base score' or 'overall score' of the building type. Relevant parameters based on their role in defining building vulnerability against UF were collated from literature.

Thereafter, HVI and BVI can be joined in GIS-based HAZUS-MH by running the model with the dataset of the human and building vulnerability parameters. This will give the loss estimation for the population in terms of number of people and for the building stock in monetary terms. The ratio of loss estimated and the vulnerable population will be R_{Human} and the ratio of loss estimated and the vulnerable building stock will be $R_{Building.}$ Using weighted average of both, the composite index (i.e. UVFI) can be calculated. The weights will be calculated using multiple-criteria decision analysis technique.

4. Key Findings and Discussions

After measuring the human vulnerability and the ongoing work of measuring the building vulnerability, it was found by the authors that these two has strongly co-related variables that increase UF vulnerability. Such as education, age, gender, income, past disaster experience, poverty, isolation, lack of social security services, funds for disaster prevention and mitigation, location of buildings, material of buildings, maintenance, unprecedented population growth, CIs providing services, health services, etc. In this study the HVI and BVI will be combined in HAZUS—MH interface to arrive at a common UFVI, because according to (NDMA, 2010; Jha, Bloch and Lamond, 2012) vulnerability maps are based on two major factors – the buildings and CIs at risk and the vulnerability of the users. A total of six constructs in case of HVI and 20 parameters in case of BVI will be considered. The combined UFVI will give a composite index that will represent overall performance of the city during UF. This will categorise the 31 wards of the city into five tiers of UF vulnerability ('very high' to 'very low'). When CIs are situated in UF prone areas and the existing population also cannot be relocated, the composite index will help in enhancing decision-making procedures; for example, investments in the cities can be assigned in the best form. This index after being developed for Guwahati city can be used to determine which wards in the city are most vulnerable to UF.

5. Conclusion

Studies on UF hazard, human vulnerability and building vulnerability has become substantial for CIs since these buildings are used by the entire population. The direct and indirect effects that these CIs face, can severely affect societies and become a threat to the urban areas. The city of Guwahati is submerged in UF waters 3-4 times annually. The present study combines the vulnerability indices of humans and buildings (CIs) to UF in the city of Guwahati, using remote sensing data and geo-informatics. This will identify the city resources (both human and buildings) under threat and thus prioritize the assistance by concentrating efforts in those locations and channelling resources. This is an example of a local scale study which proposes a holistic approach by combining the two approaches (population and CIs). The study is limited only to the CIs of the city and overlooks the possible effects of other

disasters. For instance, Guwahati lies in the flood-prone Brahmaputra valley, which is so mighty and is known as a moving ocean. The entire north-east region is located in the seismic zone V in the earthquake hazard zones of India. Buildings on stilts are good for UF but open storey buildings are dangerous for areas in high seismic zones. Similar method can be adopted for the residential buildings. This is a generic method which can be applied for other disasters such as riverine floods, earthquakes and hurricanes, by considering area specific human and building vulnerability parameters. This study is a novel approach to combine the vulnerability of the human and the building component which defines the structure of any city in a developing country like India.

6. References

Alaghmand, S., Abdullah, R., Abustan, I. and Vosoogh, B. (2010) 'GIS-based river flood hazard mapping in urban area (A case study in Kayu Ara river basin, Malaysia)', *International Journal of Engineering and Technology*, 2(6), pp. 488–500.

Bach, C., Gupta, A. K., Nair, S. S. and Birkmann, J. (2013) *Critical Infrastructures and Disaster Risk Reduction*. New Delhi.

CPNI: Centre for the Protection of National Infrastructure (2016) *Critical National Infrastructure*. Available at: https://www.cpni.gov.uk/critical-national-infrastructure-0 (Accessed: 8 July 2019).

Cutter, S. L., Mitchell, J. T. and Scott, M. S. (2000) 'Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina', *Annals of the Association of American Geographers*, 90(4), pp. 713–737. doi: 10.1080/00103624.2016.1166376.

Du, W., Fitzgerald, G. J., Clark, M. and Hou, X. (2010) 'Health impacts of floods', *Prehospital and Disaster Medicine*, (June). doi: 10.1017/S1049023X00008141.

Dutta, S. C. and Mukhopadhyay, P. (2012) *Improving earthquake and cyclone resistance of structures: Guidelines for the Indian subcontinent*. New Delhi: The Energy and Resources Institute (TERI).

FEMA: Federal Emergency Management Agency (2015) *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook*. Washington DC.

Ghislandi, S., Sanderson, W. C. and Scherbov, S. (2019) 'A simple measure of human development: The human life indicator', *Population and Development Review*, 45(1), pp. 219–233.

Gichamo, T. Z., Popescu, I., Jonoski, A. and Solomatine, D. (2012) 'River cross-section extraction from the ASTER global DEM for flood modeling', *Environmental Modelling and Software*. Elsevier Ltd, 31, pp. 37–46. doi: 10.1016/j.envsoft.2011.12.003.

Godfrey, A., Ciurean, R. L., van Westen, C. J., Kingma, N. C. and Glade, T. (2015) 'Assessing vulnerability of buildings to hydro-meteorological hazards using an expert based approach - An application in Nehoiu Valley, Romania', *International Journal of Disaster Risk Reduction*. Elsevier, 13, pp. 229–241. doi: 10.1016/j.ijdrr.2015.06.001.

Gulati, B. (2006) *Earthquake risk assessment of buildings: Applicability of HAZUS in Dehradun, India*. Indian Institute of Remote Sensing, Dehradun, India and International Institute for Geo-Information Science and Earth Observation, Enschede, The Netherlands.

Hartanto, I. M., Beevers, L., Popescu, I. and Wright, N. G. (2011) 'Application of a coastal modelling code in fluvial environments', *Environmental Modelling and Software*. Elsevier Ltd, 26, pp. 1685–1695. doi: 10.1016/j.envsoft.2011.05.014.

IRC-NRC (1993) *Manual for screening of buildings for seismic investigation*, *National Research*

Council Canada. Ottawa, Canada. doi: 10.1007/s10815-014-0382-1.

Jain, S. K., Mitra, K., Kumar, M. and Shah, M. (2010) 'A proposed rapid visual screening procedure for seismic evaluation of RC-frame buildings in India', *Earthquake Spectra*, 26(3), pp. 709–729. doi: 10.1193/1.3456711.

JBDPA: Japan Building Disaster Prevention Association (2001) *Seismic Risk Evaluations of Buildings in Japan*. Tokyo, Japan.

Jha, A. K., Bloch, R. and Lamond, J. (2012) *Cities and Flooding- A Guide to Integrated Urban Flood Risk Management for the 21st Century*. Washington, D.C.: The World Bank. doi: 10.1596/978-0-8213-8866-2.

Jonkman, S. N. and Dawson, R. J. (2012) 'Issues and challenges in flood risk management—Editorial for the special issue on flood risk management', *Water*, 4, pp. 785–792. doi: 10.3390/w4040785.

Karimzadeh, S., Miyajima, M., Hassanzadeh, R., Amiraslanzadeh, R. and Kamel, B. (2014) 'A GIS-based seismic hazard, building vulnerability and human loss assessment for the earthquake scenario in Tabriz', *Soil Dynamics and Earthquake Engineering*. Elsevier, 66, pp. 263–280. doi: 10.1016/j.soildyn.2014.06.026.

Kelman, I. (2002) *Physical flood vulnerability of residential properties in Coastal, Eastern England*. University of Cambridge, U.K.

Khan, F. A. and Salman, A. (2012) 'A simple human vulnerability index to climate change hazards for Pakistan', *International Journal of Disaster Risk Science*, 3(3), pp. 163–176. doi: 10.1007/s13753-012-0017-z.

Lang, K. (2002) *Seismic vulnerability of existing buildings*, *Institute of Structural Engineering, Swiss Federal Institute ofTechnology*. Zurich, Switzerland. doi: https://doi.org/10.3929/ethz-a-004333389.

Martina, M., Molinari, D., Dottori, F. and Scorzini, A. (2015) 'Development of synthetic flood damage curve by explicit costs analysis', *Geophysical Research*, 17. Available at: http://adsabs.harvard.edu/abs/2015EGUGA..1715536M.

Mcbain, W., Wilkes, D. and Retter, M. (2010) *Flood resilience and resistance for critical infrastructure*. London.

MHA: Ministry of Home Affairs (2011) *Population Enumeration Data*. Available at: http://censusindia.gov.in/ (Accessed: 2 April 2019).

Mukhopadhyay, P. and Dutta, S. C. (2012) 'Strongest cyclone of the new millennium in the Bay of Bengal: Strategy of RVS for non-engineered structures', *Natural Hazards Review*, 13(2), pp. 97–105. doi: 10.1061/(asce)nh.1527-6996.0000057.

NDMA: National Disaster Management Authority (2010) *National Disaster Management Guidelines: Management of Urban Flooding*, *National Disaster Management Authority, Government of India*. New Delhi. Available at: https://ndma.gov.in/images/guidelines/management_urban_flooding.pdf.

Petal, M. (2004) *Urban disaster mitigation and preparedness: The 1999 Kocaeli earthquake*. University of California, Los Angeles. Available at: https://www.researchgate.net/profile/Marla_Petal/publication/34978659_Urban_disaster_mitigation_and_preparedness_the_1999_Kocaeli_Earthquake/links/559c2e0808ae0035df2454cd/Urban-disaster-mitigation-and-preparedness-the-1999-Kocaeli-Earthquake.pdf.

Pistrika, A., Tsakiris, G. and Nalbantis, I. (2014) 'Flood depth-damage functions for built environment', *Environmental Processes*, 1(4), pp. 553–572. doi: 10.1007/s40710-014-0038-2.

Rajendran, K. and Rajendran, C. P. (2011) 'Revisiting the earthquake sources in the Himalaya:

Perspectives on past seismicity', *Tectonophysics*. Elsevier B.V., 504, pp. 75–88. doi: 10.1016/j.tecto.2011.03.001.

Riedman, D. (2016) 'Questioning the criticality of critical infrastructure: A case study analysis', *Homeland Security Affairs*, 12(May). Available at: https://www.hsaj.org/articles/10578.

Saaty, T. L. (2008) *Decision making for leaders: The Analytic Hierarchy Process for decisions in a complex world*. New Editio.

Sarmah, T. and Das, S. (2018a) 'Earthquake vulnerability assessment for RCC Buildings of Guwahati city using Rapid Visual Screening', in *Procedia Engineering*. Elsevier Ltd., pp. 214–221. doi: 10.1016/j.proeng.2018.01.028.

Sarmah, T. and Das, S. (2018b) 'Urban flood mitigation planning for Guwahati: A case of Bharalu basin', *Journal of Environmental Management*. Elsevier Ltd., 206, pp. 1155–1165. doi: 10.1016/j.jenvman.2017.10.079.

Sawada, Y. and Shimizutani, S. (2008) 'How do people cope with natural disasters? Evidence from the great Hanshin-Awaji (Kobe) earthquake in 1995', *Journal of Money, Credit and Banking*, 40(2–3), pp. 463–488.

Senapati, A. (2019) 'Cyclone Fani leaves Odisha in the dark, paralysed', *Down to Earth*, May. Available at: https://www.downtoearth.org.in/news/natural-disasters/cyclone-fani-leaves-odisha-in-the-dark-paralysed-64331.

Singh, P. (2005) *Population vulnerability for earthquake loss estimation using community based approach with GIS*. International Institute for Geo-Information Science and Earth Observation, Enschede, The Netherlands. Available at: https://webapps.itc.utwente.nl/librarywww/papers_2005/msc/upla/pratima_singh.pdf.

UNDP: United Nations Development Programme (2006) *UNDP in India: The Human Development Index*. Available at: http://www.in.undp.org/content/india/en/home/search.html?q=human+development+index (Accessed: 11 January 2019).

Upadhyaya, H. (2018) 'Kerala floods: What to expect when none of the 61 dams have any emergency plan?', *Down To Earth*, September. Available at: https://www.downtoearth.org.in/news/natural-disasters/kerala-floods-what-to-expect-when-none-of-the-61-dams-have-any-emergency-plan--61416.

Xia, J., Falconer, R. A., Lin, B. and Tan, G. (2011) 'Numerical assessment of flood hazard risk to people and vehicles in flash floods', *Environmental Modelling and Software*. Elsevier Ltd, 26, pp. 987–998. doi: 10.1016/j.envsoft.2011.02.017.

Yucel, G. and Arun, G. (2012) 'Earthquake and physical and social vulnerability assessment for settlements: Case study Avcilar district', in *15th World Conference on Earthquake Engineering (WCEE)*. Lisboa.

Case Study Paper

Building Dignity: A participatory concept for climate change-impacts mitigation in informal settlements in North Jakarta

Rolf Schuett, Systemarchi; Poland

Abstract

Jakarta is today the centre of one of the largest and most populated human agglomerations in the world, and the economic and political centre of one of the largest economies. However, Jakarta is also considered a "mega city gone wrong", because of its ongoing challenges. The city faces serious issues in pollution, social inequity, mobility and flooding, which in the next decades are doomed to cause critical consequences to the economic base of millions who depend on the city, not only in the Java region. The continuous growth of population and urban land in Jakarta is also condemned to hit the impacts of climate change first hand. Jakarta is a coastal mega city that already faces the effects of raising water levels, because it is subsiding at a rate of 15cm (avg) per year. This paper analyses the challenges and opportunities of each of these aspects in Jakarta, but it also discusses cultural aspects that may help to stimulate real participation of the population, provided that the legal and political framework applies a background of policies that comprehensive planning can deliver. One of these elements is the Malay concept of "gotong royong"or communal cooperation, which is very popular in rural Java (and has analogies world wide). It has been practiced in the kampungs or rural villages for generations, was eventually integrated, perhaps misused, in political agendas since the post colonial years of young Indonesia in the mid 20th century, yet lacking the expected success it achieves at lower scale. The paper also proposes an example of physical implementation in informal neighbourhoods in Pandemangan, North Jakarta, that the author developed some years ago.

Keywords

Comprehensive planning, participation, informality, climate change impacts

1. Jakarta, "a mega city gone wrong"

1.1. Introduction

The journalist and TV host Teymoor Nabili from Al Jazeera said once about ten years ago "Jakarta is a Mega city gone wrong". And probably this still applies today. Jakarta was at that time a mega city that was trying to deal with severe issues, perhaps the most challenging were waste management (connected to flooding), traffic and insufficient housing. Jakarta also had difficulties to provide adequate drinking water and sanitation services.

Today Jakarta has more than ten million inhabitants, receives each day more than three million commuters who come to work from outside and by 2030 is predicted to become the world's biggest megacity. The challenges grow with the city. Even more, Jakarta is suffering subsidence at alarming rates of up to 25 cm/year (North Jakarta). The main reason behind this phenomenon is the extraction of water from the ground for domestic consumption.

The aim of this paper is to describe the current urban development problems of Jakarta, which in combination with its growing population, its urban sprawl and potential impacts of climate change reflect a situation that can be considered typical for mega cities in developing countries. The paper describes also the background of Jakarta's challenges, which can also be tracked to other regions in the world and can spread as well the same way.

Finally, the author refers to the Malay concept of Gotong Royong or communal cooperation and suggests this as a key to transform the situation of informal settlements in Jakarta in particular, in order to improve the living situation of their neighbours from the inside. A revitalization concept is proposed to this end in the last section of the paper.

2. Analysis

The urban situation of Jakarta will be described in this section under consideration of environmental, economic and socio-cultural aspects. Because the issues are not exclusively local but mostly a world-wide phenomenon, reflections are included to relate them to the global context.

2.1. Environmental challenges of Jakarta

Cities in the world consume 75% of the energy and produce 75% of the world's CO_2 emissions. Just as in any large metropolis, Jakarta faces important pollution issues, which are aggravated because of an ever-increasing motorized vehicle number at a rate of above 9% per year.

Solid waste has been as well mentioned in the media as a major issue. Each Jakartan produces in average 2,9l of garbage per day. A study of 2001 reported that scavengers (who collect recyclable waste) collect up to half of the city's waste. (The Jakarta Post 1, 2009)

One of the consequences of the insufficient solid waste management is that because a considerable amount of waste never reaches treatment plants, it contaminates the storm water collection system, the city water streams and eventually the ocean. Clogged storm water sewers contribute largely to local flooding, a problem which has increased in the last decades. Indonesia is the second largest feeder of plastics into the ocean after China. The activity of scavengers all over the city contributes also to aggravate the problem.

Bridges over rivers are now critical points because of garbage accumulation and the risk of flooding. The macro and micro drainage operate at 50-70% of their capacity due to garbage and silt clogging. The accumulation of garbage on roads affects the automatic railway crossing systems, which is also an eminent risk. (The Jakarta Post 2, 2009; Kurniasari, 2009)

An Article in the April 2019 edition of "Marine Pollution Bulletin" warns about the underestimated financial costs of ocean pollution.

According to the paper, which reports on a metadata analysis of 1100 international datasets, each tone of plastic that reaches the ocean will cause an economic damage of worldwide up to 2,2 billion €/year, translated from a 5% estimated reduction of the potential yield of exploiting marine resources. (Köppe, 2019)

Plastics in the oceans contribute to a heavier pollution with bacteria and algae, which added to the negative effect of bisphenol A (BPA) in fish reproduction, means that this compromises the availability of fish as food resource, which is the diet base of 1,5 billion people on earth. (Beaumont, 2019)

Industrial economies are reacting accordingly. The recently adopted ban 560-35 on single-use plastic items (including plates, cutlery, straws and cotton buds sticks) by the EU Parliament has been a crucial step forward in Europe. The EU Commission assumes that the new regulation will have a cost on the bloc's economy, but eventually will reduce 22 billion € in environmental damages until 2030. (Köppe, 2019)

60 % of Jakarta's waste is domestic household waste, which is collected with no previous separation by the residents. Even more, a study at Atma Jaya Catholic University in Jakarta in 1999 concluded that more than 70% of Jakarta's waste is organic. Both conditions open the possibility to introduce in Jakarta the use of sorting out recyclable waste at home, which can be used as a resource, and to collect organic waste, which can be processed in biodigestors to produce biogas and natural fertilizers. Biogas can be collected as energy resource. Even though its production is controversial, because it is a greenhouse gas, the high amount of organic waste that Jakarta generates justifies this alternative.

Certainly, no matter how well we deal with organic waste, it makes more sense to avoid it to happen than to deal with it afterwards. The "Zero Waste Scotland", for example, is a public initiative that aims to cut carbon emissions by informing and encouraging the society to live more responsively so that Scotland becomes "greener, wealthier and fairer". In 2019 Zero Waste Scotland launched a Food Waste Reduction Action Plan aimed at encouraging citizens to improve the way food is consumed in order to avoid unnecessary food waste. Because that waste rots once it is discarded and it produces the greenhouse gas methane. According to Zero Waste Scotland, food waste is therefore a bigger cause of climate change than plastics. Nevertheless, Jakarta is still far away from introducing policies that effectively would reduce organic waste the way it is being done in Scotland. (NN, bbc.com, 2019)

Bagasse, Paddy (rice husk) and other agricultural sub-products from the region of West Java can be also used as biomass to produce heat and energy with biodigestors, together with organic waste of the city (Benget, 2009). Thinkable would be a network of small units in the neighbourhoods or larger central plants with high technology and efficiency.

There is already a project for generating power with waste in the landfill of Bantar Gebang, a plant could generate 26MW. The waste collection site is the largest in SE Asia and is the main landfill for Jakarta's solid garbage. About 100 000 people live around the place, which is also the base of income of most of them. The first waste-to-energy incinerator started to operate 2019 and generates just under 1 MW. (Purningsih, 2019)

Jakarta has also serious challenges concerning drinking water and sanitation. Only 3% of Jakarta's wastewater is treated. E.coli bacteria are reported to have been found repeatedly in all of the 13 rivers of Jakarta. Because of this risk, private investors build treatment plants

for their housing developments, contributing to the growth of their market value. (Besalicto, 2019)

The drinking water situation in Jakarta affects also about one fourth of the world population. According to a UNO report, 2 billion people have insufficient or no access to safe water. The situation is especially critical in sub-Saharan African countries. (Breda, 2019)

In Fact, in the world four billion people currently have at least once a month no access to drinking water. This figure applies especially to the rural population in countries with insufficient water services in general.

Yet the water situation has improved considerably in most regions. North America and Europe have reached a coverage of 99%, South America 96%, but the sub-Sahara 58% and Oceania 52%. Paradoxically, only 1% of that delivered water is actually drinking water, the rest is used for industry and agriculture.

The problem of basic access to safe water in the world is doomed to get worse. The growing global population and the improving access to water in developing countries imply a growing demand of water, which is in average 1% higher each year since the 1980s.

Stefan Uhlenbrook, water expert at United Nations warns that climate change is another factor that will change water access: dry zones are getting drier and wet zones are getting wetter, which means that the distribution of water sources in the world is not improving.

Unfairly, in many developing countries, in underdeveloped suburbs locals have to pay more for water than the average population in areas with regular service, even though the water quality they get is insufficient.

Uhlenbrook explains that politicians often build less wastewater treatment plants because they don't deliver a visible impact, thus politically these are not as effective as dams or public toilets. Meanwhile in these cities 80% of the wastewater is released back to nature without treatment, which is the origin to even more issues. In sub-Saharan countries like Central African Republic, Chad, South Sudan and Eritrea more than one hundred people out of hundred thousand died in 2017 for consuming contaminated water, actually a totally avoidable situation. In other words, solving the clean drinking water issue is not a knowledge issue but an administrative fail. The situation in Jakarta is even more controversial given the fact that the service is provided by two private companies that operate under concessions of 25 years. (Breda, 2019)

2.2. Economic Issues

Jakarta generates about one fifth of Indonesia's GDP and its GRP per capita is predicted to be the biggest in South Asia by 2030 and a top twenty world wide by 2028. Jakarta's economy is driven by services and manufacturing, including automobile, chemistry and electronics. The city hosts the headquarters of the largest Indonesian corporations dealing with oil, energy, cosmetics, food, trade, insurance and financial services. Its economic growth averaged between five and six percent in the last years, which induces the ground and property prices to rise, and also the general cost of living.

Despite of Jakarta being a magnet for capital and property investment, the unsolved mobility issues, together with the already mentioned subsidence rate, are prompting the government to consider radical measures.

The recently re-elected president Joko Widodo recognized after winning the elections in April 2019 that there is a need to move the capital. Moving Jakarta has been studied for more than sixty years, since Indonesia's independence from The Netherlands. Researchers calculate that a large part of the city may disappear until 2050 under water. Already most of the city's surface is below the sea level. (BBC Mundo, 2019)

Planners are considering three possibilities. The first one is to establish a special government district in Jakarta. The second one is to move the government into new infrastructure to be built in a suburb of Jakarta and the third one is to completely move the government to a new location. Indonesia's territories in the Island of Borneo have been mentioned, more precisely Palangka Raya in Kalimantan, which is on the south of the island.

The environmental impact for Kalimantan would be huge though, since the island's forests are considered not only by the local population as "the lungs of the world".

There is also a political interest to decentralize the administration of the country, and the new location in the centre of the archipelago would serve this purpose, especially because it does not stick to the main island Java.

On the other hand, the traffic issue is also yet to be solved. Among the factors that contribute negatively to the heavily congested roads is the fact that about 70% of the 3,6 Million daily commuters into the city use an own vehicle to travel and only 27% use public transportation, which also does not serve all commuter trips.

Jakarta has probably the worse car traffic in the world. The minister for national development planning has stated that only in Jakarta, traffic jams cost the country 6800 M USD each year. Other sources talk about 7400 M USD (BBC Mundo, 2019). Alternative solutions for mass public transit have been installed amid considerable investments. The most prominent is probably the Bus Rapid Transit BRT TransJakarta, which is considered today as the largest in the world (210 km). In its first years of operation back in 2004, TransJakarta contributed successfully to reduce traffic congestion. However, due to operational and design faults, the system has not had the expected overall impact. Tracks are too often invaded by other vehicles, the assigned Busses consume more fuel than originally estimated, which raises the subsidized costs, and the number of users does not increase due to the unreliability of the system.

Due to Jakarta's dependency on traffic and the growth rate of motorized vehicles in its streets, the role of mobility will become more meaningful in the medium term, to a point that the cost of traffic congestion to the local economy may compromise the viability of many economic sectors. In the eyes of the author, it makes little sense to try solving the traffic issue in Jakarta repeating the same approach. The answer may be much more radical. And the situation has been understood in many large economies worldwide, but transformation processes tend to be more difficult to implement in developing economies (or Newly Industrialized Countries, as in the case of Indonesia).

Cars have transformed our civilization, but they also have pushed cities to sprawl and continue to affect our health and safety. They contribute to 70% of the carbon emissions in the transport sector and pollute the air we breath. 1,25 million people die each year in car accidents and the particulate matter that increases to critical levels with heavy vehicle traffic is considered by the WHO as a group 1 carcinogen. The air pollution with micro particles

$PM_{2,5}$ contributed to 4,1 million deaths from diverse heart and respiratory diseases in 2016. (HEI, 2017)

Prof. Richard Kingston and Ransford A Acheampong from the Spatial Policy Analysis Lab at Manchester University recommend three ways in which cities can achieve less car dependency, so that pedestrians, cyclists and public transport recover public space that once was taken by cars.

They recommend, among other measures, to introduce car-free zones. Examples are Copenhagen, Brussels, Ghent, Madrid, where cars are either not allowed into the city centre or banned if they don't belong to residents. London charges congestion reducing fees. In all cases, socializing campaigns need to be previously organized to gain public understanding and public transport has to be made available to cover the mobility needs. (Kingston et. al. 2019)

Another recommendation relates to public transportation, which has to be reliable, flexible and cost effective. A reflection of its success is the decreasing use of private cars in many European cities, the US and Australia. Millennials are considered today a generation that generally avoids owning a car.

We as planners and urban designers have obviously a main responsibility when it comes to recover the excessive public space that was sacrificed for car transit. But planners need to make sure that solutions are inclusive, housing is affordable and close distances motivate citizens to cycle or walk to their work or the locations they visit on their daily life. The key is to provide again the human scale and human speed that was usual before the automobile revolution and to make sure people understand the benefits, support the changes and adapt their habits.

2.3. Social Issues

The consequences of poverty, high migration, river pollution and subsidence are visible through the existence of numerous slums in Jakarta, most of them located in vulnerable areas. These spaces have been usually occupied by migrants, who set up their homes with their own hands. Tambora is one example. One of the densest slums in the world, where in just under 4,5 square km about 250 000 dwellers live. Even though the government has programmes to relocate slum residents to social housing blocks, most of them refuse to live, because they have no documents, and without identification they are ineligible to take part in the programmes. Besides, they are not willing to leave a place they have lived in their whole life. (Wargadiredja, 2016)

Slums and informal housing areas in vulnerable sites in general lack the basic elements for living with dignity. With no sanitation, scarce open space, critical levels of pollution and despite of living in extreme density, dwellers feel abandoned to their fate. The Jakarta government uses different methods to evict residents and make space for profitable developments. There is no programme that foresees revitalization and inclusiveness, with few exceptions.

Muara Baru is one of the scarcely any examples, where revitalization was chosen instead of bulldozing. But not because it is too valuable to destroy, but because it is located in perhaps the most vulnerable area of North Jakarta, just behind Jakarta Bay, separated from the sea water by a cracking sea wall, which is also sinking.

However, the project goes beyond the recovery of a neighbourhood, the old traditional fishers villages around Muara Baru are the gate to a future so-called Giant Sea Wall, a 40 billion USD new waterfront built on reclaimed land called National Capital Integrated Coastal Development (NCICD), which comprises in total seventeen islets. The project has received important political support, but is socially and environmentally very controversial. Once completed, it would separate the Jakarta Bay from the ocean and convert it into a lagoon. The idea behind it is to pump the water out of the lagoon to lower the water level, so that the rivers from Jakarta can recover their natural flow and flooding in North Jakarta become less likely. Local experts however warn that instead of restoring the natural flow of the rivers, the lagoon could end up becoming a septic pond with polluted water and debris coming from Jakarta. (Sherwell, 2016)

Certainly, Jakarta, especially its coastal area, has reached a point of no return, and something urgently needs to be done to avoid a massive loss of homes and urban fabric with catastrophic outcome. First groups of hundreds of residents in the area have been forced to leave from 2016 on.

In Jakarta poverty and scavenging are obviously two interrelated conditions. However it seems that they are the product of a missing political vision to incorporate alternatives that effectively fight poverty, create opportunities and let as many Indonesians as possible take part in the ongoing economic growth.

Malaysia, Thailand, Philippines and Indonesia have been portrayed by the media in mid 2019 after they rejected containers of recyclable waste from overseas because they were contaminated with diverse other chemical and bio-hazards. Importing recyclable solid waste represents an opportunity to obtain cheap raw materials for manufacturing, but the health and environmental cost is high, and some countries, China ahead of them, have understood that the derived environmental degradation is not worth the effort. Recycling is a booming business in Indonesia, and scavengers don't seem to care about the side effects of their activity, they are happy to have an income. (Whiting, 2019)

Jakarta and other Indonesian cities struggle to tackle the domestic solid and organic waste problems and need to improve its waste management plan to industrial scale. Regrettably, the primitive way solid waste is processed in Indonesia, with the involvement of low income, untrained rural population is neither healthy for the workers nor compatible with the environment. Due to Indonesia's important industry sector, it is certainly feasible to implement a solid waste recycling programme based on the Circular Economy, which allocates for instance household recyclable garbage in the local industry as raw material. Even though it happens today, the applied methods do not comply with minimum international health and safety standards. A change starts with introducing a different approach of packaging material, change of materials for more sustainable alternatives, inducing pre sorting at home, community involvement and public support initiatives.

3. A regeneration proposal for vulnerable settlements in Pandemangang and Sunter Agung districts

Following the analysis of some of the most important challenges in urban Jakarta, the author wants to summarize the findings into a set of ideas as a conceptual regeneration proposal.

The main motivation for the design concept was to look for a way to turn informal neighbourhoods in vulnerable areas into green water absorbers and carbon collectors and combine the process with the *Kampong Gotong Royong* concept. That means, keeping the residents on the site instead of relocating them out of soil they call home perhaps since generations. As well it was a motivation to propose a way to maximize the green areas inside these extremely dense neighbourhoods.

The site that was chosen belongs to the districts of Pandemangang and Sunter Agung, which belong to North Jakarta. The site of the proposal was chosen as a symbolic location, and is not a concrete redevelopment proposal, but an idea of how the author considers that revitalization of Jakarta's slums could work out. Some of these areas have been already considered by private investors for new redevelopment, some of them with luxury character, towers and shopping malls.

The concept incorporates a mix of residential, commercial, services, education, communal infrastructure and green space. All functions are surrounded by a network of paths, corridors and access that maintain a healthy degree of permeability. Most of the site has been covered by at least two layers. The lower one comprises roads and corridors, flooding areas, ground water collection, playgrounds and sports facilities, with the existing water streams below. They also contain the green areas with vegetation and some allotments as urban farming with a biodigester plant. The middle layer, which is essentially a flooding proof elevated layer, contains the residential infrastructure, some services, education, and some communal infrastructure and the network of access bridges. The rest of the built infrastructure, such as services, communal buildings and some commercial buildings are located in areas with lower vulnerability.

The scheme design foresees to respect and conserve representative buildings (key points) in the existing neighbourhood, such as mosques, public buildings and other elements that have some kind of communal value. All other buildings, mostly for housing use, would replace the existing ones, making sure they have a longer life span and provide satisfactory living conditions.

The proposal also incorporates the participation of residents in the design and construction of their houses. Training should be provided to all disciplines involved, from craftsman to carpenter, gardener, etc. This would be a way for beneficiaries to contribute to cover the costs for their homes with their work and also learn new skills that would provide them chances in the labour market.

In the urban scale, a honey comb pattern was chosen to reduce the surface of paved roads and increase the size of blocks without increasing walking distances. Despite of the large areas covered by private ground, an extensive network of walking and cycling paths can be incorporated in the scheme, as well as green corridors and representative sites, where the existing and added key points are located.

On the micro scale, houses are preferably grouped around semi private courtyards, which have the aim to maintain the social dynamics that would arise during construction time, as a way to represent the kampong spirit of G*otong Royong*, communal cooperation, in the big city.

Figure 1 ***The honey comb web is an interpretation of gotong royong in the urban landscape: mutual cooperation to raise the life quality***

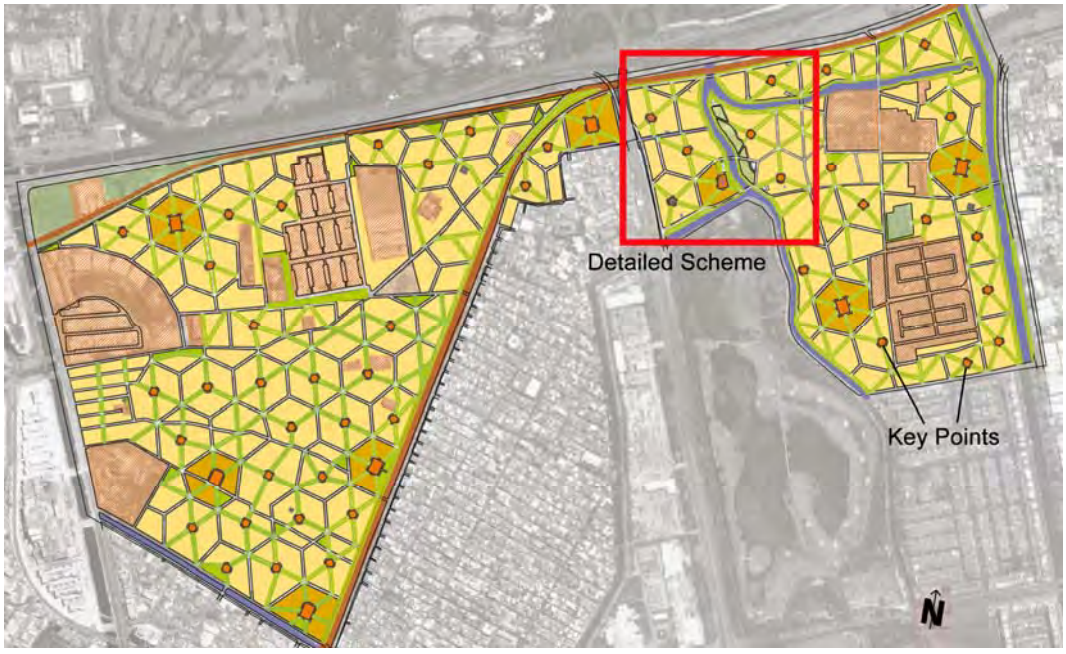


Figure 2 ***The concept applied in the Pandemangan (left) and Sunter Agung (right) districts.***

The traditional communal cooperation can be applied to set up a cooperative-type of neighbours business sector, which includes retail, repairing services, recycling, urban farming, craftwork, child care, elderly care, gardening, etc.

The honey comb pattern also reduces the attractiveness for transit traffic, which is compatible with the neighbourhood character. It is assumed that residents will rather not own a car, but smaller sized mopeds or motorbikes.

The streets that surround the blocks and the green corridors that cut across them should be wide enough to allow the transit of emergency services and also to incorporate vegetation, seating and pedestrian movement.

4. Discussion and Conclusions

Indonesia recovered well from the Asian crisis in the early 2000s, and since 2005 has been experiencing a positive economic growth. However, the gap between rich and poor has also expanded (Diela, 2016).

The author considers that the best way to fight poverty in urban Jakarta is to combine urban revitalization with the improving of the living conditions of the most vulnerable poor population, especially women and children, without moving them out of the city, but instead increasing their chances to benefit from the economic growth.

The simple fact that people increase their earnings and secure their jobs in times of improving economy will also increase the pressure in the market to provide housing opportunities, which pushes planning authorities to increase among other things the built density. And the current trend for sustainable neighbourhoods is to mix uses with living, which reduces distances, increases concentrations of public space and green, and invites residents to share a community-based, often multi cultural townscape.

Inclusive urban revitalisation is not compatible with exclusive high end, west oriented gated developments. Indonesia has a rich, geographically, historically and culturally diverse background that must be incorporated in the way their urban development is guided, for it to maintain a strong and rich local identity.

Communities in many industrial nations have started to realize the monetary and social cost of urban sprawl for the cities and the crises that it causes when it comes to provide new affordable housing. One of the most discussed consequences has been racial and economic segregation due to the separation of exclusive residential zones (and services) from the rest of the city and the drop of conditions for low income families or ethnic minorities. (Badger et. al. 2019)

This shows that planners today finally understand that increasing the built density reduces overall car traffic emissions, prevents urban sprawl, increases the use of public transport and makes cities economically more viable.

The recently broadcasted images of Indonesia receiving (and rejecting) containers of recyclable waste as an import good for their cheap labour to sort and reuse have been shocking. They demonstrate how irrational human consume has turned in developed nations. The worse thing is, the more educated we are, the more we are aware of the impact

of our consumption. But the wealthier we are, the more we potentially contribute to it. Our actions in our micro world play also a role in the global context.

We can influence 72% of greenhouse emissions at home. In fact, 10% of the richest global population cause the most climate pollution and we as qualified planners probably belong to this group or are very close. Certain is that the poor cause very little pollution. The renowned British newspaper The Guardian interviewed several scientists living in the UK and asked them how they contribute to reduce their personal carbon footprint. Their answers were rather predictable. Most have basically given up flying, they own no car or have substantially reduced driving, some eat only vegetarian food and in general they consume much less than the average British population. Concerning consumption, the article mentions C40, a network of the world's largest cities, in which they discuss strategies to reduce climate impact. One of the focuses of research is the impact of consumption. A C40's proposal to address climate change is to introduce a four day working week, which would reduce the speed of the "ever-expanding economies" and thus reduce our capacity to consume and have more time for a balanced life. (Masoliver, 2019)

The 'standard occupancy rate' that the architects among us planners use to measure success of a built investment can be applied to consumer goods. How many times a year does a consumer use their collection of tennis racquets? How often do they use their second, third, fourth winter coat? A 'standard rate occupancy' applied to consumer goods would probably indicate that most things we possess have been just a wasted investment, and an unnecessary impact to environment.

The author of this paper hopes that eventually accurate information about the environmental impact of the goods we buy will become as important as the cost itself, and that this information will be displayed on a price tag in an internationally recognizable, standardized way.

The state of water provision in the world was mentioned earlier. It is recognized as a human right, but we do not necessarily appreciate how valuable it is. Just to put water availability in context: Water is actually an abundant resource in the world. It obviously is. However, almost all of it is salty. Freshwater (which is not automatically drinking water) is less abundant (2,8 % of all the water on earth). Yet drinking water (potable water) is rather rare. Only 0,003% of the total available water in the world is fresh and unpolluted. To understand the rareness of naturally occurring drinking water, in the earth crust (down to 100km depth) gold is only 600 times less abundant, silver is 428 times less abundant, and uranium is only 12 times less abundant than naturally occurring drinking water.

And we cannot forget that the available 'drinking water' is actually not drunk, two thirds of it is used by the manufacturing industry. Every good we consume has an embedded water footprint. According to figures published by FAO, every cup of coffee we drink needed about 140 l of water along its production chain. One kg of beef accounts for 15 415 l of water, one apple costs 70 l, and if we buy it as apple juice, a cup costs 190 l until it reaches the consumer. (Fao.org, 2019)

Nuts are not meat, but they cost also a lot of water: cashews, pistachios, walnuts or hazelnuts need about 15000 l of water per kg to produce. That is, each single pistachio costs 2,6 l of water. The state of California (USA) produces 80% of the almonds that are consumed in the country, and it uses 10% of its rather scarce water resources to grow them. A T-shirt needs 2 720 l, a pair of jeans almost 10 000 l water to manufacture (Guertin, 2017). Even our

electricity may have an imbedded water footprint. Greenpeace has calculated that coal fired power plants need as much water as one billion people consume. That means, even by reducing our electricity consumption, we also save water. (Greenpeace, 2016)

Jakarta is considered by the author as a fascinating case study to analyze the most fundamental challenges of today's planning. Poverty, pollution, traffic, city reinvention, vulnerability… whatever key arises, Jakarta embeds it. In this sense, Jakarta is probably a black box for urban sustainability analysis, a living research book, perhaps a mandatory examination for each future planner or a perfect billboard of examples for each senior planner.

In that sense, it is very fortunate, timely and suitable to congregate this year in Jakarta to discuss urban planning "beyond the metropolis". This experience hopefully will leave a shocking impact in the minds of all participants, one that will inspire the work and shape the influence we as planners exert wherever we work.

5. References

Badger, Emely et. al. "Cities start to Question an American Ideal: A House with a Yard on Every Lot" in The New York Times Online (18 June 2019) <https://www.nytimes.com/interactive/2019/06/18/upshot/cities-across-america-question-single-family-zoning.html> [retrieved on 3 July 2019]

BBC Mundo "Yakarta: el preocupante motivo por el que el gobierno de Indonesia quiere trasladar la capital del país" in BBC Mundo online (29.04.2019) <https://www.bbc.com/mundo/noticias-internacional-48097530> [retrieved on 29 April 2019]

Beaumont, Nicola J., et al. "Global ecological, social and economic impacts of marine plastic." Marine pollution bulletin 142 (2019): 189-195.

Benget, Besalicto "Economic crisis helps boost growth in Indonesia's organic fertilizer sector" in The Jakarta Post Online (03 Feb 2009) <https://www.thejakartapost.com/news/2009/03/02/economic-crisis-helps-boost-growth-indonesia039s-organic-fertilizer-sector.html> [retrieved on 3 July 2019]

Breda, Adrian "Trinkwasser: Zwei Milliarden Menschen haben keinen Zugang" in Der Spiegel Online Edition (18 June 2019) <https://m.spiegel.de/politik/ausland/trinkwasser-zwei-milliarden-menschen-haben-keinen-zugang-a-1271147.html> [retrieved on 3 July 2019]

Diela, Tabita "Indonesia's Richest One Percent Controls Nearly Half of Nation's Wealth: Report" in Jakarta Globe Digital News portal (1 Dec 2016) <https://jakartaglobe.id/context/indonesias-richest-one-percent-controls-nearly-half-nations-wealth-report> [retrieved on 3 July 2019]

Fao.org "How much water is needed to produce...?" in Fao.org Food and Agriculture Organization of the United Nations Online <http://www.fao.org/resources/infographics/infographics-details/en/c/218877/> [retrieved on 3 July 2019]

Greenpeace Africa "World's coal power plants consume enough freshwater to sustain 1 billion people" in Greenpeace Press Release (22 March 2016) <https://www.greenpeace.org/africa/en/press/2036/worlds-coal-power-plants-consume-enough-freshwater-to-sustain-1-billion-people-greenpeace/> [retrieved on 3 July 2019]

Guertin, Laura "How much water cost nuts to grow" in PAESTA: Pensylvannia Earth Science Teachers Association (6 Aug 2017) <https://www.paesta.psu.edu/podcast/how-much-water-does-it-really-take-grow-almonds-paesta-podcast-series-episode-43> [retrieved on 3 July 2019]

HEI, IHME. "State of global air 2017: a special report on global exposure to air pollution and its disease burden. 2017." (2017).

Kingston, Richard et. al. "Climate change: we can reclaim cities from the car without inconveniencing people" INDY/LIFE in The Independent Online Edition (8 June 2019) <https://www.independent.co.uk/life-style/design/climate-change-we-can-reclaim-cities-from-the-car-without-inconveniencing-people-a8941556.html> [retrieved on 3 July 2019]

Köppe, Julia "Plastik in Ozeanen kostet Weltwirtschaft bis zu 2,2 Milliarten Euro pro Jahr" in Der Spiegel Online Edition (04 Apr 2019) <https://www.spiegel.de/wissenschaft/natur/plastik-in-ozeanen-kostet-weltwirtschaft-pro-jahr-2-2-milliarden-euro-a-1261316.html> [retrieved on 3 July 2019]

Kurniasari, Triwik "Sanitary agency races against time to rid rivers of garbage" in The Jakarta Post Online (19 Jan 2009) <https://www.thejakartapost.com/news/2009/01/19/sanitary-agency-races-against-time-rid-rivers-garbage.html> [retrieved on 10 March 2009]

Masoliver, Daniel "No flights, a four-day week and living off-grid: what climate scientists do at home to save the planet" in The Guardian Newspaper Online Edition (29 June 2019) <https://www.theguardian.com/science/2019/jun/29/no-flights-four-day-week-climate-scientists-home-save-planet> [retrieved on 3 July 2019]

NN, bbc.com "Food waste worse for climate than plastic" in BBC online (13 May 2019) <https://www.bbc.com/news/uk-scotland-48257019> [retrieved on 13 May 2019]

NN, The Jakarta Post 1 "Garbage piles up in city rivers, streets" In The Jakarta Post Online (24 Feb 2009) <http://www.thejakartapost.com/news/2009/02/24/garbage-piles-city-riversstreets.html> [retrieved on 10 March 2009]

NN, The Jakarta Post 2 "Most of Jakarta train crossings unattended" In The Jakarta Post Online (06 Mar 2009) <http://www.thejakartapost.com/news/2009/03/06/most-jakarta-train-crossingsunattended.html> [retrieved on 10 March 2009]

Purningsih, Dewi "Bantar Gebang Waste-To-Energy Plant is Ready to Operate" in Greeners News Service Jakarta (26 March 2019) <https://www.greeners.co/english/bantar-gebang-waste-to-energy-plant-is-ready-to-operate/> [retrieved on 3 July 2019]

Sherwell, Philip "$40bn to save Jakarta: the story of the Great Garuda" in The Guardian Newspaper Online Edition (22 Nov 2016)

<https://www.theguardian.com/cities/2016/nov/22/jakarta-great-garuda-seawall-sinking> [retrieved on 3 July 2019]

Wargadiredja, Aiza Tivany "In This, One of the World's Most Densely Packed Slums, the Sun Never Rises" in VICE Media LLC Asia (31 October 2016) <https://www.vice.com/en_asia/article/yvj53v/in-this-one-of-the-worlds-most-densely-packed-slums-the-sun-never-rises> [retrieved on 3 July 2019]

Whiting, Kate "Indonesia has a plan to deal with its plastic waste problem" in The World Economic Forum (WEF), Cologny-Geneva, Switzerland (13 March 2019) <https://www.weforum.org/agenda/2019/03/indonesia-has-a-plan-to-deal-with-its-plastic-waste-problem/> [retrieved on 3 July 2019]

Winarti, Agnes "Clean canals could reduce flooding by 40%: Expert" In The Jakarta Post Online (02 Feb 2009) <https://www.thejakartapost.com/news/2009/02/02/clean-canals-could-reduce-flooding-40-expert.html> [retrieved on 3 July 2019]

Wood, Johnny "Your morning cup of coffee contains 140 litres of water" in The World Economic Forum (WEF), Cologny-Geneva, Switzerland (22 March 2019) < https://www.weforum.org/agenda/2019/03/hidden-water-in-your-cup-of-coffee/> [retrieved on 3 July 2019]

Research Paper

CHALLENGES OF SPATIAL PLANNING IN COASTAL REGIONS OF BANGLADESH

A Case for Chalna

Muhammad SHAMSUZZAMAN, City Region Development Programme, LGED; Bangladesh

Abstract

The delta land Bangladesh has a unique coastline where numerous rivers meet the Bay of Bengal, creates a complex net of tidal river estuaries, forming the base for world's largest mangrove forest the Sundarbans. Chalna is small town located at the confluence of Rupsha and Chunkuri rivers, only 9 km north of the Sundarbans, and a well know river port. The Sundarbans, which acts as a buffer between the sea and the human habitats including arable lands. The forest is rich in unique biodiversity and natural resources providing livelihoods of a large number of people living in the towns and villages around it. As the region is near the sea and land morphology is plain and of low altitude it is always vulnerable to natural disasters. Due to global warming and sea level rising the land mass is vulnerable to flooding.
The sign of climate change; erratic behavior of rainfall and draught, intrusion of salinity etc., are changing the usual pattern of agriculture and fishing, affecting the livelihoods of the people here. The eco system of this mangrove forest is also threatened by recent policies of the Government and initiatives of private sectors of establishing high risk industrial establishments like thermal power plant, liquid petroleum gas stations etc., around Chalna and its surrounding region in sprawling manner. The potential of running large number of vessels through the rivers and canals of the Sundarbans might have negative impacts of the flora and fauna living there. Popular protests against these harmful interventions are being observed, international public organizations and concerned learned societies are also recommending not let these damaging developments going on. Although there are some promises from the government to the international agencies, there is no sign of management of such developments. This paper systematically investigates the reasons of this phenomenon, identifies the challenges and concludes that; absence of regional spatial planning in Bangladesh, neglecting the values of environment and public goods, defying the regulations in various ways and not accounting public opinions in the decision making process are the core ones.

Keywords

Challenges of spatial planning, planning in coastal regions, natural and man-made disasters

1. Introduction

1.1. Description of the study area: Chalna and its surrounding coastal region

The study area is Chalna, a small municipality town and its surrounding coastal region which lies in Dacope sub-district of Khulna, a south western district of Bangladesh (figure 1). The study area borders protected forest the Sundarbans and the Bay of Bengal at its south. Chalna is a famous river port located at the confluence of Rupsha and Chunkuri rivers, only 9 km north of the Sundarbans. The Sundarbans are the largest mangrove forest in the world, recognised as a natural World Heritage site by UNESCO. They provide a subsistence living to 3.5 million people and offer protection from cyclones in southwest Bangladesh. The mangroves' extensive root systems help stabilise wet land and coastlines, break up storm waves that exceed four metres in height and result in the areas with good mangrove coverage suffering less from wind and wave surges than those areas with less or no mangroves. (Dudley, N., et al. 2010). The major parts of the town inside the Polder built in the 60s and almost whole part of it is flood free.

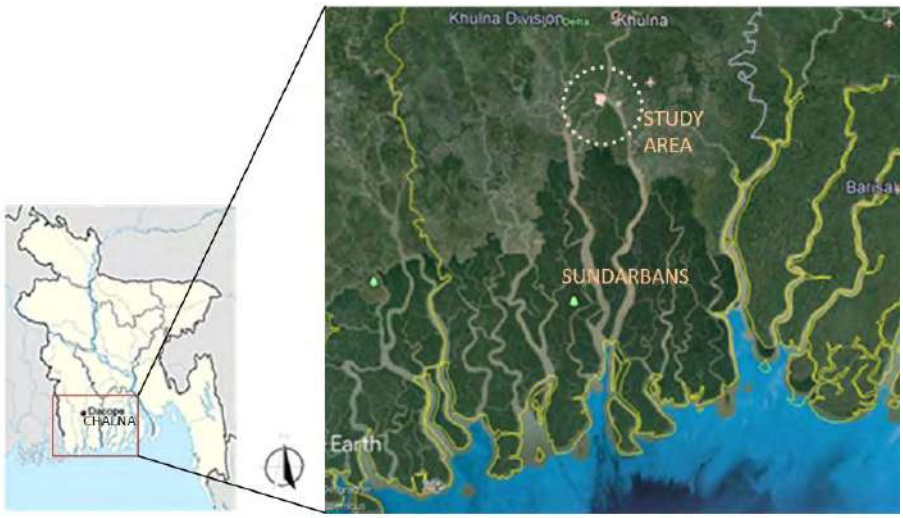


Figure 1 Location of the study area in the context of Bangladesh and the Sundarbans

Unplanned developments those are not compatible with this location are popping up sporadically posing high risk to the ecology and life of the people living here. Following chapters of this paper delineates the research methodology, forms hypotheses, present the evidences for and against the hypotheses and finds out the core hypotheses. Finally conclusions are made based on the comparisons of evidences with the hypotheses which is called Structured Geospatial Analytic Process. An indication of further research is also given at the concluding chapter.

Figure 2 Google view of Chalna town showing Chalnacanal in the middle

2. Methodology of the Study

2.1. The analytical process

Structured Geospatial Analytic Process has been followed as the study/ research methodology. The main steps of this process are Question, Grounding and Team Building, Hypotheses Development, Evidence Development, Fusion and Conclusions. The *question* defines the broad nature of the spatial and temporal patterns the analyst is seeking to ultimately identify. *Grounding is* the raw evidence that reaches the analyst. *Hypotheses* are the tentative representation of conclusions with supporting arguments. *Evidence* refers to snippets extracted from items discovered in the grounding. The *fusion process* is the comparing of the evidence to each hypothetical geospatial and temporal pattern to determine consistency. The *conclusion* is a proposition about which hypothetical pattern(s) is (are) most consistent with the evidence and answers the question. (University Library 2019)

2.2. Research question

News, publications and personal experience about the natural and man-made disasters, environmental changes vulnerabilities, unmanaged developments etc., in the towns and adjacent coastal region gives us the impression that it is highly vulnerable and complex situation and the planning and management of the developments of the area is not functioning properly. The urban areas are managed by municipal laws and there are environmental laws for managing developments in the ecologically sensitive areas. Still spontaneous and harmful human interventions are escalating the vulnerability of natural disasters and climate change impacts. To search for the explanation of this phenomenon the author naturally raised the following research question;

What are the challenges of spatial planning for coastal settlements/towns of Bangladesh which hinders livable, eco-friendly, disaster and climate change resilient development?

2.3. Hypotheses

From intuition and after analyzing the raw evidences News, publications and personal experiences, the following hypotheses are developed by the author;

- Coastal settlements are vulnerable to natural disasters and climate changes
- Human interventions in the coastal area are escalating the vulnerability
- Soft interventions are performing well
- Weak framework for region spatial planning in Bangladesh
- Developments defying urban and environmental regulations in the study area
- Issues of environment and public goods are overlooked indecision making
- Public opinions are overlooked in development decisions

3. Evidences Related to Hypotheses

3.1. Coastal settlements are vulnerable to natural disasters and climate changes

Bangladesh is one the most vulnerable countries of the world exposed to multiple natural hazards, such as cyclones and floods, particularly in its coastal areas. Over the last few years, coastal area of this part of Bangladesh as well as Chalna town has been greatly affected by extreme natural disasters such as cyclones, storm surges, etc. On 25 May 2009, Cyclone 'Aila' hit the coastal areas of Bangladesh. Aila cost an estimated $1.7 billion in damages and losses. Cyclones and associated storm surges and floods have led to almost all the nearly 520,000 natural disaster deaths recorded over the past 40 years in Bangladesh. This country is also one of the most vulnerable countries in the world to the effects of climate change. The country's extreme vulnerability to hydro-meteorological hazards, including storm-induced tidal flooding, is likely to increase due to climate change. (GFDDR n.d.)

The nationwide climate vulnerability index Table of Ministry of Environment and Forest of Bangladesh shows, at Dacope Upazila, the sub-district where Chalna is located, increased number of people will be affected by natural disasters, mangrove forest will be depleted, the health of livestock and poultry will be decreased, groundwater quality will be depleted and land available for agriculture will be decreased due to potential climate change. (Ministry of Environment and Forest 2018)

3.2. Harmful human interventions in the study area

Environmental degradation due to infrastructure development at the natural habitats their ecosystem services have been failed. During 1960s a series of coastal embankments were constructed in Bangladesh to protect low lying lands from tidal inundation and salinity penetration. Although the land within the embankments became highly valuable agricultural land the embankments, however, block the drainage of freshwater from the land within embankment to the other side of the barriers after excess rainfall and /or river flooding. Some sluice gates were constructed to regulate the flows of water when necessary, but most of them became inoperable due to various reasons. If sea-levels rise due to climate change as predicted then higher storm surges could also cause over-topping of saline water behind the embankments. OECD warns that, "climate change could be a double whammy for coastal

flooding, particularly in areas that are currently protected by embankments". (Dudley, N., et al. 2010)

Figure 3 Dried up Chalna canal at inner side of the polder due to non functioning sluice gate

Figure 4 Natural Liquid Gas plant at the south of Chalna

IUCN recommended placing the Sundarbans in Bangladesh on the List of World Heritage in Danger to the World Heritage Committee of UNESCO recently according to a press of IUCN, dated 7th June 2019, due to severe threats from coal-fired power plants and numerous industrial activities in close proximity. The site is part of the world's largest mangrove forest, home to the royal Bengal tiger. However, the recommendation was reverted at the last moment. 'Following a joint IUCN-UNESCO mission in 2016, the World Heritage Committee called for the large Rampal power plant project, to be cancelled and relocated. Despite this, its construction has continued without any assessment of its impact on the Sundarbans' World Heritage values. Two additional coal-fired power plants are being constructed on the Payra River, which flows into the same bay as the Sundarbans. Over 150 industrial projects are also active upstream of the site, and their associated shipping and dredging activities further threaten its hydrological and ecological dynamics. The hydrological systems, which drive this dynamics, are very large in scale and vulnerable to upstream impacts.' (IUCN 2019)

According to the EIA of the said thermal power plant project the aerial distances from the plant to Chalna is only 3.18 km northwest. As such, in case of Chalna, there is a possibility of emission flow toward the town city, when prevailing wind flow from southeast to northwest direction. The boundary of Sundarban reserve forest is 10 km south. The 10 km radius boundary from the Sundarban is only 4 km away from the thermal power plant. (Government of Bangladesh 2013)

So three negative forces; natural disasters, climate change impacts and harmful consequences of human interventions coincides at Chalna and its surrounding areas.

3.3. Soft interventions are performing well in the study area

After experiencing two devastating cyclones of 1970 and 1991, Bangladesh has given significant efforts to reduce its disaster vulnerability. Bangladesh is now considered a global leader in coastal resilience due to its substantial long-term investments in protecting lives. (World Bank 2018)

Bangladesh is often cited globally as a positive example for investment in DRM. The Government of Bangladesh has taken significant steps to strengthen disaster risk management (DRM) efforts. These include:

- Endorsing the DRM Act (2012), which outlines the country's legal framework for disaster management; and
- Mainstreaming DRM into a number of development plans, including the National Sustainable Development Strategy (2010-2021). This strategy recommends increased and cross-cutting investment in DRM.

Global Facility for Disaster Reduction and Recovery, GFDRR has helped enable DRM efforts in Bangladesh since 2007 focused on post-disaster reconstruction, risk reduction, and building urban resilience. GFDRR is providing ongoing technical support and capacity building to the Government of Bangladesh. Activities are supporting several technical areas, including provision of ICT for weather and climate services; assessing user needs for weather, water, and climate analysis; and enhancing technical understanding of instruments, modelling, and use of models for generating weather, water, and climate information. (GFDDR n.d.)

3.4. Weak framework for regional planning in coastal regions in Bangladesh

Urban development regulations and environmental regulations do exist in Bangladesh but there is no practice of regional spatial planning. Due to absence of regional planning framework it is difficult to manage developments beyond the municipal areas. However, Bangladesh Delta Plan 2100 Formulation Project have identified two main challenges for urbanisation and settlement with regard to the Delta plan. One of them is 'providing a holistic long term plan combining (amongst others) water management and sustainable spatial and urban development' under which a regional scale planning strategy have been suggested. (GoB 2019)

3.5. Developments defying urban and environmental regulations in Chalna town and in the study region

Although there are urban development regulations and environmental regulations to manage developments in municipal areas and beyond but many evidences have seen harmful developments in the ecologically sensitive areas, particularly in the coastal regions of Bangladesh. Power plants, natural liquid gas (NLG) plants, shrimp farms, brick fields, various types of industries are sprawling around Chalna and other coastal areas of Bangladesh (Fig. 4 & Fig. 5). Sites of such establishments are chosen for easy sea and river transport facility, existence of vacant land and comparatively lower land prices than upland areas. I many cases these developments are occurring defying the urban development and environmental regulations of the country in various ways.

Figure 5 Industries, shrimp far, thermal power plant around Municipality of Chalna

3.6. Issues of environment and public goods are overlooked in decision making

Coastal areas of Bangladesh are ecologically sensitive and provide ecosystem services, natural resources and employments. A major part of coastal area of Bangladesh is the tidal mangrove forest, the Sundarbans, a natural heritage site recognized by UNESCO bordering south of the study area. Utmost care should be taken for any kind of interventions in this ecologically sensitive area. It is evident that developments incompatible with this environmentally fragile location are increasing gradually putting the nature and the local inhabitants at high risk of environmental catastrophes. The value of natural resources and ecosystem services often undermined by the investors and by the decision makers as well. Frequent news about such interventions and protests against them covers in the media.

An example of reluctance for revoking permissions (granted earlier of declaration of ECA zone) to nearly 150 industrial projects located within the ten kilometre area surrounding the Sundarbans, declared as ECA back in 1999. The permissions never revoked despite there are provision to revoke such permission once the area is declared ECA. Ignorance, administrative

negligence and faulty legislation have put the ecologically sensitive sites in serious degradation. The Environment Impact Assessment of the ongoing Rampal Power Plant project, admits that the 142 tons of sulphur dioxide and 85 tons of nitrogen dioxide that will be emitted daily from the plant will increase the concentration of Sulphur Dioxide (SO2) and Nitrogen Dioxide (NO2) in the air near the Sundarbans. Popular protests, recommendations and writings against the project is continuing. (University 2016)

In a response to the observations of World Heritage Committee on the Sundarbans, the state party, Government of Bangladesh submitted a report on the state of conservation of the property which assures that,

> No environmental clearance or permission has been given to any large-scale industrial projects adjacent to the property.
>
> An overview of current and future development plans until 2041 in the Southwest region of Bangladesh has been undertaken in preparation for the Strategic Environmental Assessment (SEA). A consultancy firm to undertake the SEA was to be shortlisted in January 2019. (UNESCO 2018)

3.7. Public opinions are overlooked in development decision making

Despite tremendous popular protest against the Rampal Power Plant project, the Department of Environment (DoE) of the Government of Bangladesh accepted the project to be feasible. A writ petition filed to stay the project was summarily dismissed by the Supreme Court.

In 2013 a public interest litigation was filed before the High court division praying for a direction upon the respondents to constitute a committee with renowned local and international environment biodiversity and eco-system experts to make impact assessment of the proposed Rampal coal-fired power plant on the environment and ecology, and on the Sundarbans. But the honourable court rejected the petition by saying that -unless things shape up as much as to enable judicial mind to come to a clear conclusion, giving direction for formation of a committee of experts for that matter to suspend a huge development project would be a gratuitous interference by court which is not permissible under law. (Shekh Md Muhibbullah,2017). An article in DW regarding control of politics in Bangladesh mentions that, 'a limited number of people make decisions in Bangladesh'. (DW 2019)

Figure 1 Save Sundarban protesters in Dhaka on July 28, 2016 (Daily Star photo)

(Source: https://www.sourcewatch.org/index.php/Rampal_power_station Accessed 8 July 2019)

4. Fusion: Comparison of Evidences with Hypotheses

4.1. Matrix of evidences and arguments

The hypotheses/ arguments are placed in columns under the argument heading and the evidences are placed in rows under the evidence heading. Each item of evidence is examined at a time to see how consistent that item of evidence is with each of the hypotheses. Evidences are weighted by using notations. Notations C, I, and N/A standing for consistent, inconsistent, or not applicable evidences. The evidence is weighted by using combinations of CC, II, C, and I.

Table 1: Matrix of evidences and arguments

		Arguments						
		Coastal region is vulnerable to natural disasters & Climate change	Harmful human interventions	Soft interventions are working well	Weak regional Spatial Planning	Defying urban & environmental regulations	Issues of environment and public goods are overlooked indecision making	Public opinions are overlooked/ overruled
Evidences	Natural disasters	CCC						
	Climate Change Forecasts	C						
	Polders in 60s		C					
	Power plants&Industrial development in coastal Sundarbans		CC		C	C	C	C
	CDMP/ DRM Act			CC				
	NGO works/ GFDRR program			C				
	Studies on challenges of urban planning				C			
	Delta Plan 2100				I			
	Unplanned developments				C			
	EIA of Rampal		C			C	C	C
	Not revoking industry permissions						C	
	Dismissal of writ petition						C	
	IUCN advices on Rampal				C	C	C	C
	GoB's report to World Heritage Committee on the Sundarbans				I	I	I	
	Public protests					C	CC	C
	DW News on decision making							C

Examination of each of the hypothesis one at a time is done by looking down the column to consider each hypothesis as a whole. Generally, the hypothesis with the fewest "I"s is probably the most likely one. The hypothesis with the most "I"s is probably the least likely one.

The first hypothesis, 'coastal settlements are vulnerable to natural disasters and climate changes' scored 4 "C"ssupported by previous reports of natural disasters and forecast of climate change impacts and it does not scored any "I"s.

The second hypothesis, 'Human interventions in the coastal area are escalating the vulnerability' scored 4 "C"s supported by the evidences of construction of embankments during 60s, recent industrial and power plant developments in the study area. It does not score any "I"s.

The third hypothesis, 'soft interventions are performing well' scored 3 "C"s which is consistent with the evidences that Bangladesh has enacted a Disaster Management Act in 2012 and the Comprehensive Disaster Management Programme has positive results. There are many national and international NGos are working with livelihoods, nature conservation, climate resiliency etc., It has no "I"s.

The fourth hypothesis, 'weak framework for region spatial planning in Bangladesh' got 4 "C"s and 2 "I"s. Uncontrolled industrial and power plant developments in the study region, studies on spatial planning challenges, findings of the Delta Plan 2100, unplanned urban development and recent recommendation of IUCN to placing the Sundarbans in Bangladesh on the List of World Heritage in Danger to the World Heritage Committee of UNESCO support the hypothesis. However, recommendation for preparing coastal regional plans in the Delta plan 2100 and taking an overview of current and future development plans until 2041 in the Southwest region of Bangladesh has been undertaken in preparation for the Strategic Environmental Assessment (SEA) show some initiatives towards regional spatial making.

The fifth hypothesis, 'Developments defying urban and environmental regulations in the study area' scored 4 "C". Issuing permission of large industries in ecologically sensitive areas around the Sundarbans through loopholes of laws and regulations, approval of the Rampal thermal power plant project despite the harmful emissions stated in its EIA report, inclusion of 'water infrastructure' and 'non-renewable energy facilities' and others as affecting factors of the Sundarbans in the provisional agenda to declare it as World Heritage in Danger. (UNESCO, 2019..) , reports of public protests in the media etc., confirms the relevancy of the hypothesis. The hypotheses scored 1 "I"s, due to assuring undertaking Strategic Environmental Assessment (SEA) of the Sundarbans in a report on the state of conservation of the property.

The sixth hypothesis, 'Issues of environment and public goods are overlooked indecision making' scored highest 7 "C" and 1 'I's only. Recent industrial and power plant developments in the coastal area, issuing permission of large industries in ecologically sensitive areas around the Sundarbans, approval of the Rampal thermal power plant project despite the harmful emissions stated in its EIA report, inclusion of 'water infrastructure' and 'non-renewable energy facilities' and others as affecting factors of the Sundarbans in the provisional agenda to declare it as World Heritage in Danger, dismissal of writ petition to form expert committee to review Rampal thermal power plant project, reports of public protests in the media etc., shows the consistency of this hypothesis. The hypothesis scored 1

"I"s, due to assuring to undertaking Strategic Environmental Assessment (SEA) of the Sundarbans in a report on the state of conservation of the property.

The seventh hypothesis, 'Public opinions are overlooked in development decisions' scored highest 5 "C" and no 'I's. People raised their concerns during establishment of the major harmful interventions at the study region, EIA reports and international public agencies made their recommendations but those were properly taken care of. Recently published article in DW Bangla indicates that decisions are taken in Bangladesh by a limited number of people having a chance of disregarding the public opinions.

5. Conclusion

From the systematic comparisons of hypotheses with the evidences the most consistent hypotheses have been identified. The core challenges of spatial planning in the coastal region of Chalna, Bangladesh are; absence of strong regional spatial planning framework in Bangladesh, neglecting the values of environment and public goods, defying the regulations in various ways and not accounting public opinions in the decision making process. So, there is a tremendous scope of working with regional spatial plans in Bangladesh, particularly for its coastal regions.

There are further scopes to adopt the climate resilient and blue-green approaches of designing the infrastructures instead of the conventional ones. There is also scope of exploring the local landscape and building cultures that are generated through generations local adaptive wisdoms.

The public authority need to adopt participatory culture in planning, and collaborating with learned bodies, international authorities, private sectors, NGOs to achieve the goal of planning a coastal town like Chalna in adaptive or resilient way.

6. References

Hardoy, Jorge; Satterthwaite, David (1983) "ISOCARP: Exchange of ideas", Cities, The International Journal of Urban Policy and Planning, Vol. 1 No. 1 (August).

Dudley, N., S. Stolton, A. Belokurov, L. Krueger, N. Lopoukhine, K. MacKinnon, T. Sandwith and N. Sekhran [editors] 2010, *Natural Solutions: Protected areas helping people cope with climate change*, IUCNWCPA, TNC, UNDP, WCS, The World Bank and WWF, Gland, Switzerland, Washington DC and New York, USA. Available from: Ebook Library. [4 June 2019].

University Library 2019, The Learner's Guide to Geospatial Analysis, 8 January 2019, The Pennsylvania State University. Available from: https://www.e-education.psu.edu/sgam/node/1 .[10 July 2019]

GFDDR n.d., INFORM, index for risk management. Available from: https://www.gfdrr.org/en/bangladesh. [1 June 2019].

Ministry of Environment and Forest 2018, *Nationwide Climate Vulnerability Assessment of Bangladesh*, Government of Bangladesh. Available from: https://moef.portal.gov.bd/sites/default/files/files/moef.portal.gov.bd/notices/d31d60fd_df55_4d75_bc22_1b0142fd9d3f/Draft%20NCVA.pdf. [1 June 2019].

IUCN June 2019, IUCN advises "in danger" status for three World Heritage sites. Available from: https://www.iucn.org/news/iucn-43whc/201906/iucn-advises-danger-status-three-world-heritage-sites. [27 June 2019].

Government of Bangladesh 2013,Final Report on Environmental Impact Assessment of 2x (500-660) MW Coal Based Thermal Power Plant to be Constructed at the Location of Khulna. Available from: http://www.indiaenvironmentportal.org.in. [4 June 2019].

World Bank 2018, Bangladesh Disaster Risk and Climate Resilience Program. Available from: https://www.worldbank.org/en/country/bangladesh/brief/bangladesh-disaster-risk-climate-change-program. [1 June 2019].

Government of Bangladesh 2019, Bangladesh Delta Plan 2100 Formulation Project. Available from: http://www.plancomm.gov.bd/site/files/0adcee77-2db8-41bf-b36b-657b5ee1efb9/Bangladesh-Delta-Plan-2100.[4 June 2019].

University Library 2016, Arpita Shams Mizan, Archaeological Sites and Mangrove Forest as Critical Areas in International Environmental Law: Analysing the Case of Bangladesh, Macquarie University. Available from: https://www.mq.edu.au/media/images/content-pages/macquarie-law-school/ajel/2016/05_2016-AJEL_Arpeeta.pdf.[6 July 2019]

UNESCO 2018, Government of Bangladesh, Progress Report on the Decisions of 42 COM.7B.25 of the World Heritage Committee on the Sundarbans. Available from: http://whc.unesco.org/en/list/798/documents/. [27 June 2019].

Shekh Md Muhibbullah,2017, 'Rampal power plant: Development and environment', *The Daily Observer*, 17 August, 2017. Available from: https://www.observerbd.com/details.php?id=90100. [8 July 2019].

Who Controls Politics in Bangladesh?, DW Bangla, 4 May, 2019. Available from: https:// https://p.dw.com/p/3Hvjx. [8 July 2019].

Case Study / Project

How to Plan in a Volcano-related Disaster Prone Area?

Lesson Learned from Adaptive Spatial Planning in Dieng Plateau, Central Java

Raka SURYANDARU

Abstract

Located in the Asia Pacific's Ring of Fire as well as has one of the longest shorelines in the world, Indonesia is prone to various kind of disasters. Over the past few years, Indonesia has made headlines around the world due to devastating natural disasters that resulted in environmental damage and thousands of casualties. One of the area that has multiple disaster risks is Dieng Plateau in Central Java. The infamous geopark is prone to at least from landslides, toxic gases, and earthquakes. Based on the data from Local Agency for Disaster Management, the area has a medium risk for landslides, with an average occurence of four to six times each year. It also sits in the I, II, and III levels of earthquake. The deadliest disaster in Dieng Plateau is CO2 toxic gases-with Sinila, Timbang, and Candradimuka Craters are actively emit the toxic gases sometimes. In 2011 and 2013, more than 5.000 residents were evacuated and 20 hectares of agriculture land damaged due to CO2 toxic gases from Timbang and Kalisat craters and landslides.

In 2018, Sileri Crater located in Dieng Volcano area was suddenly erupting phreatic. Batur is one of the sub-districts in Dieng Plateau that is planned to be an urban area currently consists of 3 villages: Batur, Sumberejo, and Pesurenan. Served as the commercial center to support tourism activity in the region, a specific approach needs to be taken to develop the area more carefully. Under the 'Detailed Spatial Plan of Batur Urban Area' project, the consultant introduces adaptive planning for disasters by optimizing land-use in disaster-prone areas. The benefit of this study is expected to be a lesson-learned for stakeholders to promote resilient development. The result obtained from this project is an adaptive spatial planning that is tailored to the region's disaster risk profile and aimed at achieving a higher standard of living.

Research Paper

Spatial planning and design for food security

Building Positive Rural-urban Linkages

Aishwarya Talluri , S.P.A. New Delhi ; India

Abstract

Food is vital for human survival. Food has had a significant impact on our built environment since the beginning of human life. The process of feeding oneself was most people's primary job for the greater part of human history. Urban Migration moved people away from rural and natural landscapes on which they had been dependent for food and other amenities for centuries.[1] Emergence of the cities leads to a new paradigm where the consumers get their food from rural hinterland where the main production of food products happens[2]. In a globalized world with an unprecedented on-going process of urbanization, There is an ever reducing clarity between urban and rural, the paper argues that the category of the urban & rural as a spatial and morphological descriptor has to be reformulated, calling for refreshing, innovating and formulating the way in which urban and rural resource flows happen. India is projected to be more than 50% urban by 2050 (currently 29%). The next phase of economic and social development will be focused on urbanization of its rural areas. This 50 %, which will impact millions of people, will not come from cities, but from the growth of rural towns and small cities. Urbanization is accelerated through Government schemes such as JNNURM (Jawaharlal Nehru National Urban Renewal Mission) , PMAY (Pradhan Mantri Awas Yojana), 100 smart cities challenge, Rurban Mission are formulated with developmental mindset. The current notions of 'development' are increasing travel distances, fuels consumption, food imports, deterioration of biodiversity, pollution, temperatures, cost of living. The enormity of the issue is realized when the cumulative effect of all cities is addressed. Urban biased development becomes an ignorant choice, causing the death of rural and deterioration of ecological assets. Most people live in places that are distant from production fields have been observed as an increasing trend. Physical separation of people from food production has resulted in a degree of indifference about where and how food is produced, making food a de-contextualized market product as said by Halweil, 2002[3] . The resulting Psychological separation of people from the food supply and the impacts this may have on long term sustainability of food systems. Methodology : . Sharing the learning about planning for food security through Field surveys, secondary and tertiary sources. Based on the study following parameters : 1. Regional system of water 2. Landforms 3. Soil type 4. Transportation networks 5. Historical evolution 6. Urban influences A case study of Delhi, India, as a site to study a scenario that can be an alternative development model for the peri-urban regions of the city. To use the understanding of spatial development and planning to formulate guidelines for sustainable development of a region that would foster food security.

Keywords

Food security, spatial planning, urbanisation

1. Introduction

1.1. Najafgahr

Zone L is one of the 6 zones that are demarcated as urban extension and rural area. Najafgahr is designated as a sub regional centre with 6 villages as service and growth centres. Najafgahr is a representative of the trend of transformation in the peri-urban areas of the developing nations. It is often representative of the edge condition of the metro cities that are growing in size, rapidly.

1.2. Current Scenario

By the year 2025, 83 per cent of the expected global population of 8.5 billion will be living in developing countries. Yet the capacity of available resources and technologies to satisfy the demands of this growing population for food and other agricultural commodities remains uncertain[4] . India is projected to be more than 50% urban by 2050 (currently 29%). The next phase of economic and social development will be focused on urbanization of its rural areas. This 50 %, which will impact millions of people, will not come from cities, but from the growth of rural towns and small cities. The current notions of 'development' are increasing travel distances, fuels consumption, food imports, deterioration of biodiversity, pollution, temperatures, cost of living. The enormity of the issue is realized when the cumulative effect of all cities, is addressed.

2. Trends

In the midst of this transformation, it is the urban-rural and rural-urban interaction that is deteriorating. Most people live in places that are distant from production fields, an emerging trend that is a result of our transformation from urban to rural societies. As urbanised specie, Humans have created a distinct division between agriculture and city life.[5]. Contextualisation and positive linkages between urban and rural can be built through a critical dimension of food systems.

Past 40 years, the government of India has emphasized on cereal farming (green revolution) now we are self-sufficient in that area. In many parts of the country, farmers are agitated because of insufficient income out of growing cereals. Speculation of land-use change in urban peripheries forces farmers to sell land for short-term monetary returns, as they lack the skill to adapt farming, to the changing needs of the city and climate. Leading to the disintegration of communities. Parallel to that , many studies have highlighted a shortage of vegetables & fruits. There are large price fluctuations, as they are not supported by the government and their supply is uncertain too. The huge requirement of food in the main consumption centres, like Delhi (25 million people) is transported from long distances (onions from Maharashtra and chillies from Karnataka). It is crucial to reduce transportation cost and energy. A more sustainable farming practice would be to grow vegetables and fruits close to the city and have a high value realization for farmers. This is where farming and industry come together i.e. farming done in an industrial mindset e g: trellising system, poly houses, controlled irrigation etc .Here agriculture is not understood as a primary way of cropping but with a mindset of tertiary and secondary.

When this is projected against real estate development, it will not only provide farmers a better livelihood, it will encourage them to learn and educate. By weaving this into the idea

of Rurban lifestyle at the edge of the city, with cultural characteristics of communities, every part of the city need not be a state-led urban development project, thereby creating a fresh way of dealing with city edges of mega-polis like, Delhi. Through the New urban agenda, agenda 21 , Sendai framework, it is an opportunity to open a new way of developing a fresh mindset and action plan to create an alternate way of developing the urban extension / urban periphery.

3. Significance of Urban Rural linkage:

Urban rural linkages have been defined broadly as the reciprocal flows of people, goods, services, money and environment services with many of these linkages related directly or indirectly to food systems. There are significant changes happening within food systems that impact urban-rural linkages, such as the decline of traditional markets, globalizations of diets and increasing availability of highly processed food. Small holder producers and processers, who often rely on nearby urban areas for market are increasingly competing with food produced from distant sources, often selling for lower prices.

As a result of food system changes, with multiple and interacting economic, environmental and social impacts, urban and rural areas have become less interdependent in a food systems context in many countries. Paradoxically , the severing of local food chains linking rural and urban areas has occurred while urban and rural communities are also becoming more interdependent in other ways , for example in the flow of money labor , culture and social technologies . All these changes are having profound impact on smallholders across the urban rural continuum .the diverging interdependent realities of urban and rural communities need t be addressed if we are to achieve sustainable urbanization, resilient food systems and balanced urban rural development.

By strengthening linkages between people growing and consuming food is an effective way to increase harmony and synergy lessening the gaps between urban and rural communities. The food systems often have an effective policy area through which to strengthen urban rural linkages but the impact of the policy is often diluted during its spatial manifestation.

The 2030 Sustainable Development Agenda invites new narratives, including integration of *peri*-urban and rural sustainable development. climate change , biodiversity loss, land grabbing , water shortage , forced migration as a result of disaster , war and occupation , violation of land , food and other human rights all add to the pressures on food systems , most affecting women ,children and other marginalized members of society . Despite the fact that food and cities are among the seventeen sustainable development goals (SDG2) both with developed targets , indicators and means of implementation , their integration has not been fully articulated . Until interdependence of these two areas is acknowledged as part of the implementation agenda for SDGs balanced urban rural development may not occur or not at all in places where urban expansion is the greatest and this balance is most needed. In order to develop spatial planning framework for strengthening food systems in the immediate peripheries of the city below method was adopted. Earnings about planning for food security through Field surveys, secondary and tertiary sources. Based on the study following parameters: 1. the regional system of water 2. Landforms 3. Soil type 4. Transportation networks 5. Historical evolution 6. Urban influences A case study of Delhi, India, as a site to study a scenario that can be an alternative development model for the

Peri-urban regions of the city. Challenges to integrate urban and rural are specific to local places and there is an urgent need to find constructive ways address the issues . As a solution to strengthening urban-rural connection, FOA (Food and agriculture Organisation) defined a term " city region food systems " in December 2013 " Complex network of actors ,Processes and relationships to do with food production, processing , marketing , and consumption that exist in a given geographical region that includes more or less concentrated urban centre and its surrounding peri-urban and rural hinterland ; a regional landscape across which flows of people , goods and eco system services are managed . " To use the understanding of spatial development and planning to formulate guidelines for sustainable development of a region that would foster food security.[6]

4. Research Parameters

The following parameters provide window to investigate and understand the local region and the origins of it from many perspectives. It is also a framework to explore the potential avenues for transforming the area into city region food system. Through these parameters, a vision to re-imagine an alternate development model for urban extension is imagined, where sustainable urban development is imagined as a consequence of food systems.

4.1. Ecology Historical evolution –heritage characteristics:

Historically, Najafgahr has been cultivated. It falls on the trade route starting from Rajasthan .This trade route is along the foot hills of Aravali range. The presence of Aravali, creates a unique scenario of rich network of natural drains.

4.2. Ecological setting and environmental conditions:

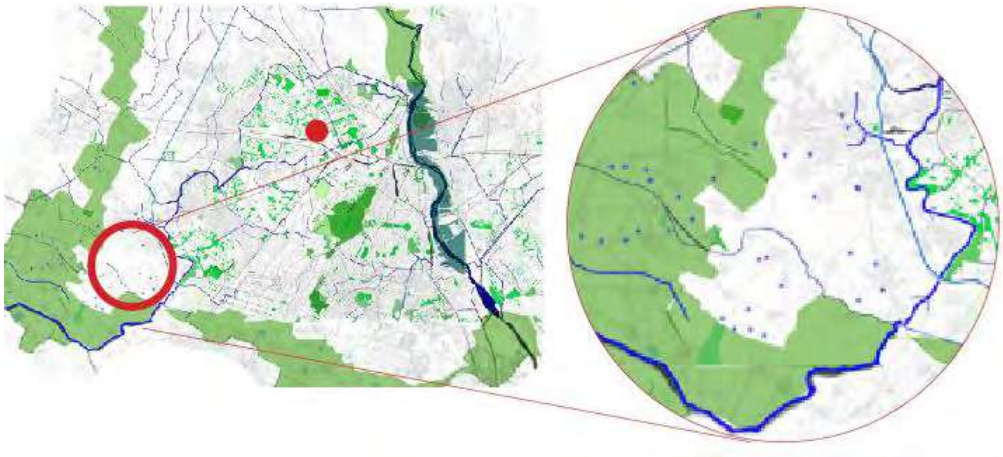
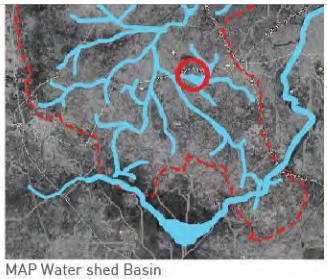


Figure 1 Map: Natural Drains of Delhi , Source : The Yamuna Project



MAP Water shed Basin
Source : GIS

GIS Stream Density map
ource : GIS

Seasonal streams
Source :GIS

Figure 2 Natural Drainage of the village cluster L-3, GIS map Stream density , Seasonal Streams , Source , Author .

The above maps show the network of natural drains from macro scale, meso to micro scale. Analysis of natural terrain, drainage system, seasonal drains, reveals the valley zones. Study of soil and various zones of fertility based on scientific data is mapped. Fertility of soil and natural drain density has a healthy coherence. These valleys are valuable in structuring and guiding demarcation of buildable land. These valleys are zones that must be protected in order to ensure well irrigated region and there for high water table. Super imposition of the two data sets, can reveal structure and function of natural systems that have evolved to fit the natural resources of the given location. Developing an understanding of such kind can inform agro ecology and reveal ways to incorporate into farming systems and food systems. Since the natural water systems is continuous , by strengthening the eco system in these zones can serve as valuable habitat for wildlife , key part of integrated natural systems and a boon to those people who want to observe this aspect of the system Simultaneously , also revealing that areas where built expansion can happen , as shown in Figure 2 . If this system is designed well, along with native species, it will begin to flourish independently. A well-designed interface with this area itself can become a forum for recreation, education and potential economic interaction. [6]

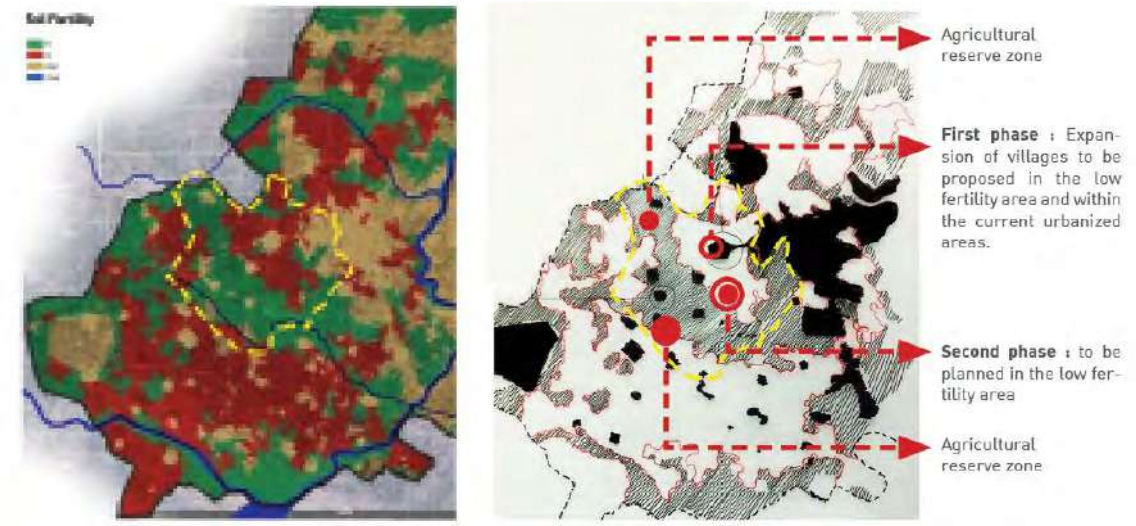


Figure 3 Soil Fertility map, Source: SLUSI , Development zones and protected zones , source : Author

4.3. Social, cultural and demographic attributes:

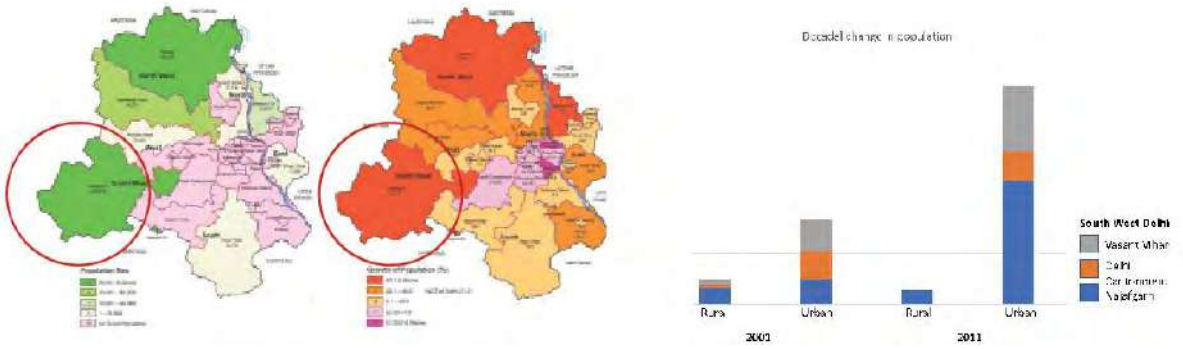


Figure 4 Increase In rural population ,Increase in population , Occupational shift in L-zone , Source : N.C.R.P.B

Decadal growth in population, literacy rate and occupational shift are indicative factors that project that scale of urbanisation.

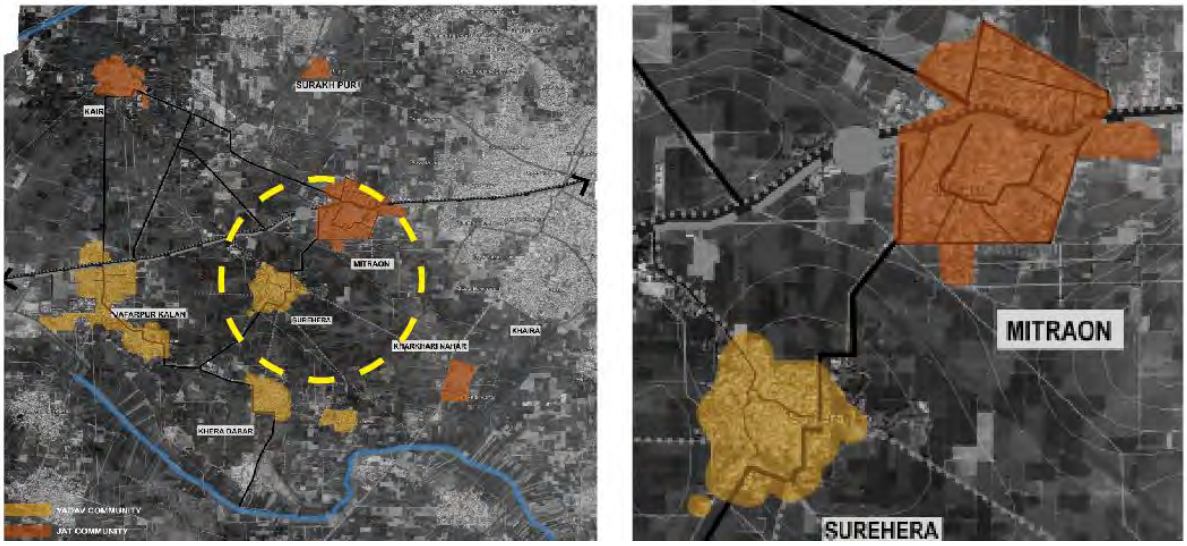


Figure 5 Map : Social Structure in village cluster , Sub cultural groups. Source : Author.

Social structure of clusters: The cluster is divided such that the major census town and the rest of the villages in the cluster are always at a conflict. The Government documents bind this cluster of villages as a unit, but there is a sub cultural divide amongst these. Forming 2 groups. The historical evolution of the 2 communities is fundamentally different and therefore the present day differences are there.

4.4. Morphological districts and their characteristics

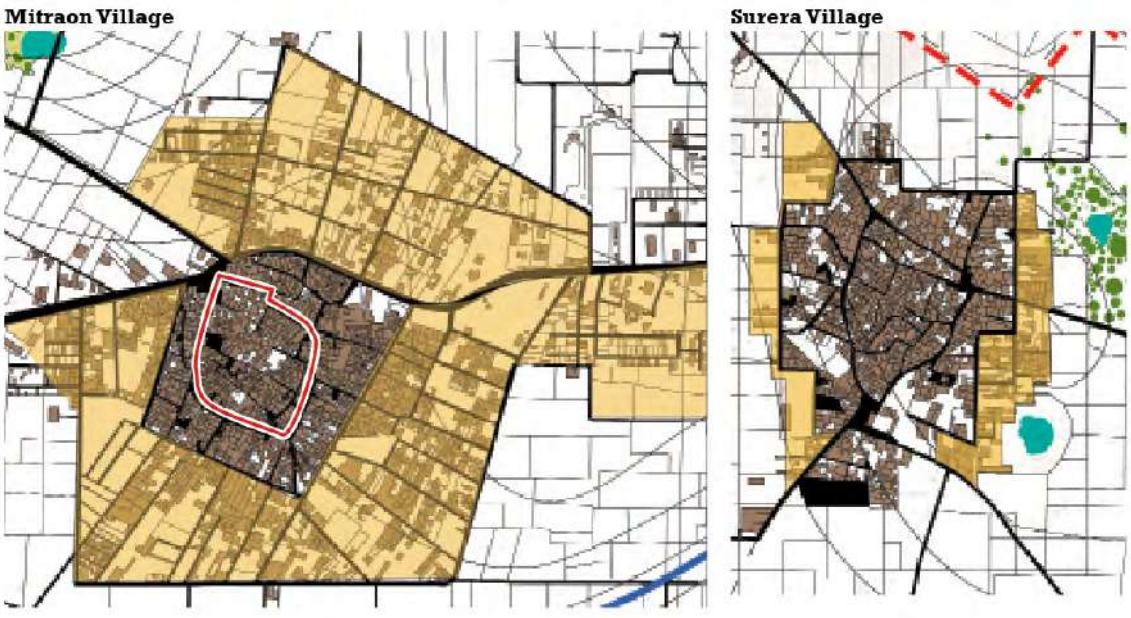


Figure 5 Mitroan village of Jat community, Surera Village of Yadav Community, Highlighting the sprawl .

Morphological character reveals the cultural attributed of the community, their lifestyles, activities and trends of development. The above map indicates the difference in the nature of sprawling according to different communities.

4.5. Physical and social infrastructure – distribution and access:

The hard infrastructure of roads , processing , storage and agricultural services business and the soft infrastructure knowledge , culture and social supports , financial credit and remittance link rural and smaller settlements and intermediate scale cities in different ways than larger cities[2] .

4.6. SPATIAL Recommendations:

Outcomes: To identify systems that reinforce agriculture as green infrastructure in areas those are close to the urban centres, as a defence against an urban-biased expansion of cities.

To strengthen the presence of the local community by providing healthcare, education and social infrastructure and locating facilities by the understanding its cultural fabric.

Facilitate young farmers to develop scientific and technical skills, business and management skills to practice farming with an industrial mindset, thereby creating productive landscape and employment opportunities. To protect and enhance the ecological assets of the place.

Principles to enable this project:

1. Integration of system: Drainage, Movement, Ecological, Agricultural
2. Morphology of interface
3. Function at interface
4. Typology of buildings at the interface

5. Strategy

Strategies are an outcome synthesising information of a broad spectrum into spatial guidelines. The guidelines are crafted with a belief that all policy, programs, social and cultural issues , economic and environmental issues have a spatial translation . Therefore a solution to create the urban rural continuum through the lens of food systems, spatial solution is created.

5.1. 1.1 Regional level strategy:

1. Plantation to be seen in such a way that there blue green infrastructure.
2. To identify and secure water catchment area. And harness it.
3. Using native, indigenous plant species as they are climate adaptive and high yielding.
4. Studying soil to identify least fertile soil -barren land to limit high density construction (if needed) in those boundaries.
5. Moving towards multi crop farming, harvesting greens-vegetables as a part of the increasing higher economic valuation of crop. – Especially in the areas with high real-estate value.
6. Strengthening the role and presence of educational institutes.
7. Implementation of the form guideline in the region in order to strongly secure the predominant identity of this area.

5.2. 1.2 Village cluster level:

1. To strengthen the presence of education institutes at cluster level.
2. Decentralizing the supply chain system according to the strengths and skill of each village.

3. To locate the given infrastructure by the government in such a manner that the inter-connecting bond of the villages strengthens.
4. Creating interface of amongst villages that strengths their relationship with one another.
5. Creating a movement network for efficient movement of produce.
6. Ensuring that the natural drainage is protected by creating bio-swales and dirt tracks at the valley areas.
7. High impacting but less no. of vehicular roads. To avoid dissection of farmlands. Placement of vehicular road is THE MOST crucial part of working in the agricultural landscape. Roads often area the starting point of strip development, with the characteristic widening of this strip, the farm lands tend to become the constantly shrinking backyards.
8. Creating decentralized system of settlements that work as a cluster of villages with each specializing in a service. The FAO studies have shown that when village work in a cluster the profitability can multiply 3 folds. Can be done by creating interdependencies and specializations at the same time.
9. To identify sub-cultural divides and build interface for cohesion.
10. Movement network to have strong hierarchy that will be maintained by the design of the section, such that people are encouraged to walk and cycle and recreate.

5.3. 1.3 Village level

1. In India, MSME accounts for 45% of manufacturing output, fostering growth of MSME sector along with the provision of social infrastructure for hamlets and villages can diversify employment opportunity for the rural population and alleviate the need for migration or give up farming practices.
2. Recreating the rule of commons, something was a fundamental part of village functioning as a unit.
3. Strengthening sense of community
   - By strengthening congregation spaces of the village and making them more accessible.
   - Creating shared facilities.
   - Making space for cultural attributes of the community.
   - Creating new ways of congregation that is inclusive of youth generation.
4. De-congesting core roads to protect the community life at the dense core.

5.4. Local intra village strategy:

1. Protecting, strengthening and creating potential natural drainage spines.
2. Based on soil fertility and capability the village expansion must be located.
3. The interface of the new and the old much be designed to accommodate new scenario and morphological continuum in order to retain the landscape quality.
4. Ensuring no strip development between 2 villages.
5. Careful locational setting of educational institutions based on their capacity and to enhance accessibility.
6. Making this area also be a training foreground and outreach program for the new generation farmers.

5.5. Built Forms

1. Systematizing the new development.
2. Morphological transition with the existing structure.
3. The form must respond to the fact that the soil is loamy.
4. The new structures will be a shared facility (present day commons) therefore modularity is a crucial point in the design.

5. The form must enhance the relationship of the people with farmlands and farming practices.

6. Conclusion

Integrated planning for urban and rural areas around the world is extremely challenging and the rise of structural inequity and polarization is not reducing the level of challenge. And yet, there are new openings and opportunities of developing alternate ways of development. However, the benefits of a balanced urban and rural approach to strengthening urban rural linkages summarized in this paper will only occur with deliberate efforts to integrate urban, peri-urban and rural food system planning in sustainable development planning at all levels. The significance of having an ecosystem of urban and rural is the only way to move towards a sustainable future. The Agenda 21 Document strongly advocates for urban rural continuum and food security, this paper is an attempt to translate the ideas into spatial guidelines, as it is observed, that often the spirit and intentions of the project is lost in translation from text to space .Frameworks for design and planning must be created to factor in new Narratives that are specific to local context so that ecology and biodiversity , therefore sustainability of the region at large is made possible .

References

1. FRANCIS, C., LIEBLEIN, G., STEINSHOLT, H., BRELAND, T. A., HELENIUS, J., SRISKANDARAJAH, N., & SALOMONSSON, L. (2005). Food Systems and Environment: Building Positive Rural-Urban Linkages. *HUMAN ECOLOGY REVIEW.* 12, 60-71.
2. STEEL, C. (2008). *Hungry city: how food shapes our lives*. London, Chatto & Windus.
3. HALWEIL, B. (2002). *Home grown: the case for local food in a global market*. Washington, DC, World watch Institute.
4. UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT. (1992). *Agenda 21, Rio Declaration, Forest Principles*. [New York], United Nations.
5. FLORA, C. (2001). *Interactions between agroecosystems and rural communities*. Boca Raton, CRC Press. http://www.environetbase.com/books/3961/0917fm.pdf.
6. FORSTER T., SANTINI G., EDWARDS D., FLANAGAN K., & TAGUCHI M. (2014). Strengthening urban-rural linkages through city-region food systems. *Regional Development Dialogue.* 35, 121-137.

Case Study Paper

REIMAGINING PAMBA

Sustainable design strategies for Sabarimala Pilgrimage.

Rahul V, B.arch; India

Abstract

Kerala, an Indian state, known popularly as gods own country, lies one of the ancient temples, Sabarimala. Other than its historical and cultural prominence, this temple is open only for a few days in a year and prohibits the entry of women of 15-55 years of age. The temple is situated along the banks of the river Pamba. The flood plain of this river acts as a transitional area between The Sannidhanam(the temple) and Nilakkal (the parking area) .The Study extends from natural setting of the area to the pilgrim behavioural study . Unplanned development of the Pamba flood plain, without considering the context lead to the study of; Malai Arayans the natural inhabitants of the forest. Their settlement pattern and lifestyle were studied.

Research oriented design strategies were prepared also by considering recent devastating flood in Kerala and the Supreme Court order for women's entry which created lots of riots and chaotic situation within the state. Study includes pre-flood condition, during the flood and after flood scenario of Temple's base camp, situated along the bank of the River Pamba; during seasonal and non-seasonal time. After considering the need of pilgrims and ecological impact, proposal includes design interventions which reduce ecological footprint, waste generation, wildlife threatening and measures to improve tribal life. Design proposal includes study of local materials, documentation of indigenous techniques, construction details and issues of the native tribes. Rather than imposing an alien architecture inside the forest, the study ends up in search of temporary, semi temporary architectural interventions using natural materials and technology. End result of the project includes the whole mapping of Pamba during various stages, the pilgrimage culture and its effect on nature and a whole new design for pilgrim culture which includes women pilgrims; architecturally and non-architecturally

Keywords

Sabarimala, Malai Arayans, Pilgrimage, Flood, Pamba.

1. Introduction

Sabarimala is an ancient temple for Ayyappa (Sasthavu) situated deep inside the western ghats of Pathanamthitta Dist. Kerala, India. Nilakkal, 17 km before Pamba, acts the parking area for pilgrims. Pamba act as the final halting in the journey to Sannidhanam (shrine). Lots of preparations and rituals are happening at Pamba with very less facilities. Sabarimala is one of the area with floating population is greater than existing population of the entire state. Due to this lot of infrastructural facilities are introduced inside the forest, which cause tremendous changes that affected context and environment of the site.

Figure 1. Pamba basin before flood

Source: Google Earth

2. Site Study

2.1. Location

North: Peerumedu taluk

South: Pathanamthitta district

East: Theni, Thirunelveli & Ramnad District of Tamilnadu

West: Kottayam district.

The site area comes under high ranges of Southern Western Ghats with an altitude vary from 100 to 2019 m. The western part of the reserve, where the elevation ranges from 100 to 11OOm, mainly occupies west coast tropical evergreen forests. It is in this biodiversity rich forests where the famous Sastha Temple is situated.

2.2. Climate

. The site experiences a varied range of temperature, humidity and rainfall due to the wide range of altitude. The river side has predominantly salubrious climate. The temperature varies between 19°C and 36°C. During winter months, at high altitudes the temperature is considerably less and frost occurs during the period. The humidity at the foothills varies from 70% to saturation, due to the presence of the river, whereas at higher altitudes it is slightly less. The two monsoons – The south west monsoon during the months of June to august contributes about 60-65% rainfall.

The Northeast monsoon experienced during September to November contributes 20-25 % of the rainfall and 10-15 % of the rainfall is received during January to May as summer rains..

2.3. Malai Arayans

Malai Arayans are the native tribals of travancore forests. The Malai Arayans inhabit mainly the Kottayam, Idukki and Pathanamthitta Districts of Kerala. They are included in the list of Scheduled Tribes officially accepted as such both by the Union and Kerala Governments.

Settlements

The Malai Arayan Village was built generally on high ground mostly by the side of a stream. In defense of possible attacks by wild elephants they built anamadam on trees (tree houses) a bamboo ladder access. They took shelter in them during night and drove off wild elephant by shouting Ayyappa"

The huts were built without windows as a safe guard against the sultry heat of summer. The huts were scattered here and there and they had an easterly orientation. They stored the harvests chiefly paddy and tapioca in the “Anamaadam’’

Materials and Construction

Huts were built of Jungle-wood posts, bamboos, and reeds and thatched with grass. The huts were built without windows as a safe guard against the sultry heat of summer. Some Malai Arayans had huts made of stone or mud, built on foundations about two feet high. Some of the huts had mud walls and rooms with doors and windows fitted on wooden frames. Bamboo mats were used for sitting and sleeping.

3. Pilgrimage

3.1. Rituals

After 41 days of fasting, pilgrims reach Pamba after visiting Erumely either through traditional trekking route or by road. At Pamba, pilgrims take holy bath in the river and visit Pamba Ganapathy temple and continue their trekking to Sannidhanam. Lot of pilgrims stay and take rest at Pamba before taking steep route towards Sannidhanam. They are provided with space for placing 'viri' (bed spread) and take rest. During festival period, (April), the shrine is carried by head from Sannidhanam to Pamba “Arattukadavu” for the holy bath of Ayyappa as part of rituals.

3.2. Activities

SEASON

Continuous flow of pilgrims throughout the day and riversides are filled with them to conduct holy bath. Continuous KSRTC services.Services of TDB, Forest Dept., Ayyappa Seva Sangham, Fire & Rescue, Police force, Health Dept., BSNL, Water Authority, NDMA and many other private service providers. Commercial acitivities like hotels, stationeries, tea stalls, Prasadam counters etc are active during season. Dolly services are available at Pamba at a rate of Rs 4200/-

Figure 2. Mapping during pilgrimage season

OFF SEASON

Major construction and development activities take place. Few KSRTC buses with hault at Pamba. No Communication facilities other than BSNL. Employees of TDB, Police, Forest, KSEB, KWA departments accommodate at Pamba as well as in Sannidhanam. People visit Pamba Ganapathy Temple and conduct rituals like Choroonnu, Bali Darppanam etc.

3.3. Building character

Visually the whole area inside the dense green forest is very shabby. No particular character or look is visible in most of the buildings. In addition, no structures are built by considering fire safety and other precautions. Building materials - Normal concrete construction using concrete blocks and cement. No consideration for environmental impact. Even Sannidhanam also, same construction practice is happening.

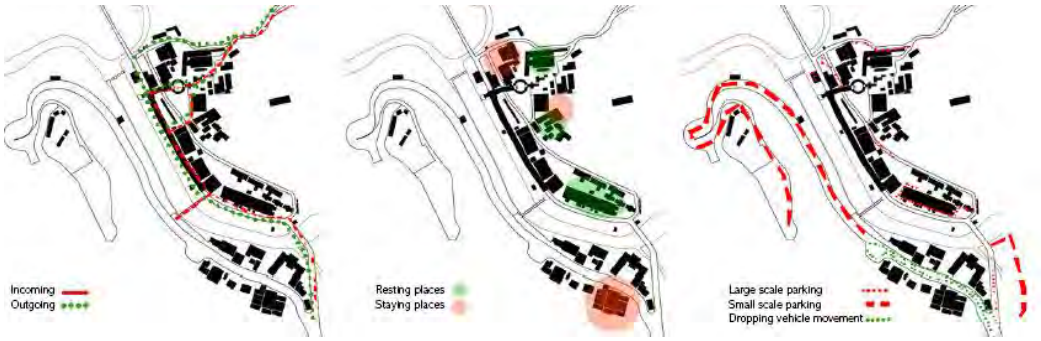


Figure 3. Various parking and vehicular zones

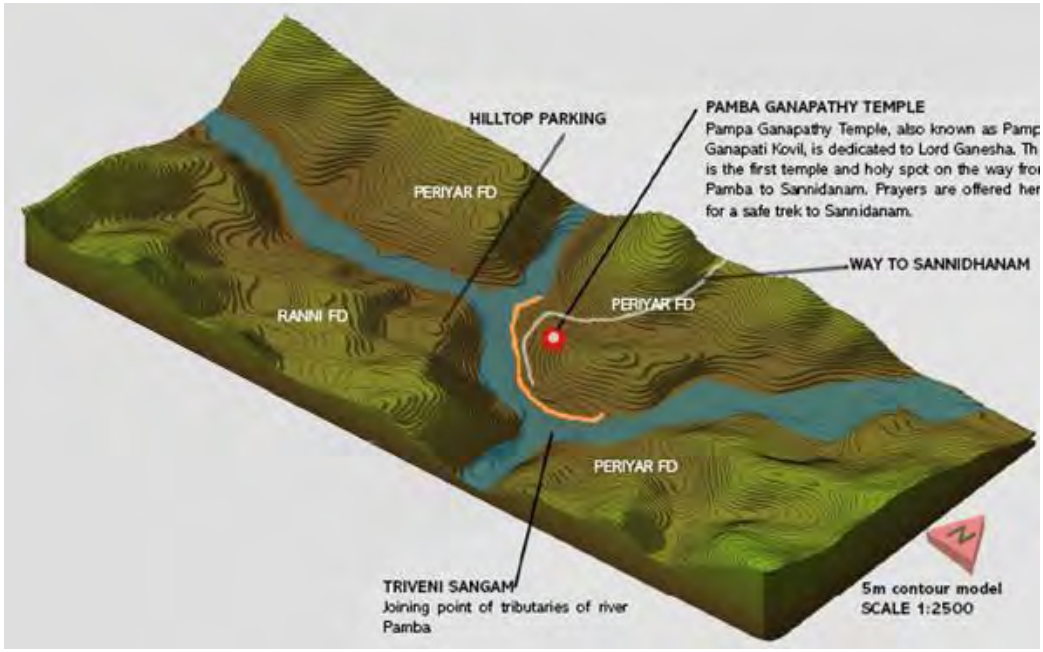


Figure 4. Contour setting of the valley

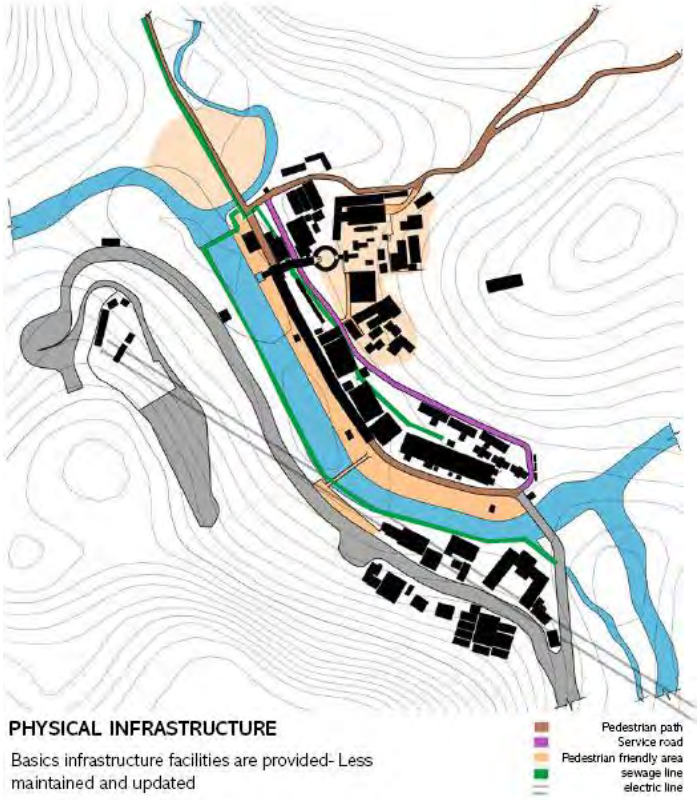


Figure 5. Physical infrastructure

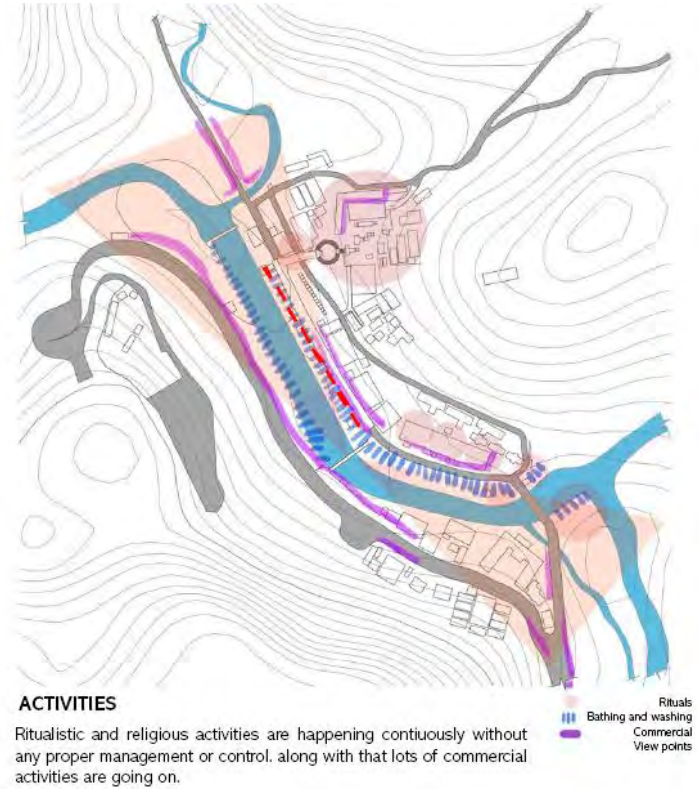


Figure 6. Activities during pilgrimage

3.4. Pilgrim behaviour

Most of the pilgrims are not aware about the proper path and spaces at Pamba. No proper guiding or signage are provided, and it causes scattered movement of pilgrims without any restrictions results uncontrollable crowd.

4. CURRENT EVENTS - FLOOD OF THE CENTURY

Impact of the flood on site was very huge. So many structures are destroyed and river flowing direction is changed. An estimated loss of 100 crore declined the human access to Sabarimala.

Figure 7. Pamba after floods

Source: Malayala Manorama newspaper

4.1. LOSS OF PROPERTIES

The pedestrian bridge, Toilet blocks, Annadana Mandapams, Resting halls, Hotels, Pedestrial paths etc,. get destroyed fully or partially. Most of the temporary structures vanished from the flood plain.

Figure 8. Before and after flood - Hospital

Figure 9. Before and after flood - Bridge

Figure 10. Before and after - Waiting area

Figure 11. Commercial complex

More than the destruction happened, A huge amount of sand get deposited all over the plains. Estimated amount is 2000-3000 load sand. Ground floors of every exisiting structures get filled with sand, about 3m height deposition.

Figure 12. Before and after - Temple bridge

4.2. Master Plan

Even the flood creates a chaotic condition at Pamba and Nilakkal, The masterplan gets more relevant, so that Nilakkal will become the Basecamp for the pilgrims and Pamba will become a transist points with basic facilities. And also masterplan aims at cleaning the Sannidhanam by reducing all the built ups to bring back the natural setting to a more splendid condition

4.3. Findings

Due to increased built up which causes a huge runoff, results in flood with that microclimate. Also the water holding capacity of soil reduced due to the absence of water absorption cycle. Here in Pamba, the whole destroyed structures are construcuted without respecting basic rules and get affected by the flood. Flood plain is always intended to works as a functional wetland which always keeps the water table normal, which reduces the effect of flood.

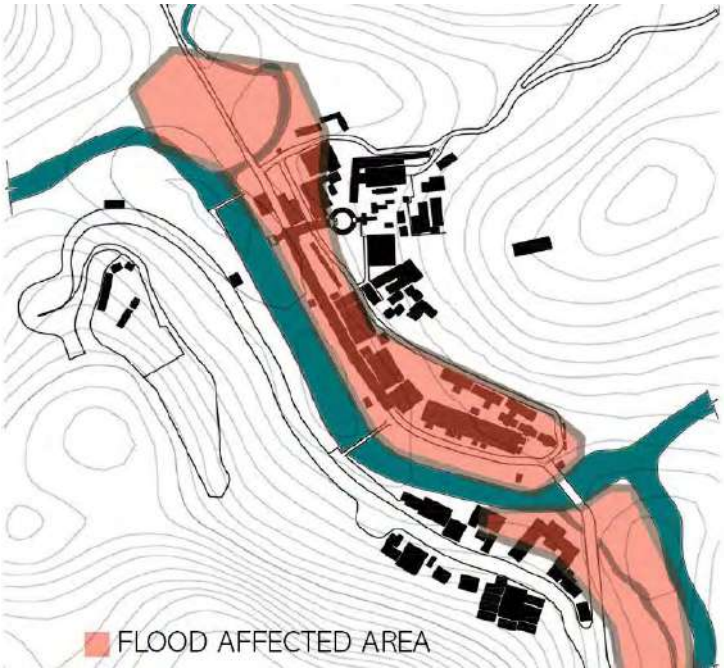


Figure 13. Flood affected area

5. Interventions

5.1. Regional Planning

The whole crowd that directly come to Pamba is controlled at Nilakkal by providing all amenities like parking, rest places, regional hotels, shops etc. All private vehicles are limited at Nilakkal. Then the pilgrims are transported through electric buses up to Pamba. Only mass transportation and emergency vehicles are allowed in this route.

From Pamba, after holy bath and rituals, pilgrims are controlled using queue complexes by prohibiting outside food and water. After visiting Pamba Ganapathy temple, pilgrims directed to Sannidhanam through oneway trek route. Interventions at Pamba will discuss in next chapter.

At sannidhanam, basic amenities are provided and no builtup other than these are allowed. An area with minimum built up area. Nature evokes the spirituality and is emphasized with a subdued architecture.

5.2. Pilgrim facilitation at Pamba

Pilgrims from bus droff off are directed to Ghats through a pedestrian bridge, with passive ventilated porous flooring, which helps to dry the barefoot easily. Bridge directs pilgrims to queue complex, where free medicated food and water is provided in reusable plates and glasses. From here crowd is controlled according to the rush, season and climate. Temporary structures kept inside this complex during off-season so that it can use during seasonal times, whch reduce built up. No built up is provided on Ghats. In case of women entry become common, the symmetry of the complex helps to break the crowd to sides of ghats.

All designs and materials are inspired from the native inhabitants. Implementing a traditional architecture inside forest is not a sincere approach.

5.3. Non-Architectural Interventions

- Whole pilgrimage is redesigned according to current situation, climate and population. Limiting pilgrim count per day using online ticketing.
- Limiting all private holdings at Nilakkal
- Participation of Malai Arayans community for the maintenance and functioning of the system.
- Creating a less carbon footprint from each pilgrim by providing least packed food and bottled water.
- In future all administration and departments will concentrate at Nilakkal. Control rooms and information counters will be provided at Pamba.

Figure 14. Design process

6. Conclusion

The journey to the Sannidhanam to see Swami Ayappan is considered very holy and the pilgrims and devotees follow strict ceremonies to qualify to visit the deity. Even though lessening the burden on the devotees is essential, we have to give something back to the nature, which nurtures us, and not destroy it. The purpose of this thesis has been to design for the needs of the pilgrims who come to visit the deity at Sabarimala after devout austerity, their trek to the deity being part of their religious journey, devoid of unnecessary luxury while retaining the sanctity of the pristine forests which itself was the reason the deity chose it as his abode.. The climate change has led to the Kerala Floods of 2018 washing off large portions of Pamba, which is the place where the pilgrims start their holy journey. The on-going controversy regarding the entry of women to Sabarimala, flooding of the River Pamba, increasing number of pilgrims, the services associated with the huge number of people, encroachment into nature have been addressed.

The design is pilgrim and nature centered accommodating age-old customs, restoring the degraded natural surroundings, actively incorporating passive crowd management techniques through design and planning.

7. References

Mehrotra, R. (2015). *Kumbh Mela: Mapping the Ephemeral Megacity.* Allahabad, Academia Verlag Gmbh, Uttar Pradesh.

T., Aji A. (2005) *Impact of pilgrimage on the environment of Sabarimala with special reference to River Pampa.* (Doctoral thesis) Retrieved from Shodhganga.

K. Joseph, Joice & et al. (2016). *Pilgrim governance and environmental sustainability: A case study of Sabarimala pilgrim destination, Kerala*. Retrieved from Research Gate.

Patange, Priyanka, Dandapani, Shrinithivihahshini & Mahajan, D. (2013). Pilgrimage and the environment: Challenges in a pilgrimage centre in Maharashtra, India. *International Journal of Environmental Sciences.*

Watson, Donald & Adams, Michele.(2011) *Design for Flooding: Architedcture, Landscape and Urban design for Resilence to Climate*, New Jersey, John Wiley & Sons Inc.

Case Study / Project

360cityscan

Integrated solut ons to face urban challenges

Mattia VANSTEENWEGEN, Etienne DROUET

Abstract

Tractebel has developed the 360 city scan, a holistic methodology to assess cities and guide them according to their needs and priorities. Scans have already been deployed in more than 40 cities worldwide. Based on this scan, we offer integrated approaches to our clients, tailormade solutions leveraging on our urban engineering expertise. The perspectives of the 360cityscan meet the global challenges cities face today: climate change, resource scarcity, technologisation, demographic changes, social transformation and glocalisation. Within cities, the intensity of these challenges is much higher than in rural conditions. All perspectives are somehow related to these challenges; the perspectives give therefore an accurate status of the city against these threats. The perspectives work together as a whole towards a balanced city. The perspectives must be seen as different layers of a city, a balanced city encloses all the different perspectives in a good ratio. When one perspective is underdeveloped, the city does not work properly or excludes citizens. Preferably, each intervention in the city has a positive impact on all the perspectives. We created a tool to measure the level of maturity for the different themes. The inner 2 circles represent the status of the physical system of the theme, the outer 2 circles the 'efficiency' or 'quality'. To illustrate this for 'water': the inner circles indicate the status of the basic infrastructure of water (amount of people with wastewater collection), in the outer circles we measure the level of wastewater treatment by the city. The city is shown in a user-friendly 360 diagram with an individual score for each theme, arranged by perspective. The diagram summarizes in a visual way the maturity of a city and highlights the strength's and challenges. If well designed and managed, cities offer important opportunities for economic development and for expanding access to basic services, including health care and education, for large numbers of people.

Coming from a engineering background of top-level expertise in Energy, Transport, Water, Urban design, the integration of different teams and know-how is essential to deal with the complexity of issues and challenges that cities are facing worldwide and for successful sustainable urban development. Searching for synergy between different disciplines is in this sense key to unlock hidden potentials. When they meet and connect, creative solutions to complex problems are found. Urban processes are also becoming increasingly complex given the fast-changing evolutions in terms of stakeholders, policy governance and political processes. In this perspective a more process oriented and collaborative way of working is needed, with different in between goals of diverse scale and nature instead of blue print masterplanning approach.

This way of working will allow a stronger local embedded and bottom-up approach involving a large set of stakeholders from the beginning to the end. Also Technology is changing the way citizens live, move and work: smart city platforms, BIM, City Information Modelling. Cities are becoming data platforms: as more data are available, urban development projects should be able to collect and exploit them to build new sustainable and liveable cities. For this reason technologies need to be combined with a strong focus on qualitative design in the entire range of elements that compose a city: from infrastructures to public space and buildings. The Integrated Approaches (11) represent innovative transversal domains defined to emphasize the integration of our services and expertise related to cities and territories: Places of mobility - Water Urbanism - Productive landscapes - Recycling territories - Smart networks. All together the Integrated Approaches cover the complexity of issues that cities are facing nowadays through the fundamental paradigm of 'integration'.

Research Paper

Research on the Spatial Effect of Urban Construction on Heat Island Effect in Shanghai Based on Remote Sensing Data

Shuo ZHANG, Shanghai Tongji Urban Planning&Design Institutional Co.,Ltd., China

Abstract

Since the twentieth Century,global urbanization process is constantly accelerating,while the landscape pattern dominated by vegetation was gradually replaced by the landscape pattern dominated by artificial buildings.The change of climate and temperature caused by the expansion of urban construction land and the population aggregation,has aroused widespread concern.Under the background of national new type urbanization,improving the urban environment is the inevitable path to the new type urbanization.

Urban heat island effect is the most prominent feature of human activities impact on temperature,and it has many effects on environment,economy,society,health and so on. Among the existing researches related to urban heat island effect,the influence of urbanization on it has not been paid enough attention.Therefore, the research on the effect of urban construction on the heat island effect is incompletable,and the method is limited to the quantitative analysis as the spatial analysis is insufficient. Based on the existing research,while under the background of urban planning major,taking Shanghai as a typical case, this paper concentrates on the urban heat island effect under the influence of Shanghai urban construction.

First of all,this paper takes the Landsat-7 ETM+ remote sensing image data of Shanghai in 01/08/2000,28/07/2010 and 28/07/2016 as the basic research data.ENVI software is used to retrieve land surface temperature on the thermal infrared band.Then this paper divides the heat island effect level,analyses the spatiotemporal distribution of land surface temperature in different years in Shanghai,and summarizes the evolution characteristics of urban heat island effect, analyzing the spatial impact of urban construction related factors such as urban scale, spatial structure and land use.

Analysis shows that city construction land expansion will aggravate the urban heat island effect.The increment of built construction in the city,the size of the resident population,as well as the population density have significant correlation with urban heat island effect,but the spatial distribution of population density and spatial distribution of heat island effect has no significant correlation.In various types of landuse,residential,industrial and mining,warehousing, commercial services,and transportation land can significantly aggravate the heat island effect, land types like green land, water area and farmland,etc can produce urban cold island effect in some individual area.At the same time,the location, area and shape of the green space and water area have an effect on the distance of reducing the heat island effect.

Keywords

Urban heat island effect, Spatial effect, Urban construction, Remote sensing data

1. Research Background

Shanghai is one of the areas with the fastest urbanization development in China. The expansion of urban construction area and the agglomeration of population to the central area lead to the expansion of the urban heat island effect area year by year. In the 1960s-1970s, the area of the heat island was limited to 100 km^2 in the central area of Shanghai.In the 1980s, it expanded to more than 400 km^2. In the late 1990s, it expanded to suburban areas with an area exceeding 800 km^2. The existence of heat island effect makes the Central District of Shanghai have higher extreme maximum temperature and longer duration of high temperature than the suburbs.

Urban heat island effect is an important environmental problem in a city. Urban planning and construction have an essential impact on it. The results show that urbanization contributes about 20% to 30% of the urban surface temperature warming in the past 50 years. Therefore, the impact of urbanization on urban heat island effect should be paid enough attention. It is necessary to study urban heat island effect from urban planning, urban spatial structure, urban land use and other aspects. This paper will study the impact of urbanization on urban heat island effect from the scale, structure, land use and other aspects, so as to provide new ideas for urban planning and sustainable construction.

2. Research Data Sources

2.1. Remote Sensing Satellite Image Data

The remote sensing satellite data in this paper are Landsat-7 ETM+image data, which are derived from the Geospatial Data Cloud Platform (http://www.gscloud.cn) of the Computer Network Information Center of the Chinese Academy of Sciences. In this paper, the image data of Landsat-7 ETM+in Shanghai from August 1, 2000, July 28, 2010 and July 28, 2016 are selected. The image of 2000 is Landsat-7 SCL-on satellite digital product (1999-2003), and the image of 2010 and 2016 is Landsat-7 SCL-off satellite digital product (after 2003). Detailed information is shown in Table 1.

Table 1 Landsat-7 ETM+Remote Sensing Satellite Data Source Specific Information

Year	Data Identification	Strip Number	Line Number	Data Time	Average Cloud Cover（%）
2000	LE71180382000214SGS00	118	38	2000/08/01	0.34
	LE71180392000214SGS00	118	39		2.44
2010	LE71180382010209EDC00	118	38	2010/07/28	3.13
	LE71180382010209EDC00	118	39		2.46
2016	LE71180382016210EDC01	118	38	2016/07/28	27.19
	LE71180392016210EDC01	118	39		0.19

2.2. Ground Meteorological Observation Data

In this paper, the surface temperature data of 10 meteorological stations (Xujiahui Station, Pudong Station, Minhang Station, Baoshan Station, Jiading Station, Jinshan Station, Songjiang Station, Qingpu Station, Fengxian Station and Chongming Station) in central and suburban areas of Shanghai from 1985 to 2016 are analyzed. The data are from the temperature records of Shanghai Meteorological Bureau and Shanghai Weather Network (http://www.soweather.com).

2.3. Data on Economic and Social Development

The data of economic and social development mainly include the scale and density of Shanghai's permanent population, the total area of built buildings and other indicators. The data come from Shanghai Statistical Yearbook (1984-2016), Shanghai Population Census (the Fifth Census in 2000 and the Sixth Census in 2010), and statistical yearbooks of all districts.

3. Evolution Characteristics of Urban Heat Island Effect in Shanghai based on Remote Sensing Inversion

3.1. Remote Sensing Inversion of Surface Temperature in Shanghai

Landsat-7 ETM + remote sensing satellite image is used to retrieve the surface temperature of Shanghai. Based on the available remote sensing data sources and related data in Shanghai, using ENVI5.2 software platform, using JM&S single channel algorithm and Tan Zhihao single window algorithm to retrieve the surface temperature in Shanghai, the spatial distribution maps of surface thermal environment in different years in the study area were obtained. In order to analyze the spatial distribution pattern of surface temperature in Shanghai more intuitively, the Mean-standard Deviation Method is used to divide the surface heat field. Based on the study of Chen Songlin, the image of surface temperature in Shanghai is divided into six levels, i.e., mu (mean), +0.5std, +1std (standard deviation), with strong heat island area (33.1 C-45.4 C) and sub-strong heat island area, respectively. The spatial distribution maps of the heat island effect in Shanghai are obtained from the heat island area (30.6-33.1 C), the heat island area (28.1-30.6 C), the weak heat island area (25.6-28.1 C), the cool island area (23.2-25.6 C) and the cold island area (0.0-23.2 C).(Figure 1,2,3)

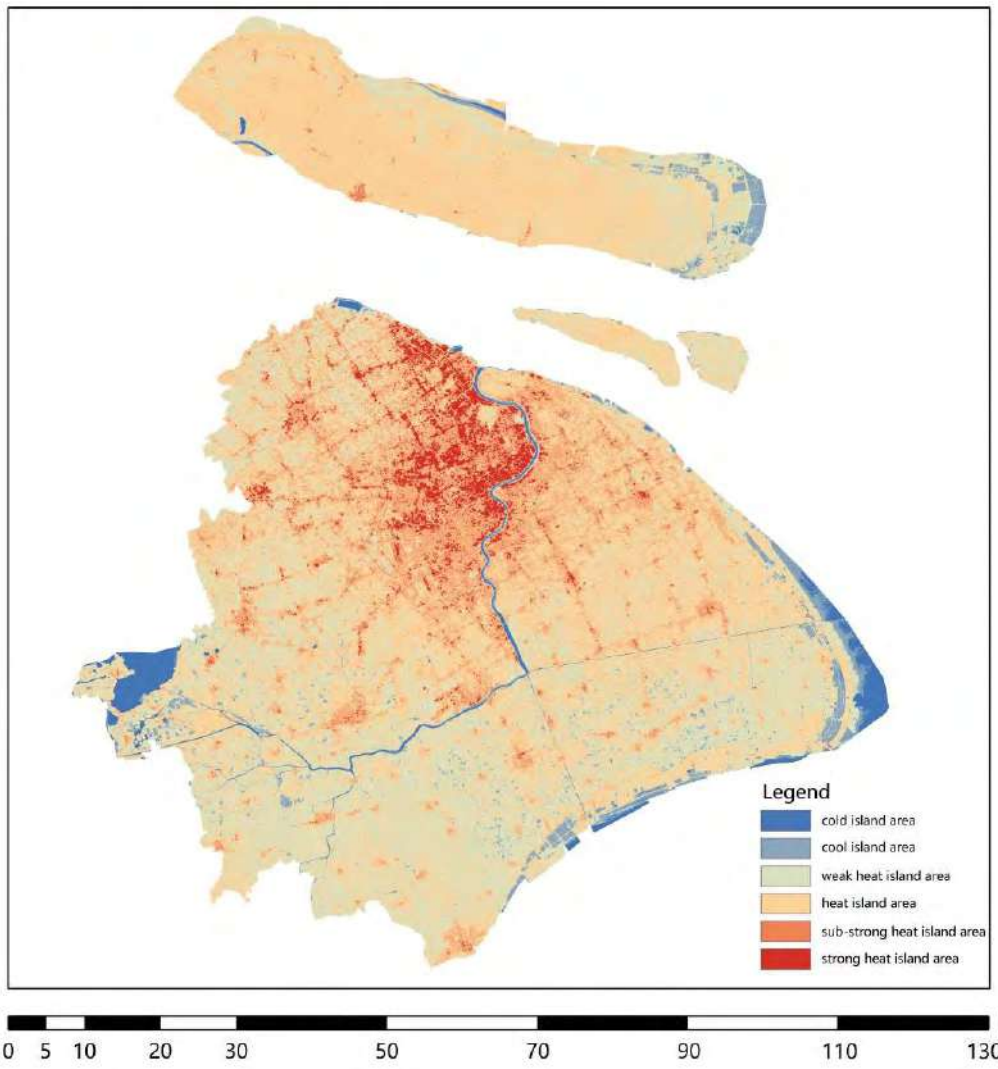


Figure 1 Spatial Distribution Map of Heat Island Effect in Shanghai on August 1, 2000

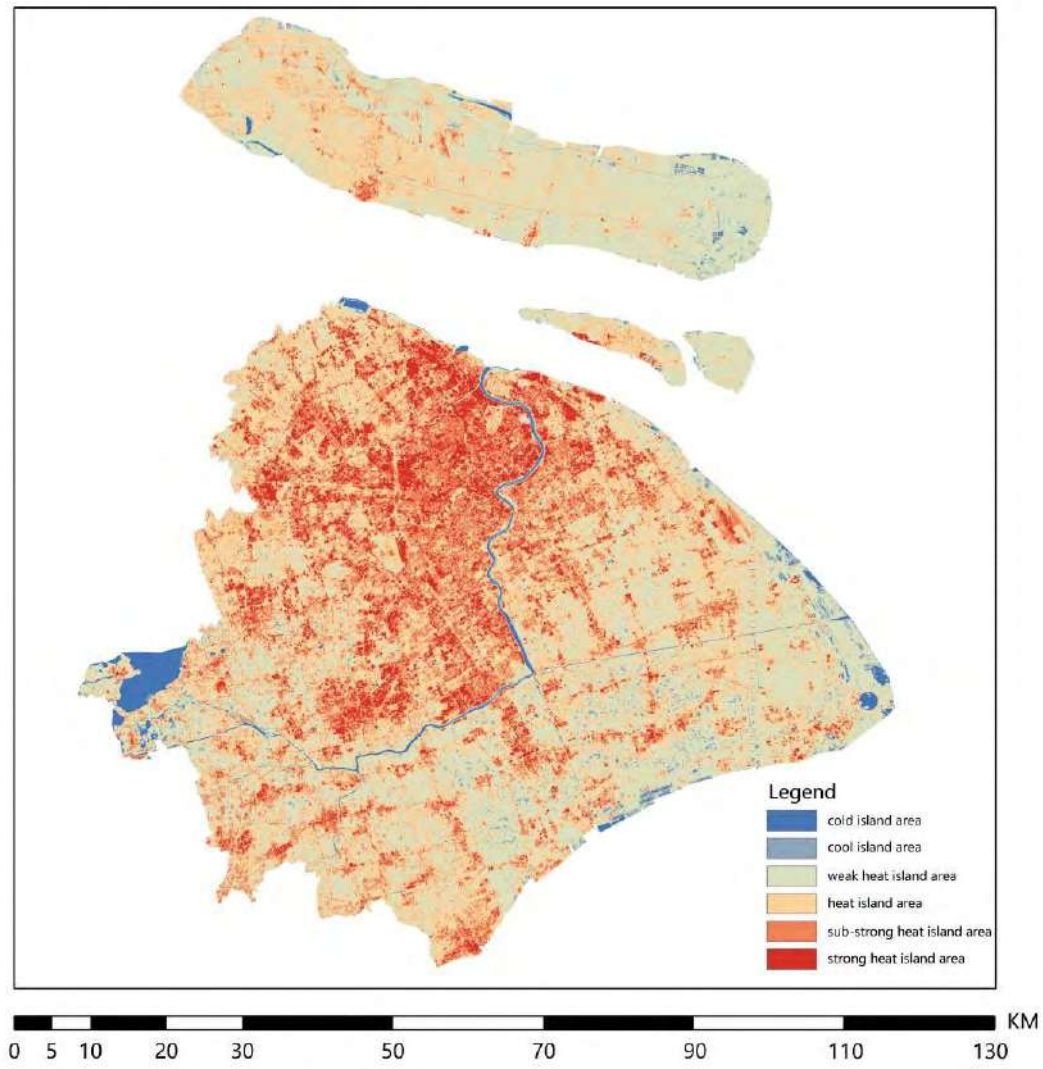


Figure 2 Spatial Distribution Map of Heat Island Effect in Shanghai on July 28, 2010

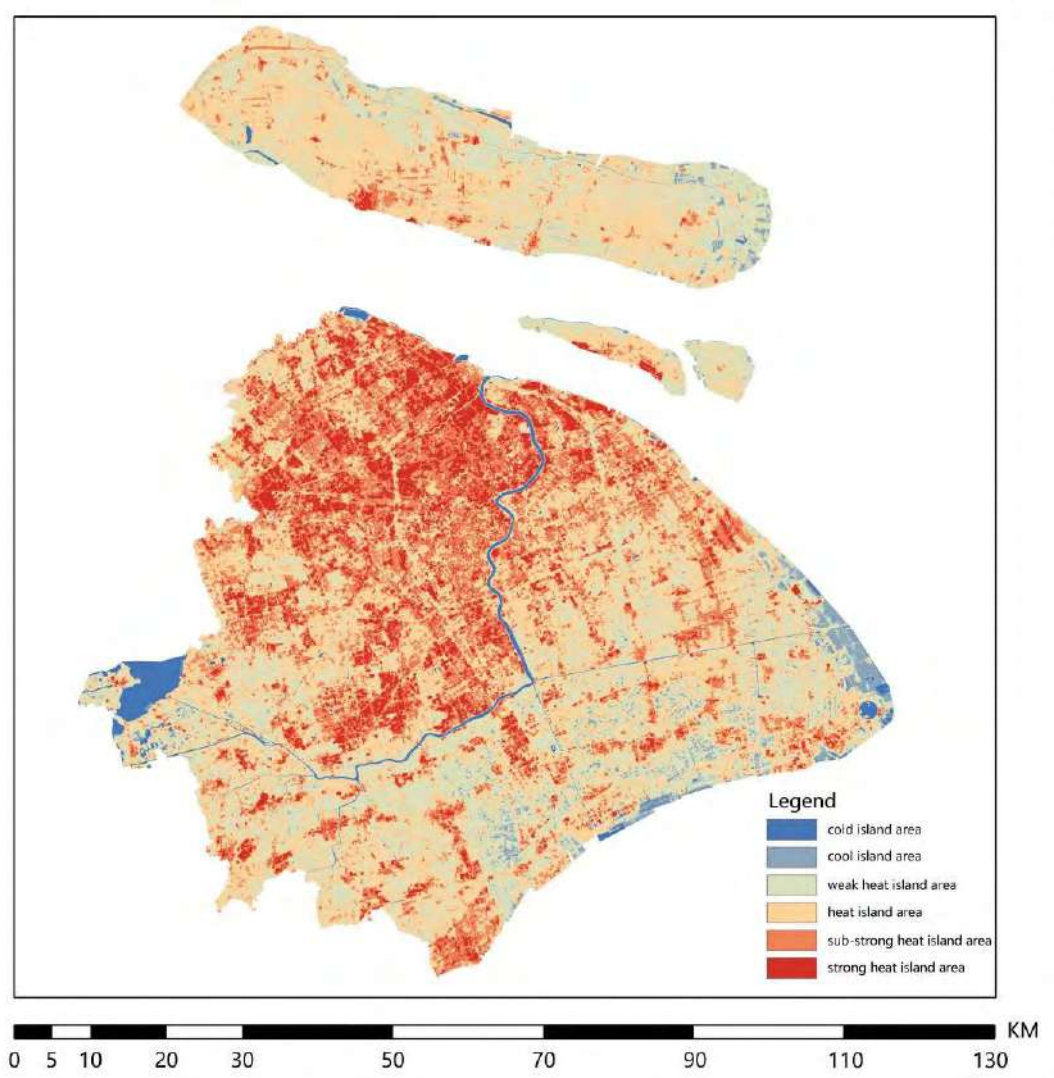


Figure 3 Spatial Distribution Map of Heat Island Effect in Shanghai on July 28, 2016

3.2. Evolution Analysis of the Urban Heat Island(UHI) Effect in Shanghai

3.2.1 Temporal Evolution of UHI

By comparing the spatial distribution maps of the urban heat island effect of Shanghai in 2000, 2010 and 2016, we can see that the urban heat island effect of Shanghai is stable and obvious in three groups of data in different years, months and meteorological conditions, indicating that the urban heat island effect of Shanghai has been formed and has an aggravating trend, and the spatial distribution of urban heat island has a trend of expansion. Statistical analysis of the temporal variation of urban cold and heat island area in Shanghai (Table 2) shows that the urban heat island effect in Shanghai is increasing from 2000 to 2010, in which the area of the strong heat island area increases the most, accounting for about 55% of the total increment of the heat island area; from 2010 to 2016, the urban heat island effect in Shanghai eased, the area of the strong heat island area and the heat island area decreased, but the area of the sub-strong heat island area increased by 165.57%. Overall, from 2000 to 2016, the urban heat island area of Shanghai increased by 281.46 km^2 and showed a steady increase trend.

Table 2 Temporal Change of Urban Cold Island and Heat Island Area in Shanghai

Year	Urban Cold Island		Urban Heat Island		Urban Cold VS. Heat Island
	Area(km^2)	Percentage(%)	Area(km^2)	Percentage(%)	
2000	2117.64	33.40	4222.37	66.60	1：2
2010	1698.71	26.79	4641.28	73.20	3：8
2016	1836.16	28.96	4503.83	71.03	2：5

With the increase of urban heat island area, Qingliang Island area shows a trend of decreasing year by year and accelerating the decline rate, from 278.10 km^2 in 2000 to 153.96 km^2 in 2016. The reason is that in the process of rapid economic development and urban expansion, construction land replaces a large number of natural vegetation and greening. In addition, while the area of strong heat island and sub-strong heat island expands, the area of cool island decreases synchronously, and some of them are polarized by temperature, which transforms into cold island area. The area of cold island area shows a trend of increasing year by year. From 2000 to 2016, it increased by 86.98 km^2 with an average annual growth rate of 14.19%. It is the fastest growth rate of area in all levels of temperature zone. The above changes indicate that the area of extreme temperature zones in Shanghai has grown larger and larger in the past 16 years. Among the six temperature grades, the area of the two extreme grade zones, the strong heat island zone and the cold island zone, has the fastest annual growth rate and an aggravating trend. Relatively speaking, the area of the weak heat Island zone and the cool island zone are gradually declining. However, these two grades are the most livable temperature conditions.

3.2.2 Spatial Evolution of UHI

By analysing the spatial distribution maps of urban heat island effect in Shanghai in 2000, 2010 and 2016, it can be seen that the spatial distribution and structure of urban heat island effect in Shanghai have obvious regularity. Generally speaking, the main cold sources regulating urban heat island effect are large areas of water and green space, such as Huangpu River, Dianshan Lake, Dishui Lake, Gulf National Forest Park, Chongming Dongtan Wetland Park and so on. The main heat sources aggravating the heat island effect are industrial, commercial, station, square and high-density residential areas.

In 2000, the spatial distribution of urban heat island in Shanghai was mainly sub-strong heat island area and heat island area, and the proportion of strong heat island area was relatively small, only in traditional industrial and commercial concentrated areas. Overall, in 2000, the urban cold island area of Shanghai was 217.64 km^2 and the heat island area was 4222.37 km^2, the ratio of which was approximately 1:2. Urban heat islands are concentrated in the central area, while suburban heat islands are few and scattered. The overall spatial structure of heat island is "centralized in the central area and scattered in the suburbs". The inner heat island space in the central area presents a single-center circle-layer distribution. The pattern of scattered heat island in the suburbs basically corresponds to the spatial distribution of new towns and central towns in the suburbs of Shanghai in 2000, including Baoshan Industrial Zone, Jiading New Town, Anting Town, Zhoupu Town and Chuansha Town.

From 2000 to 2010, the urban heat island effect of Shanghai was further aggravated, and the urban heat island showed a trend of expansion. Among them, the area of the strong heat island increased by 230.07 km^2, the area of the sub-strong heat island increased by 141.25 km^2 and the area of the heat island increased by 47.59 km^2. The spatial expansion of the strong heat island area is very significant during 2000-2010. The Shanghai heat island effect

has initially shown the spatial pattern of "main heat island + corridor + secondary heat island". The central area is the "main heat island" of the heat island effect, and a "hot corridor" is formed along the main urban transportation network, which extends to the suburbs and links several "secondary heat islands". In the central area, "main heat island" mainly distributes in the West Bank Industrial Zone of Huangpu River, Nanjing East Road-Nanjing West Road Business District, Xujiahui Business District, etc.; "hot corridor" mainly along Shanghai-Nanjing Expressway and Shanghai-Hangzhou Expressway; "secondary heat island" mainly includes Songjiang, Jiading, Qingpu, Nanqiao and other suburban New cities.

From 2010 to 2016, the area of urban heat island declined considerably, and the urban heat island effect of Shanghai was alleviated. However, the specific analysis shows that part of the heat island region temperature increases, transforms into sub-strong heat island region, and the area of strong heat island region decreases slightly. Overall, since the 12th Five-Year Plan of Shanghai, urban development has focused on ecological environment protection, high-quality healthy urbanization, and the urban heat island effect has been alleviated. Spatially, the mitigation degree of the heat island effect in the central area is more obvious than that in the suburbs. The urban heat island has formed a spatial pattern of "multi-center + two circles + three corridors". The spatial distribution of the urban heat island coincides with the main urban construction areas. By 2016, except for the heat island area formed in 2010, there were local heat island effects in suburban central towns and market towns. To a large extent, the impact of urban construction on the heat island effect is existent and obvious.

4. Spatial Impact of Urban Construction on Heat Island Effect in Shanghai

Under the urban scale, the scale, structure and land use types of urban construction in Shanghai have different effects on the intensity and pattern of urban heat island effect. This paper chooses four indicators, including the scale of built buildings, the scale of permanent population, spatial structure and land use types, to analyze their spatial impact on the heat island effect.

4.1. The Impact of the Scale of Buildings Built on the Heat Island Effect

The increasing scale of urban buildings affects urban wind speed, direction, energy consumption and heat emission. On the one hand, the existence of buildings changes the properties of the underlying surface of the land, improves the roughness of the underlying surface, and reduces the wind speed of the built area. At the same time, the height of buildings varies affects the urban wind direction. On the other hand, city buildings are endowed with different functions. While operating and maintaining different functions, energy consumption and heat emission are aggravated. For example, air conditioning operation of high-rise office buildings in summer releases more heat.

4.2. The Impact of Resident Population Size and Density on the Heat Island Effect

In the process of urbanization, the total resident population size affects the intensity of human activities' impact on the urban environment. The increase of the total population size will increase the energy consumption and heat emission of the city as a whole. The increase

of population density will increase the heat emission per unit area of land. At the same time, the increase of the size and density of the resident population will bring about the demand for regional transportation and residence, energy consumption and energy consumption. Heat emissions will further increase, aggravating the urban heat island effect.

4.3. Impact of Land Use Types on Heat Island Effect

Different types of land have different underlying physical characteristics. The surface albedo is different. The amount of solar radiation absorbed is different, and the land is endowed with different urban functions by man-made, and the way of thermal effect is different, so the surface temperature has different processes. The influence of degree aggravates or slows down the urban heat island effect in varying degrees. Among all kinds of land use types, there are land use which obviously aggravates the heat island effect, such as residential land, industrial and mining storage land, business clothing/public use land, transportation land, etc. There are also land use which significantly slows down the heat island effect and produces local urban cold island, such as cultivated land, woodland, grassland, garden land, water area, etc.

Heat island effect of residential, industrial and mining land

4.3.1 Heat Island Effect of Residential, Industrial and Mining land

By classifying urban heat island in Shanghai on July 28, 2016 according to land use types , the underlying surface characteristics and heat island effects of land use types in urban built-up areas, such as residential land, industrial and mining storage land, commercial/public Service land and transportation land, are explored (Table 4). The analysis shows that the heat island effect and influence degree of different land use types in Shanghai are different, showing different surface temperature grades. Generally speaking, the average surface temperature is: industrial and mining warehouse land > residential and commercial land > transportation land.

4.3.2 Cold Island Effect of Green Space and Water Area

According to the distribution of urban heat island effect in Shanghai on July 28, 2016, the spatial distribution map of urban cold island in Shanghai was extracted (Figure 4). It can be seen that parks, suburban arable land and water in Shanghai constitute urban cold island, which plays an obvious role in weakening urban heat island effect.

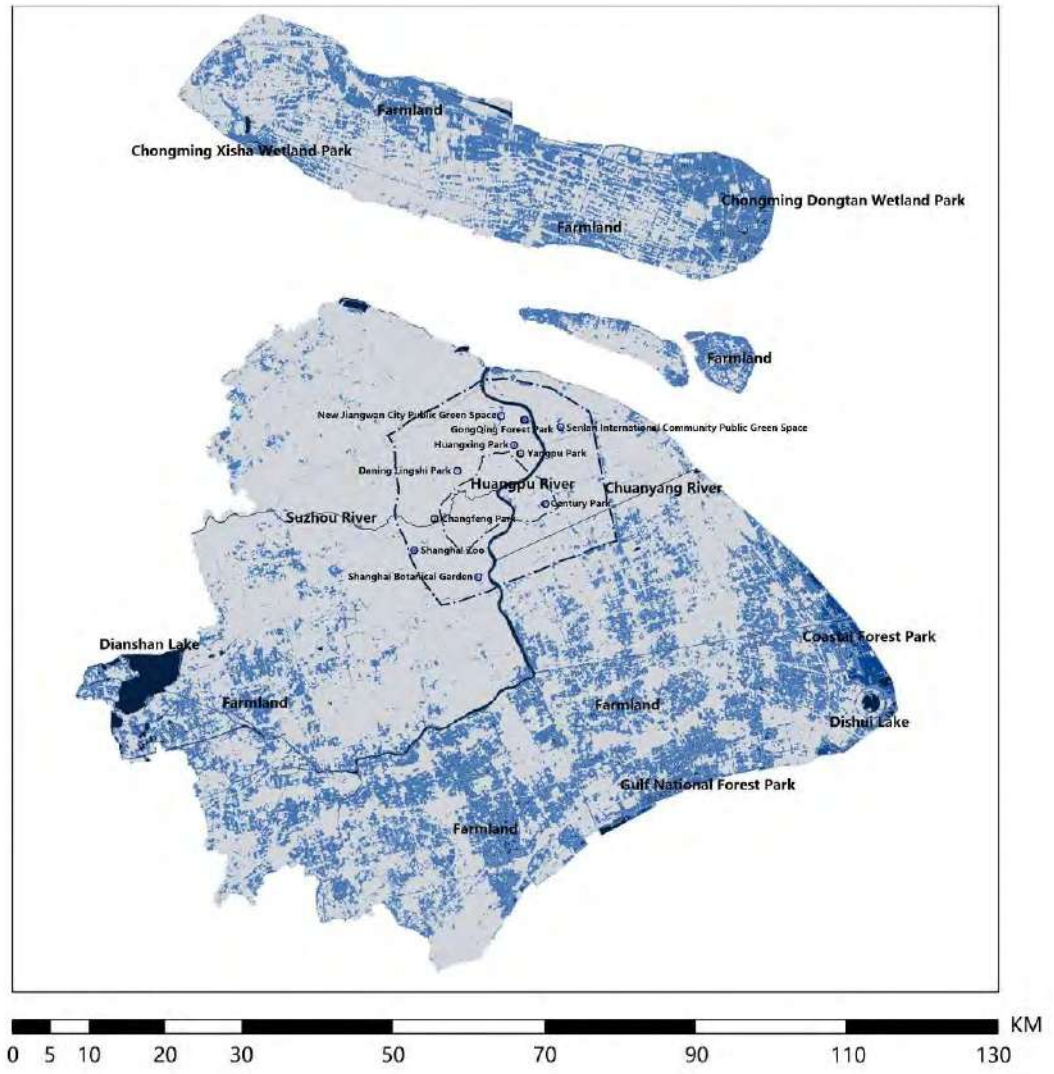


Figure 4 Spatial Distribution Map of Shanghai Urban Cold Island on July 28, 2016

This paper chooses 4 green spaces in Shanghai suburbs and 13 green spaces in the central area as the research objects, carries out "symmetrical" buffer analysis respectively, and counts the information of area, shape and spatial distance to mitigate the heat island effect (Table 3), and studies the spatial impact of green space on urban heat island effect.

Table 3 Statistical Table of Typical Greenbelt Information in Shanghai

Location	Green Space	Area（hm^2）	Block morphology	Average Temperature（℃）	Spatial Distance of Mitigating Heat Island Effect（m）
Suburb	Gulf National Forest Park	23.99	Rectangle	26.32	300-500
	Coastal Forest Park	8.10	Rectangle	25.95	100-300
	Chongming Dongtan Wetland Park	181.00	Rectangle	25.83	1000-1200
	Chongming Xisha Wetland Park	6.75	Rectangle	26.70	100-300
City Center	New Jiangwan City Public Green Space	25.30	Banding	27.10	300-500

	Senlan International Community Public Green Space	29.27	Banding	26.75	500-900
	GongQing Forest Park	29.50	Rectangle	27.52	300-500
	Huangxing Park	62.40	Rectangle	26.51	900-1200
	Yangpu Park	22.36	Rectangle	27.80	100-300
	Daning Lingshi Park	68.00	Irregular	26.42	900-1200
	Changfeng Park	36.60	Irregular	27.13	500-900
	Century Park	140.30	Irregular	26.32	1200-1500
	Shanghai Zoo	74.30	Irregular	26.47	900-1200
	Shanghai Botanical Garden	81.86	Irregular	26.55	900-1200

Green space has a significant cooling effect on the surrounding area, and the cooling effect decreases with the increase of distance. Location, area and shape have an impact on the spatial impact distance of Mitigating Heat Island effect.

A.Location impact of green space: The same area of green space, suburban and central green space for mitigating the heat island effect of the spatial distance is different. And when the green space area is small, the cooling effect of suburban coastal green space is lower than that of central green space of the same area; when the green space area is large, the cooling effect of suburban coastal park green space and central park green space of the same area is basically the same.

B.The influence of green space area: On the premise of the same location and shape, the larger the green space area, the lower the average surface temperature of the green space itself, and the larger the spatial impact scope of mitigating the heat island effect in the surrounding area.

C. The influence of green space shape: On the premise of the same location, the larger the ratio of perimeter to area of green space, the more obvious the mitigation of heat island effect.

5. References

Ding, Jincai; Zhou, Hongmei (2002) "The Significance of Urban Greening from the Evolution of Shanghai Heat Island", Meteorological, Vol. 2 No. 22-24 (April).

Tan, Jianguo; Zheng, Youfei; Peng,Li; Gu, Songqiang; Shi,Jun (2008) "Effect of Urban Heat Island on Summer High Temperature Heat Wave in Shanghai", Plateau Meteorology,Vol.S1 No.144-149(January).

Zhao, Zongci; Wang, Shaowu; Luo, Yong; Jiang, Ying (2009) "Uncertainty Analysis of Climate Warming in Recent Centuries", Science and Technology,Vol.23 No.41-48(October).

Jiménez-Munoz J C,Sobrino J A(2003) "A Generalized Single-channel Method for Retrieving Land Surface Temperature from Remote Sensing Data",Journal of Geohpysical Research,Vol.108(D22) No.4688-4695.

Qin,Zhihao; Zhang,Minghua;Arnon,Karnieli;et al. (2001) "A Single Window Method for Calculating Surface Temperature Using Landsat TM6 Data", Geography Journal ,Vol.4 No.456-466(April).

Zhou, Hongmei; Zhou Chenghu; Ge Weiqiang; et al. (2001)"Study on Urban Thermal Field Distribution Based on Remote Sensing and GIS", Geography Journal,Vol.02 No.189-197(February).

Zhou, Shuzhen;et al.(1985) Introduction to Urban Climatology , Shanghai,China, East China Teachers' University Press.

Zhou Liang(2006) Landscape Pattern and Heat Island Effect in The Process of Urbanization in Beijing , Beijing,China,Beijing Forestry University.

Peng, Baofa; Shi, Yishao; Wang, Hefeng; Wang, Yali (2013) "The Mechanism of Urban Heat Island Effect and Its Law of Action - Taking Shanghai as an Example", of Geography Journal, Vol.11 No. 1461-1471(November).

Yue Wenze;Xu Lihua (2013) "Thermal Environmental Effects of Typical Urban Waterscape Landscape ", Ecology Journal, Vol.06 No.1852-1859(June).

Case Study / Project

Resilient Infrastructure Framework

of China Coastal Cities

Shuang ZHENG, Xiaowen HUANG

Abstract

The development of coastal cities is faced with great challenges because of the increasing uncertainties and unpredictable risks. As the coastal portal connecting Dongguan with Pearl River Delta and Guangdong-Hong Kong-Macao Great Bay AreaíÎŒ?í«the Binhai Bay New Area in Dongguan is abundant in various resources and favorable opportunities. Nevertheless, intractable issues such as vulnerable ecosystem and complex stakeholders are also inundated. Combined public infrastructure with resilient city theory is an applicable path which can effectively balance these problems. The idea of resilience is first applied by Holing, an ecologist from Canada, in ecology at 1970s, then scholars from different disciplines take up research of resilience in urban design and planning application. In essence, the concrete definition for urban resilient is ambiguous and contentious, the core of this area is mainly concentrated on controlling degree framework, improving the quality of urban space, optimizing infrastructure and enhancing operating efficiency. Inspite of that, current researches on resilient infrastructures are generally with broad range or lack of operability. It is urgent to establish a targeted and feasible framework to guide resilient planning in coastal cities.

This paper firstly raises the resilient infrastructure strategy in renewal and operation for Binhai Bay New Area which aiming to tackling the ecological issues for instance water pollution, mangrove protection and typhoon. Secondly, by comparing resilient infrastructure planning of Orleans City, Rotterdam Port Area and Binhai Bay New Area, the operation mechanism of resilience infrastructure will be deduced and the operation and management system of resilience infrastructure will also be constructed. Finally, the redundancy and critical value of resilient infrastructure will be discussed, which may provide a comparatively predictable possibility for future planning of coastal cities.

References:

1. Jabareen, Yosef. "Planning the resilient city: Concepts and strategies for coping with climate change and environmental risk." Cities 31 (2013): 220-229.

2. Kennedy, Christopher, and Jan Corfee-Morlot. "Past performance and future needs for low carbon climate resilient infrastructure? An investment perspective." Energy Policy 59 (2013): 773-783.

3. Tamvakis, Pavlos, and Yiannis Xenidis. "Comparative evaluation of resilience quantification methods for infrastructure systems." Procedia-Social and Behavioral Sciences 74 (2013): 339-348.

Track 7

Urban governance and planning profession

Planning for future

photo: Bagus Ghufron, Unsplash

Case Study / Project

Integrated Metropolitan Governance Framework

for the GCC Future Metropolis

Khaled ABDELLATIF

Abstract

The GCC cities have been witnessing continues changes in its governance systems to cope with the post oil era. Recently the GCC governments have allocated multibillion US dollars to finance major infrastructure and transit projects in most of the major cities. As a result, transit oriented development initiatives and intensive real estate projects around metro stations have taken place without formulating an integrated governance mechanism that would steer the growth of the TODs and eventually shape the GCC metropolises Due to gap between the current GCC urban governance systems and the future of its newly born metropolitan areas, this paper will examine and tackle various patterns, problems and challenges of the current urban governance system, to reach to the optimum scenarios for governing the future GCC metropolis Accordingly, a comparison and a historical analysis of the existing urban governance systems will be covered in this paper supported by political, spatial, economic, demographical analysis to produce an integrated metropolitan governance framework for the GCC future metropolis

The paper suggests several roads maps to govern the metropolitan areas and metropolitanize the major GCC settlements on the short, medium and long terms. In addition, it answers the following questions; how to move from traditional municipal urban governance to metropolitan one? What are the required economic, social and cultural transformation and restructuring programs to support a smooth transition in the governance system? Why is it the right time to develop the metropolitan governance framework for the GCC metropolis? How will the framework guide the smooth transition towards transit metropolitan governance? The outcomes of this paper will provide a road map for the municipal leaders and urban development authorities to formulate a specific governance framework to steer the future metropolis.

Research Paper

Towards a New Paradigm in City Branding and Marketing

The Case of Doha, Qatar

Ali ALRAOUF, Prof. of Architecture and Urbanism
CB, Research & Development Coordinator
Urban Planning Department; Qatar

Abstract

In rentier countries around the Gulf, a paradigm shift is certainly happening. Gulf States resorted to branding strategies which would secure a global recognition for their cities. The paper analyzes the effectiveness of tools used in Doha, the capital city of Qatar to create its own identity within the Gulf States and the rest of the Middle East. The analyzed tools will include City Uniqueness, Quality of Public Spaces, Signature Architecture, Events, Festivals, Cultural Tourism and Facilities. One of the main strategies used in Doha to articulate its brand is enhancing the ability of the city to host global Events, Festivals, and international sports. Competitions and cultural Carnivals. The research illustrates the use of Interesting Architecture, Cultural Facilities, Unique streets, Public parks, City natural and man-made Uniqueness as a City Marketing and Positive Branding Tools. The paper investigates crucial questions including the impact of the digital paradigm on the competitiveness of cities? How to regionally and globally market a city? What are the sustainable and resilient strategies for branding contemporary city? The paper also articulates a model for the case of Doha city banding and marketing which is based on a balanced approach. Such an approach would consider traditional assets including history and heritage. Also, it will include contemporary and innovative assets resulted from the last decade unprecedented investments in the sectors of education, research, culture and knowledge. Hence, the paper suggests a more holistic approach to city branding which would balance between social equity, economic prospertiy and ecological intergrity.

Keywords

Place-branding, Doha's Urbanism, City Marketing and Branding, Post Carbon Urbanity, City as a Destination.

1. The Contemporary Context of Gulf Cities

1.1. The Evolution of Oil-based Urbanism

Once just sleepy desert settlements, the Arab Gulf states of Saudi Arabia, Oman, the United Arab Emirates, Qatar, Bahrain, and Kuwait now exert unprecedented influence on international affairs; the result of their almost unimaginable riches in oil and gas. Miller (2016) provides an account of the achievements of these countries since the 1973 global oil

crisis. In the 1970s, one of the most hot and harsh regions in the world burst on to the international stage. The discovery and subsequent exploitation of oil allowed tribal rulers of the Gulf to dream big (Cooke, 2014). The unprecedented financial revenues substantially helped simple nomads, fishermen and pearl divers to catch up with the rest of the modernized world. Cooke also investigates how the shrewd Arab Gulf rulers who have overcome crisis after crisis meet the external and internal challenges of the onrushing future. In the last decade, the Arab Gulf region has become an East–West hub for travel, tourism, sport, culture, trade, and finance. But can the autocratic regimes maintain stability at home and influence abroad as they deal with the demands of social and democratic reform? Miller (2016) considers an array of factors—Islamism, terrorism, the Arab Spring, volatile oil prices, global power dynamics, and others—to assess the future possibilities. The entire Gulf cities are in the process of diversifying their economic base, with the vision of transitioning to a sustainable post-oil future. They are positioning themselves as places to visit, work and live. Place-branding has emerged as a significant trend across the Gulf cities in the construction of this image and consequently in the production of places. For a long number of years, the concepts of branding and marketing were thought of as notions only related to trade and commercial products. In the last two decades and as a reaction to the globalization paradigm, these concepts became City Branding. Among a rising competition between cities to attract the emerging creative and knowledge class and to capture a share in the global tourism, branding is now a major strategy adopted by many cities around the world to emphasize its unique character and personality. As defined in marketing theories, Branding is not about getting your target market to choose you over the competition, but it is about getting your prospects to see you as the only one that provides a solution to their problem.

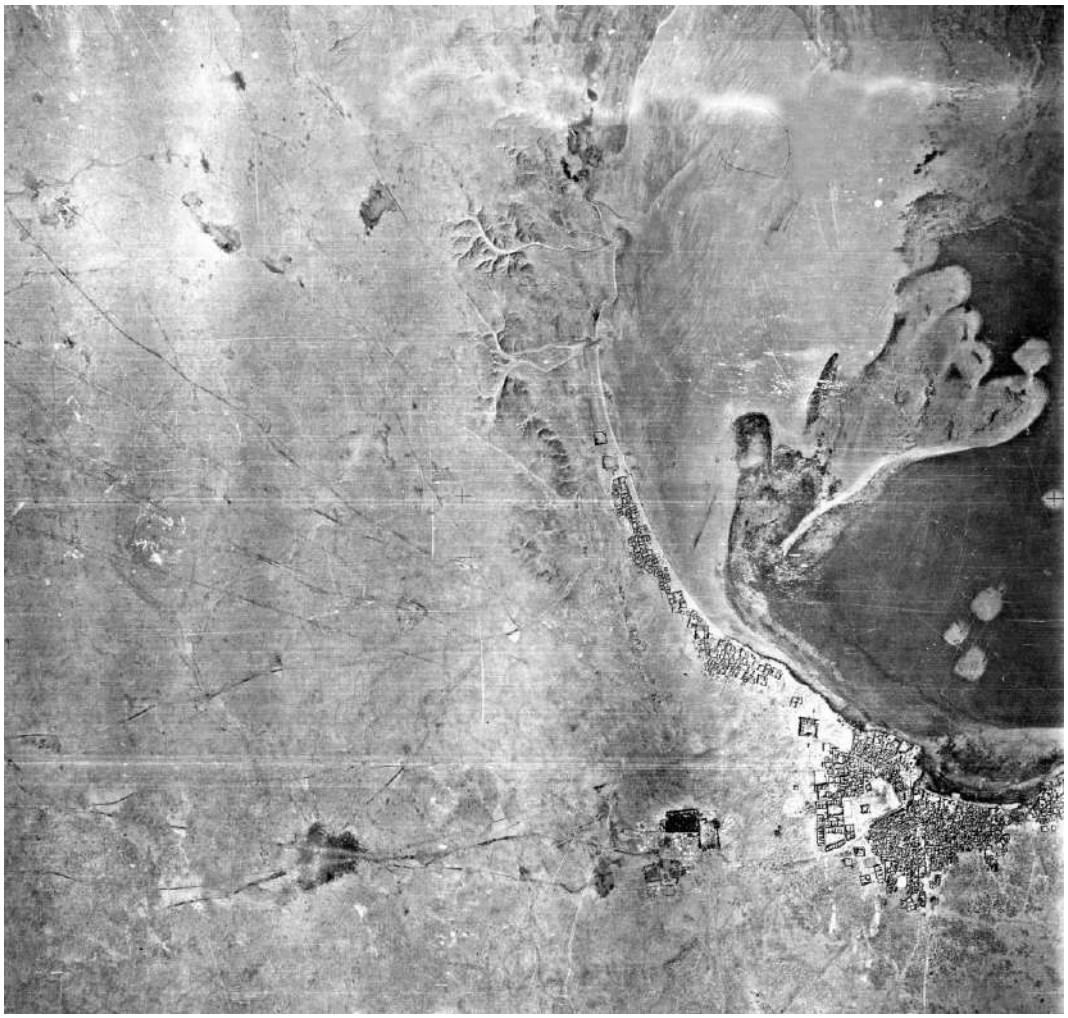


Figure 1 The Origin of Doha as a Traditional Settlement along the GUlf

The strategies used Gulf cities to transform itself into global destinations, were based on three consecutive cycles of development. The first is the move towards dealing with the city image as a replica of global cities like Chicago, Hong Kong and New York' skylines. The second was in building international projects particularly museums to gain the world recognition. The case of Abu Dhabi's cluster of cultural projects on Saadiyat Island including the new Louvre is worth mentioning in this context. The third cycle is related to the notion of hosting global events as Dubai did managing to be selected for hosting the world Expo 2020 or Qatar' success to win the bid for hosting the 2022 FIFA World cup. The three cycles were a result of the unprecedented financial revenuers generated from the oil and gas resources. As these cities compete with each other, aiming to highlight their unique offerings and attempting to clearly distinguish themselves from other cities, they have chosen to rely on place-branding as a tool. The staging of events of international importance (such as Formula One Races in Abu Dhabi, upcoming World Expo 2020 at Dubai and prospective 2022 FIFA World Cup at Qatar), the emphasis awarded to star-architecture and the emergence of strongly themed mega-projects characterize such development. Thus city-positioning and place-branding begin to assume the status of urban development models (Mishra, 2016). All the Gulf cities are in the process of diversifying their economic base, with the vision of

transitioning to a sustainable post-oil future, they are positioning themselves as places to visit, work and live. Place-branding has emerged as a significant trend across the Gulf cities in the construction of this image and consequently in the production of places. With oil resources running out, a focus on the post-oil era is a priority. Assessing the pace of urban development in contemporary Gulf cities revealed number of critical issues (Wippel, 2014). On one hand, the speed of development has social cost, negative relation with the past and the claim for identity loss. On the other hand, such rapid developments contributed to economic diversification, cultural tourism and city branding[i]. The overarching issue is exploring critically the ways in which the Gulf States prepare themselves for the post-oil era, by diversification of their assets, boosting real estate sector, and creating a knowledge economy.

2. The Narrative of Doha, Qatar: An Emerging Urban Brand

2.1. A City as a Vibrant Hub

In the last decade, Qatar has transformed itself into a major hub for numerous economic and cultural activities. Hosting several top-level sporting tournaments, culminating in the successful FIFA World Cup 2022 bid, is contributing in establishing Doha as an emerging urban and development brand within the Gulf and Middle Eastern contexts. Whether to counter regional economic competitors or to further tie Qatar to the economies of the world's leading countries, this brand is designed innovatively to counter a range of security concerns; in short, Qatar is diversifying its dependencies (Roberts 2015; Alraouf, 2016). Furthermore, Qatar has become attractive as a place for foreign knowledge workers and the creative class. This is the class of people who are moving around the world and attracted to the quality of urban environments which maintain their creative and intellectual outputs (Florida, 2002; 2005). Qatar's national vision for the year 2030 consists of basic foundations focused on the necessity of continuous social development in order to achieve a fair and safe society based on upholding human values and social welfare and aims to maintain and improve its economic standards in order to further strengthen its national economy and remain competitive, while continuing to secure and satisfy the needs of its citizens (QNV 2030). Maintaining the current growth of its urban population and fostering quality of life is seen as critical to the future development of the country, as indicated in the national development strategy 2011–2016 (QSDP, 2011). Such vision is supporting the way by which the new generation of knowledge workers decide on where to live as Florida argues (Florida, 2008). Qatar's economy has experienced three transformations.

2.2. Place-branding and Place-making

As place-branding aims at addressing the strategic goal of creating cities which attract residents, tourists, investments and workforces, it attempts to create and promote a specifically designed 'sense of place' (Lang 2011), thus becoming closely integrated with place-making. In addition to the immediate requirement of attracting the global spotlight, it aims at creating a vibrant public realm, considered an important indicator of livable cities. Interest in the public realm has reached high political levels and is evident through documents such as the Public Realm Design Manual (UPC, 2010.). Another point of convergence for both place-making and place-branding is their role in serving the sustainability agenda by addressing the economic, environmental and socials aspects. These

interdependencies of place-making and place-branding present an opportunity for place-making to leverage on branding efforts while also contributing towards it. However, despite the commonalities in these aims, there is an existing gap in the research which explores their relationship, particularly the influence of place-branding on the public realm. Reviewing this gap in research, Bani Hashim, (Forthcoming 2016) discusses the need for planners and designers to understand how place-branding manifests itself in physical and social environments, the 'place' component and the influence of branding on urban form and 'sense of place'. She elaborates that there is a gap in research on studies which examine the effect of place-branding on the place itself. This research aims to contribute towards filling this gap. With reference to the Gulf cities, place-branding has often implied new developments. Backed by a strong political will, the large-scale planning and mega-projects have been unencumbered by issues of renewal or relocation. This accelerated speed of their realization has meant that checks, balances and the possibility of participation and feedback from user are often excluded. These new projects may be looked as experiments requiring further examination. By focusing on how public space is used, the research attempts to establish a connection between built environment professionals and the end users and enrich the availability of studies which examine the relation between place-branding and the place itself.

2.3. Theoretical Thoughts

Several researchers discuss the shared aims in branding and architecture-urbanism as a political tool, a promotional medium and an identity definer (Kavaratzis 2009, Klingmann 2007). Muratovski (2012) explores the role of architecture and integrated design in city-branding, while also discussing notions of territory and iconicity. Place-branding with its manifestation as mega-projects, creation of landmarks and involvement of 'starchitects' affects the consumer experience and has been criticized for failing to craft a unique identity through the standardized 'brandscapes' (Klingmann 2007). Castello (2010) reflects on the complementary nature between place-making and place-marketing with the latter having become a modern instrument and constant complement to the process of creating new urban places. Many urbanists, through their research, have highlighted the importance of the human dimension in urbanism (Jacobs 1961, Gehl 2013) and offered insights into systematically studying environmental behaviour (Zeisel 2006) through international studies in public life (Whyte 1980, Gehl 2013, Mehta, 2007, 2009).

Figure 2 The City's Contemporary Image

3. Suggested Concepts in urban and architectural Branding and marketing

3.1. Branding the city in the Post Globalization Era

Indeed, creating a marketing personality for the city is an important concept that is often difficult to comprehend and interpret. Although it is a new concept, it has become the inevitable application of any city seeking growth and development in the contemporary world. Cities can also generate visual impressions that distinguish them from other cities by focusing on what they own and by planning to add new dimensions to their architectural and urban personality. The most contemporary theoretical theses that established a new era in interpreting the success of the cities, most notably the development thought formulated by the prominent researcher in the field of development studies Richard Florida. He founded a new era in the history of cities and the methods of planning and growth techniques. His intellectual contribution began with his book entitled "The Rise of the Creative Class" published in 2002 in which he addressed a new proposal to understand the fabric of the human society in the post-globalization era. Indeed, the world has surpassed that era and has become the continuation of ideas, markets, investments and the fusion of spatial boundaries. Geography is a dominant feature in which all developed societies, as well as communities seeking a better life.

In his next book, "Who's Your city?", Florida established the importance of place and how our choices of where to live affect our creative contributions. This proposal is closely related to the emergence of the so-called global citizen, or the knowledge workers. Additionally, it calls for a new sector of creative, innovative thinking minds that depend on their contribution to the knowledge sector or rather the areas of knowledge economy as a basis for their professional success. Such phenomena have pushed Florida to warn that the escape of the creative and cultured class of the city leads to its death according to its expression. This new sector of the human community formulates a new conception of the relationship with the geography of the place. It goes beyond the emotional dimensions that make some cling to their first place and make their ability to move limited and restricted by a certain geographical scope may sometimes not exceed several kilometres from his birthplace and origin as it is with large segments of Arab society, this new category of human society is highly dynamic. With its aspirations and hopes in the place of our country and space to unleash its innovative and innovative capabilities in the era of the knowledge and creative economy based on the value Ideas. Hence, the emergence of this category contributed to the development of a new direction in the planning and Constructional thought presented by the literature under the title of the urban competitiveness which stimulated all cities of the world seeking a privileged position on the map of the twenty-first century.

Since the advent of the concept of urban competitiveness, the mechanisms and methods adopted by the cities have emerged, most importantly the city marketing policies to contribute to the consolidation of their presence on a competing world stage. The most radical in the city's marketing policies is to be transformed into a brand or a commercial figure that influences people's consciousness and converts them from their admirers to

advocates and advocates and is responsible for convincing others to create the best intellectual and imaginary impressions of the city. The formulation of a distinctive marketing personality of the city has symbolic value such as international brands, is a process that develops in several stages the first is the awareness of the city and draw attention to it and to believe in it and defend its position and value with enthusiasm we clearly monitor it in the cases of cities such as Paris, London and New York. Therefore, the Imperative questions are; how does the city creates its own brand and distinguished character? How the city market itself? It is no longer surprising that cities are using global marketing experts to formulate a city's branding and marketing strategy. In the following section, suggested strategies that can achieve the city's vision of its distinctive personality, are articulated.

Figure 3 The City's in the Era of Globalization

3.2. Suggested Policies

First: The ability to attract important events and actors with a global impact.

The modern city is no longer a dialogue of its population but extends to the interaction of the world in the era of communication revolution and the unprecedented ability to communicate and an important part of this communication is to move to the stage of polarization of the other through the ability to host artistic events, sports, cultural and economic deepening the idea of communicating with the other The desire to open up to the world emphasizes the global value of the city and reformulates its urbanism and architecture so that it can play this global role.

Figure 4 A Satellite map of the Aspire Zone with all its main components including the sports facilities, the park, the mall, and related community facilities (Source: Courtesy of Urban planning section, Doha).

Second: Employ the architectural and Urban Assets.

The city's valuable architectural and physical heritage is an essential tool to market it if it is activated by preserving it first and then by offering new experiences to interact with the place by re-employing this heritage, as did Arab cities such as Damascus, Medina, Aleppo, Syria, Fez and Marrakech, Morocco. Equally important, what the city will have in its future projects plays a vital role in marketing it. Indeed, the exciting and creative architecture has become one of the most important urban marketing tools of the city. The Guggenheim Museum in the Spanish city of Bilbao, designed by the American architect Frank Geary, was the beginning of the spark of a new methodology that would revive the city and market it through a single building that offers a visual and aesthetic breakthrough in the city's urbanism. Today, the Arab cities have recognized this standard and are competing to attract the stars of the architecture to leave their fingerprints on their architectural map, and their touches are approaching the east after their creativity is limited to the western cities and their flow to the Middle East Square, beginning with Frank Jerry, Jean Nouvel, Tado Ando and Michael. Graves and IBM to Zaha Hadid and they all formulate their creations in Manama, Kuwait, Dubai, Abu Dhabi, Cairo, Damascus and Doha. Any city's architectural and urban heritage has a great value and is an essential tool for its marketing and branding. Heritage when kept well maintained can be activated to provide new experiences of interacting with the place through the introduction of new uses and activities[ii].

Figure 5 The Role of Creative Architectural Interventions in Constructing the City's Brand

Third: Search for the city's natural, cultural, and humanitarian distinctiveness.

The city may be distinguished from mountains surrounded by or rivers that penetrate it or from the presence of high-level cultural elements, especially museums of different types and may be new shopping environments that go beyond traditional ideas or through the ability of the human community in the city to celebrate and the existence of public spaces And the life that the city provides through these spaces, especially in terms of celebrations, festivals and carnivals, whether cultural, artistic, popular or spiritual religious. Even if what distinguishes the city is the style of movement, such as in the Italian city of Venice with its famous Venetian boats or the horse-drawn wagon in the centre of the Austrian city of Vienna or the famous red buses touring the English capital of London. Important is the ability to show this distinction in the scene of crafting the character of the city and its marketing.

Fourth: The formulation of a Brand for the city with historical tributaries and future ambitions.

The goal is to be a conscious monitor of the personality of the city that participates in its planning so that the process of confirming the character of the city and renewing it and installing it in a new form is a continuous dynamic process supported by architectural and constructional projects and patterns of movement and the excellence and distribution of uses Build on the humanitarian and environmental reference to development so that the city becomes a city for all and a model for sustainable development that calls for the rights and aspirations of future generations.

4. The state of Doha: the capital of culture, knowledge, sports and Oasis of Peace

For a city to create its own marketing personality, it must begin with a sincere assessment of its advantages, as well as shortcomings and obstacles, and then try to maximize those features. As Gumathan Gabay argues (2009), the city's marketing is not just a painted slogan, but in the small, subtle details that make the streets Clean, it is in the deep details that make the city's residents ambassadors and proud to belong to it, and then the positive messages move to the actual or digital visitors of the city through the new multimedia. Producing a positive impression is an essential act for cities that want to advertise themselves as chosen destinations for people whether to live, work, entertain or visit. Hence, media outlets are an important area for the city's marketing, and the city has been used in media of all kinds as a sign of the strength of the city and its importance to the European cities ladder in the famous study prepared by Saffron consulting company in 2008 to evaluate 72 European towns. The city's marketing strategy must also be multidimensional and dynamic, responding to cultural, economic and developmental developments. Are we dreaming of travelling to Arab cities; Doha, Cairo, Kuwait, Damascus, Amman, Manama, Tunis, Baghdad, Beirut, and others, is the dream of new generations of the global human community, with unique global values that have a marketing value that makes people scramble to explore or work. Or choose a new home as they all yearn to the fragrant streets, squares and architecture of Paris, London, Vienna, Geneva and New York.

Figure 6 Museums designed by Signature Architects are Enhancing the City Branding, the Case of Museum of Islamic Art, Doha.

Interestingly, in the case of the Qatari capital city of Doha, it has used all the strategies available to market the city locally, regionally and globally, and its class consciously and with time frames that gave the city's reputation and its marketing personality a big and global place but at the same time sustainable and continuous It is not a boom or glow that quickly

switches off. At the level of the polarization of events, Doha was transformed into a world sports capital by hosting the 2006 Asian Games, Tennis championships, horses, golf, volleyball, and world athletics, as well as its contribution to the 2022 World Cup, and the city hosts dozens of international conferences such as Conference of International Chambers of Commerce and consummate political reconciliation. With regard to the use of architectural and urban assets in the historical and contemporary areas, Doha has paid special attention to its architectural and urban heritage and the revival of Souq Waqif, a unique Gulf-wide experience that reflects this trend and has used contemporary architecture to change the line of the city sky and develop its personality As an emerging global polarization hub, Doha has confirmed its own character as a city with a balanced balance between maintaining historical tributaries and developing visions and future ambitions that change the whole city and push it to the world stage. Doha was also concerned with the environment and the importance of preserving it and then enriching the cultural experience of the city through the establishment of various cultural, cognitive and academic projects and interacting with the community of citizens and residents alike, such as the Islamic Museum, the cultural quarter and the educational city, and finally the successful city It is a city that addresses the human being and dialogue with his mind and his emotions and his requirements this latter element, as is evident in Qatar's vision 2030, will make Doha a complete model if all the tissues will be unprecedented and the dream of the Arabs is realized in a city that the whole world dreams of.

Strategies for Positive City Branding: The Case of Doha

Doha as a Sports Capital of the Middle East.

One of the routs to promote tourism in Qatar which will be interrogated in the chapter is turning Doha, the Capital city into a regional and international sports hub. The city was able to host global sports events capital like the 2006 Asian Games, ATP and WTA tennis tournaments, Global Equestrian Tours, golf, volleyball and World Cup in Track and field. In addition to winning the bid for hosting the 2022 FIFA World Cup. The Department of urban planning and urban plan in full coordination with the country's Olympic Committee and the World Cup Organizing Committee to help keep the country cities livable cities attract high-profile sporting events. Urban planning contributes to locate required services especially hotels, playgrounds, markets in addition to the public transport network for high level includes Metro and bus rapid transit buses in addition to pedestrian and bicycle traffic networks.

One of the most prominent projects to prepare Qatar to cement its position as the sports capital of the Middle East is The Aspire Zone: A New Concept for an Urban Community Park where Sports, Retail and Cultural Hub is created. The Aspire Zone, also known as Doha Sports City is a 250-hectare (2.5 km2) sporting complex located in Al Waab district. The project is a complete mega development centered on the concept of branding Qatar as the sports capital of the Gulf. It was established as an international sports destination in 2003. The complex contains several states of the art sports venues, mostly constructed in preparation for the 2006 Asian Games. To complement what was perceived as a newly constructed vibrant urban center in Doha, different facilities and supporting amenities were added gradually. In 2004 Aspire Academy, an educational center for the development of sporting champions was opened. The zone embraces Khalifa International Stadium which

was first built in 1976 and has long been the vibrant center of the country's sporting tradition. As the hosting nation of the World Cup 2022, the Stadium was subjected to a holistic renovation to be compliant with FIFA's stadium requirements. Attached to the stadium is the Qatar Olympic and Sports Museum which will be promoting the positive value of sports. The other sports facilities include Aspire Dome which is credited as the world's largest indoor multi-purpose court and Hamad Aquatic Center. To guarantee the holistic role of the sports zone, the project includes Aspetar, a specialized sports medicine hospital.

Figure 7 Establishing the Needed Facilities to Allow the City to act as the Sports Hub of the Middle East

Branding Qatar via Doha's Emerging Knowledge-based Urbanism

Architecture, urbanism and planning are used, as will be explained in the coming sections, to prepare the country for the post-carbon era and establish a model which transcends the Dubai's dominance as a reference for development in the gulf. Dohaization is consciously perceived as a process to brand Doha in a balanced manner focused on the image and the content (Alraouf, 2016). Such preparation includes creating the environment which would attract knowledge workers and creative people from around the world to settle in Qatar and contribute in its new economical and development paradigm. On a planning level, the new blueprint for the urban development of Qatar titled "Qatar National Development Framework (QNDF)" is the outcome of Qatar's urban planning department and its focus group envisioning Qatar National Master Plan (QNMP). The main pillars of the framework suggest a new form of urbanism for Qatar articulated around planning for sustainable growth, compacted settlements, transit oriented urban development, walkability, mixed use urban centers and positive public realm. Such new planning principles aim at transforming Qatari cities and municipalities into people-friendly places and spaces and create the attractive environment which speaks to knowledge and creative workers considering Doha

and other Qatari cities as their new homes. For instance, enhancing walkability within the West Bay development is considered as a catalyst to transform the city business district from a composition of isolated towers and skyscrapers into a network of activities which would enhance social integration, walkability, public real and urban connectivity.

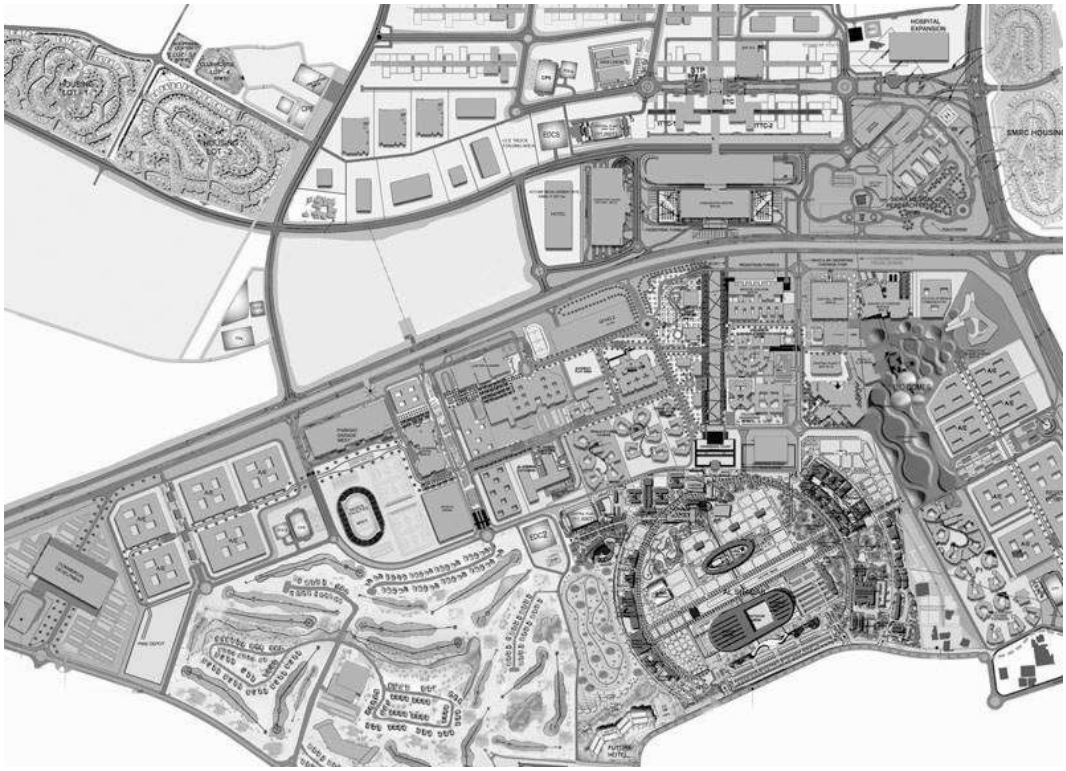


Figure 8 The Master Plan of Education City in the Heart of Doha as a Representation of KBUD

Cultural Tourism in Qatar: From Marginalized to Centralized Economic Pillar

One of the most important features about contemporary tourism is its ability to engage global visitors in memorable and sometimes transformational experiences. The classical interpretation of tourism as an opportunity to merely see local or global landmarks coupled with some sensory interactions with food and entertainments was profoundly transcended by new concepts and approaches. Qatar acknowledges that it is not a country with distinguished natural scenes or unique flora and fauna. Hence, more investment is geared towards cultural tourism using the cultural infrastructure of the country and its capital city; Doha. Hence, the fundamental question while shaping the tourism national strategy was can cultural tourism act as a driving force towards economic diversification. While Qatar critically acknowledges the vitality of considering tourism as one of its main pillars for economic diversification, yet, the State exhibits clearly its unwillingness to compromise religious, cultural, and social values. Such a clear determination resulted in shaping a strategy for tourism development which transcends the typical entertainment-based tourism. So, the challenge was creating a balanced strategy for tourism development in Qatar. Yet, even as Qatar sought to attract visitors, its tourism policy was carefully and strategically crafted to preserve local culture and prevent environmental degradation. Qatar should pursue a high-value, low-impact tourism. The small State should maintain a strict sustainable tourism

policy. Tourism if seen as a significant part of Qatar's economy, all policies and regulations should guarantee and ensure that its natural and cultural resources will be protected and stay attractive to tourists for decades to come. Published in 2014, the Qatar National Tourism Strategy (QNTS) sets out the plan for the development of Qatar's tourism industry over the next few years[1]. In qualitative terms, QNTSS spells out the focus of future tourism development. This will be based on developing a diversified, premium product that attracts families and travelers looking for new cultural experiences.

Qatar as echoed in its vision (QV2030) and tourism development strategy (QTS, 2014), considered the local values and traditions as core components of its identity and character. Therefore, the analysis of the current efforts in Qatar to promote an era of tourism development reveals a number of indicating trends and issues. In the following sections, a discussion is conducted to reveal the alternative approach adopted by Qatar to move beyond the emphasize on entertainment-based tourism which might in some of its components compromise the national values and traditions. Analyzing the Qatar tourism strategy, urban development framework and the State's economic diversification policies substantiates the State's unique approach towards balanced tourism development.

Figure 9 The Heritage Areas as Centers to promote Cultural Tourism

[1] The Establishment of Qatar Tourism Authority: Realizing the fact that tourism is vital in the post-oil economy, Qatar Tourism Authority (QTA) was established in 2011 and changes to National Tourism Council in 2018 after HH the Amir Sheikh Tamim bin Hamad Al Thani issued the Amiri Decision No.74 of 2018.

5. Conclusions and recommendations

This research first provided a background on place-branding, its origins and importance in shaping the public realm of Doha. The new trends in urban planning implemented in Qatar enrich cultural experience in the country, especially the capital city Doha. A number of cultural, academic projects are established to create an interactive knowledge platform with the community of citizens and residents alike. At the same time such projects attract specific quality of tourists, knowledge workers, short and long-term researchers and global travelers. Museum of Islamic Art (MIA), Education City, The Cultural District (Katara) and Qatar National Museums are part of such widely implemented interventions within the fabric of Doha. Such projects have been coordinated and fully integrated with the city to promote cultural tourism in the era of knowledge economy and knowledge-based urban development. The main conclusion of the chapter is that, although tourism development may provide a viable economic solution to some of the major socio-economic problems currently facing the Qatar but as a more holistic approach, knowledge-based urban development should be perceived as the most appropriate answer for the quest to overpass the oil economy era and moving vigorously towards post-oil one. A large part of the motivation behind the KBUD projects in Qatar is clearly the desire to establish the State as both a tourist destination and as an ideal place where knowledge workers might be prepared to relocate. Hence, Qatar's balanced approach to tourism development is becoming a crucial component in its overall strategy to be a balanced representations of knowledge-based urban development State open for a diversity of people composing an interesting tapestry of just, open, and knowledge-based urbanity. The strategic objectives of megaprojects in Qatar are achieved via branding the State as a new destination for cultural events, sports international competitions. It is also achieved via establishing Qatar's new identity as a context for knowledge and creativity attracting knowledge workers from all over the globe. While it is important to note here that Qatar is not only focusing on providing a new milestone in hosting mega sports events but more importantly, using the event as a catalyst for future development and progress. Qatar and as provided in the study, is fully aware of the previous negatives experiences of similar countries that faced substantial failure in transforming hosting the event into an opportunity for development and future legacy. The study shows that the main requirements of Hosting the 2022 FIFA world cup are perceived by the leadership and executive authorities in Qatar as needed for the country not only for the event. Such major strategic difference would make Qatar a winner not only economically but socially, culturally and better prepared for a post-Carbon future.

6. References

Abdullah, Mohamed and Atar, Maher. 2006. Souq Waqif. (Doha: Al Diwan Al Amiri).

Al Buainain, F. 1999, *Urbanisation in Qatar: A Study of the Residential and Commercial Land Development in Doha City, 1970 -1997*, PhD Thesis, University of Salford, Salford.

Al-Kholaifi, Mohammad J., 2003. The Traditional Architecture in Qatar (In Arabic). Doha: National Council for Culture, Arts and Heritage.

Alraouf, Ali. 2017. Interrogating Qatar's Urbanity as a Catalyst for Building Knowledge-Based Societies and Economies. In Bertelsen, Rasmus Gjedss; Noori, Neema; Rickli, Jean-Marc (eds.) Strategies Of Knowledge Transfer For Economic Diversification In The Arab States Of The Gulf. Pp: 53 -66. London: Gerlach Press.

Alraouf, Ali. 2016A. "Dohaization": An Emerging Interface between Knowledge, Creativity, and Gulf Urbanity. Pp.: 47-68. In Katodrytis, George and Syed, Sharmeen. Gulf Cities as Interfaces. Cambridge: Gulf Research Centre Cambridge.

Alraouf, Ali. 2016B. Museums as a Catalyst for a New Urban and Cultural Identity in Qatar Interrogating the Case of Museum of Islamic Art. In Museums in Arabia: Transnational Practices and Regional Processes.). Exell, Karen and Wakefield, Sarina (eds.) (Ashgate: UK, 2016).

Alraouf, A. 2016. One Nation, One Myth and Two Museums Heritage, Architecture and Culture as Tools for Assembling Identity in Qatar. Representing the Nation: Heritage, Museums, National Narratives, and Identity in the Arab Gulf States, Publisher: Routledge, Editors: Pamela Erskine-Loftus, pp.79- 94.

Alraouf, Ali. 2012. A Tale of Two Souqs. In or Out of Place: The Paradox of Gulf Urban Diversity. Open House International Journal. Volume 37, Issue No. 2, June 2012. Pp:72-81.

Alraouf, Ali. 2008. Emerging Middle Eastern knowledge cities: the unfolding story. In Yigitcaular, T., and Koray,V., eds. *Knowledge Based Urban Development: Planning and Application in the Information Era.* IGI Global Publishing.

AlSayyad, Nezar (ed.). 2001. Consuming Tradition, Manufacturing Heritage: Global Norms and Urban Forms in the Age of Tourism. London: Routledge.

Castello, L. 2010. *Ethnoscapes: Rethinking the meaning of Place: Conceiving Place in Architecture - Urbanism.* Routledge.

Cooke, M. 2014. Tribal Modern: Branding New Nations in the Arab Gulf. University of California Press.

Dinnie, Keith. 2011. *City Branding: Theory and Cases*. Palgrave Macmillan.

Fromherz, A., 2012. *Qatar: a Modern History.* Washington, D.C.: Georgetown University Press.

Kamrava, Mehran. 2013. Qatar: Small State, Big Politics. New York: Cornell University Press.

General Secretariat for Development Planning. 2008. Qatar National Vision 2030. Doha: General Secretariat for Development Planning.

Evans, G. 2012. "Branding the City of Culture - The Death of Planning?" In *Culture, Urbanism and Planning*, 197 - 214. Ashgate.

Gehl, J. and Svarre, B. 2013. *How To Study Public Life.* Translated by K. Steenhard. Washington, DC: Island Press.

Gehl, J. 2013. *Cities for People.* Washington, DC: Island Press.

Jacobs, J. 1961. *The Death and Life of Great American Cities.* New York: Random House.

Gray, Matthew. 2013. Qatar: Politics and the Challenges of Development. Boulder, CO: Lynne Rienner Publishers.

Kavaratzis, M. 2009. "Cities and their Brands: Lessons from corporate branding." *Place Branding and Public diplomacy* 5 (1): 26 - 37.

Jacobs, J. 1961. *The Death and Life of Great American Cities.* New York: Random House.

Kavaratzis, M. 2009. "Cities and their Brands: Lessons from corporate branding." *Place Branding and Public diplomacy* 5 (1): 26 - 37.

Miller, Rory. 2016. Desert Kingdoms to Global Powers: The Rise of the Arab Gulf. Yale University Press.

Mishra, Anamika. 2016. Places in The Making: Abu Dhabi's Evolving Public Realm in The Context of Place-Branding. Gulf Research Meeting GRM 2016, University of Cambridge, Cambridge, UK.

Muratovski, G. 2012. "The role of architecture and integrated design in city branding." *Place Branding and Public Diplomacy* 8 (3): 195 - 207.

Muratovski, G. 2012. "The role of architecture and integrated design in city branding." *Place Branding and Public Diplomacy* 8 (3): 195 - 207.

Roberts, David B. 2015. *Qatar: Securing the Global Ambitions of a City-stat*e. London: C Hurst & Co Publishers Ltd.

Stephenson, Marcus L. and Al-Hamarneh, Ala. 2017. International Tourism Development and the Gulf Cooperation Council States: Challenges and Opportunities. London: Routledge.

Qatar National Development Framework (QNDF). 2016. The Ministry of Municipality and Environment.

Qatar National Vision 2030. 2008. General Secretariat for Development Planning. www.planning.gov.qa.

[i] A more holistic understanding of the different strategies of city branding were discussed in City Branding: Theory and Cases (Dinnie, 2011).

[ii] Today, more than 12 sites in GCC countries are listed on the UNESCO list of world cultural heritage. Among them, the oasis of Al Ain, Historic Jeddah, Qal'at Al-Bahrain, Bahla Fort in Oman, and Al Zubarah Fort in Qatar.

Case Study / Project

The Role of Local Leadership in Fragmented Urban Development:

the Case of Higher Education Town - Jatinangor, West Jawa, Indonesia

Teri ARGO, Ery Supriyadi RUSTIDJA

Abstract

The Higher Education Town (HET) of Jatinangor is a campus area, a park of cultural technology science, and an urban center for economic activities. As part of Bandung Metropolitan Area, the challenges on social-economic change, deterioration environtment, infrastructure supply, and economic activities has lead to fragmented development that lead No. rooms for urban public space or centralized public services system. Inevitably, HET Jatinangor faces uncontrolled urban space structures, so that it increases urban problems, including densification that borders towards slums features, urban sprawl, scattered housing-apartment buildings and a lack of water supply combined with frequent flooding. These problems affect the regional levels and urban fringe area. The basic question is how local leadership plays a strategic role in urban and economic change. of HET. Using the participative action research method, the study found that the roles of local leadership promotes positively and consistently towards implementation of development plans of HET and towards resources allocation through the urban spatial plans. The study found that local leaders who lead to strong networks among institutions, such as among local government agencies, academics, and local communities, has a grasp of historical understanding of the areas as well as orientation towards providing highly qualified public services drives a performance that warrant respects and understanding among the community members . The study implies that with limited autonomy given to the local level, strong, dynamic and open minded leaderships can fill in the vacuum in urban management of this fragmented governance.

Case Study Paper

Fixing the wrongs against 'rights' in Kalyani (India)

A story of sanitation, two slums, their land tenure, a municipality and the state

Tathabrata BHATTACHARYA, CURE-India; India

Abstract

The paper explores the informal 'means' or approaches adopted by the Kalyani municipality in the state of West Bengal (India) to challenge the unconstitutional limiting of its powers by the state government. It unfolds with a community-based sanitation project; resulting in a dilemma over legitimacy of land tenure in two slums. By understanding the limitations of the municipality, the nature of the sanitation project and the informal 'links' or networks among people, groups and organisations; that were developed to support the programme, witness the degree to which an urban local body can impact the established land administration system in Kalyani and its resultant effect on the understanding of land tenure system in the two slums. It is found that not only did informal means of the municipality help instil faith in the slum communities; it also triggered voluntary slum development initiatives and a strengthened perception of legitimacy of their land tenure. This has further led to implementation of other state-funded projects in the slums, that in the past, required legal land ownership. From a planner's perspective, it imparts a new facet to the land administration of the city and the way land tenure might function in the informal settlements. With sanitation being a human right and a national priority, the study provides an insight into how sometimes informal means are adopted by formal agencies to safeguard formal functions and challenge limiting regulatory environments.

Keywords

Land tenure, Radical Planning, Coproduction

1. Introduction

In response to the weak and ineffective nature of the urban local bodies, the Indian Parliament voted for the 74th Constitutional Amendment Act (CAA) in 1992. It was considered a firm step towards decentralisation (Rai, 1999) and empowerment of the grassroots *viz.* municipality. The Act suggested mandatory and optional reforms to be brought in the municipal governance by the respective states. More importantly, it recommended transferring the responsibilities of land use development and socio-economic planning to the municipalities, adding another dimension to extending democracy at grassroots and urban planning.

In terms of implementation, West Bengal emerged as a frontrunner in democratic decentralisation and among the 'star' states (WBDMA, 2017). Not only did the state execute

the mandatory reforms in record time but achieved greatly in terms of those that were optional under the Act also *(Ibid)*.

However, even after two decades, the urban local bodies continue to remain weak. Despite the Constitutional support, the municipalities could not improve their governance and service delivery (Aijaz, 2007). Although inefficiency and corruption within the municipalities have contributed to the failure (Aijaz, 2007, Sharma, 2011), researches also indicate a greater issue. This issue pertains to the lack of support from the respective states (to the extent of reluctance) and an uneven devolution of power between the state legislature and the city council (Sharma, 2011). Despite the constitutional mandate, the state enjoys an upper hand in municipal matters; partially owing to certain provisions in the 74th CAA that were left *optional* to grant flexibility to the states in designing their individual reforms (74th CAA, 1992) and partly due to 'deep-rooted' socio-cultural perceptions of the citizens (Vidyarthi, 2004).

The paper revolves around this reluctance to share power and legislative 'upper-handedness' of the state. In actions that can only be termed desperate, the Kalyani Municipality adopted 'informal' approaches in leveraging a sanitation project in two informal settlements, to challenge the undue land administration system in the city by the state legislature. This triggered actions and events that developed new understanding of land tenure among the slum-dwellers and impacted the established land administration system in the town.

Ironically set in West Bengal, the author re-examines the methods adopted by a formal agency (the Kalyani Municipality) to claim its formal rights guaranteed by the Constitution and thereby challenge the tenure-based service regulations of the state. To uncover this phenomenon, the paper would try to understand (i) the factors that drove the Municipality to challenge the state; (ii) the approaches adopted by the Municipality and (iii) the consequences of their action.

2. Background

The story owes its roots to the Parliament's rejection to the 64th amendment (Bill[1]) to the Indian Constitution in July 1989. Although it sought to reform and revitalise local governance, the lawmakers opined that the Bill limited the freedom of the state to design local government reforms. Since, functions of local governance was in the State List[2] (CoI, 1949), the decision remained unchallenged.

Giving due cognizance to the objection, the Government of India proposed a new Bill. It was kept 'flexible' in design and provided a greater autonomy to the states. Consequently, two kinds of provisions were introduced in it. Certain reforms were mandatory in nature which every State had to initiate within a year of passing the Bill. These were indicated by the word 'shall' in the new Bill. The second type of reforms were more discretionary, indicated discreetly by the word 'may' in the law (74th CAA, 1992). While the mandatory reforms were

[1] Every law before ratification by the Parliament and the President of India is a proposal or Bill.

[2]Section Seven of Indian Constitution grants greater autonomy over different domains to Union Government (Government of India) and respective States. Items like law and order, public health, agriculture, wealth taxes, land tenure, land reforms, and functions of local government are included in the State List.

aimed at giving financial, compositional and tenure-related autonomy to the local bodies, the discretionary provisions were conceived as a tool for innovative reform of grassroots governance, *optional* for the states *(Ibid)*.

The Bill became the 74th Amendment to the Constitution of India. This conferred a constitutional status to the urban local bodies and entrusted critical functions of city management and service delivery. It was seen by some as a firm step in strengthening democracy in the grassroots (Rai, 1999). It redefined how urban areas were to be managed by linking the lowest levels of democracy to the higher legislative apparatus of the country.

However, some researchers have theorised that the real idea behind the Amendment was to provide greater constitutional protection from irrational decisions of state against the functioning of the municipalities (Misra et al., 1999) and not to substantially change the way the local government was administered (Vidyarthi, 2004). Coincidentally, its Article 243(W) implicitly makes the State Legislature responsible for deciding the extent of powers, jurisdiction and responsibilities that 'might' be enjoyed by the urban local bodies as institutions of self-government (74th CAA, 1992). The State agencies (different departments) and parastatals allegedly retain their power over matters under 12th Schedule[3] by calling for 'specialised' knowledge and expertise in projects; that the municipalities largely lack. In addition, citing 'effective communication between the state politicians and bureaucracy' for expediting implementation of schemes, the departments often side-line the municipalities (Vidyarthi, 2004).

With regards to the municipalities, it has been claimed that the inefficiency of the municipal system, corruption, lack of experience among the staff etc. are impediments to the implementation of the 74th CAA provisions (Aijaz, 2007, Sharma, 2011). However, beyond the conventional criticism of slow government procedures or administrative apathy, Vidyarthi (2004) presents a third kind of perspective that draws from people's perception. He claims that citizens mostly see the municipalities as corrupt, powerless and operating with 'vested interests' and consequently invest their faith in technocratic officials.

3. Theoretical underpinnings

From the discussion above, it can be concluded that owing to some legislative clauses, operational tactics and popular perception, the State often perpetuates a restrictive political environment in its urban areas. It is characterised by complicated and perceptibly unjust exercising of power over critical urban domains. In such a situation, for a municipality, to claim its constitutional powers and address some of its issues requires it to stand in *opposition* to the established state laws and warrants a move towards social transformation through radical planning (Friedmann, 1987).

3.1. Radical Planning

Radical planning has been theorised as deliberate efforts for the transformation of *"social, political and economic structures that create and maintain status-quo"* within one's zone of influence to combat unequal and unjust power relations (Beard, 2003, pg.16). The efforts are a response to long-term, careful critique of the present situation and institutional

[3] Under the Article 243(W), a list of eighteen fields related to city management in the 74th CAA, 1992, that the State has the option to delegate to the urban local bodies.

constraints, informed by *social learning* culminating into practical and operational solutions (Friedmann, 1987). The central characteristic of radical planning has been *opposition* or *conflict (*Beard*, 2003)*. Radical planning is known to exist in many forms (Sandercock and Bridgman, 1999, Harvey, 2000) and is mostly in opposition to the state. However, for the purpose of this paper, it is important to learn about the fact that states (or state machineries) are also capable of engaging in radical planning (Rangan, 1999).

Radical planning is popularly perceived as being *overt* (Beard, 2012, pg.715) and grand in nature, though there are arguments against it (Sandercock and Bridgman, 1999). However, in a political and administrative environment, where open challenges are either admonished, vehemently suppressed or conveniently ignored, radical planning cannot lead to social transformation (Beard, 2002, 2003). It is in such circumstances that Covert Planning makes its contribution *(Ibid)*.

Covert planning is a mode of planning that features non-confrontational efforts; marked by subtlety and undetected ways to impact power relations. These "under the radar" strategies are found to be incremental in nature and produce undercurrents of change without antagonising the authority (Beard, 2012). It is claimed that covert planning comes closest to the tradition of social mobilisation because it involves the strongest desire for emancipation (Beard, 2002).

It should be noted that the theories of radical and covert planning acknowledge the necessity of economic, political and social capital for escaping oppression. However, they do not discuss the means to achieve them (Beard, 2003). Interestingly, Coleman (1988) has established social capital as 'means' in itself; to achieve a certain end. More than a tool, social capital has been seen as *durable networks* (Bourdieu, 2011) that are required for *purposive action* (Lin, 2017). From a collective and community-based perspective, Putnam (1995) suggests that it is the networks, norms and trust that "enable participants to act together more effectively to pursue shared objectives". In marginalised communities, where people suffer from *deprivation of capabilities,* social networks hold great significance. These networks are formed between key people, known as 'agents'. According to Sen (2011), the degree of poverty is directly related to how well an individual can use these 'agents', known colloquially as a 'connections' who works on his behalf and aids in bringing change.

The discussion so far has created a framework that was necessary to critically examine the case of CLHI project in Kalyani. The theory provides a logic through which it is now possible to understand the peculiarity of the actions of the Municipality, the driving force behind them and the results.

4. Context

4.1. Kalyani township

Kalyani is a planned township, 65 km towards north of Kolkata with an area of 29.21 sq.km. It has a population of 1,00,575 people with approximately 24,492 households (Cesus of India, 2011). The population of the town has increased by 15,072 people since 2001. It has most of the services of planned townships but is presently seen as a satellite town for Kolkata. It benefits from its proximity to Kolkata; the largest employment centre of the region, political capital and expanding rapidly into the suburbs. Its proximity to Kolkata with

industries and other institutional facilities, Kalyani proved to be a desirable place for migrants from rural areas and Bangladeshi refugees (between 1947-1971). These, predominantly poor, households settled in large underserved areas that were vacant or conveniently close to job centres and railway stations. Researches have revealed that over the last fifty years, open unused spaces in peripheral wards (predominantly wards 1, 2, 3, 4, 5, 14 and 15) have increasingly come under unplanned and underserved slums (colloquially called *Colonies*) (Choudhury, 2011). However, certain slums can also be found in more central wards (6, 9, 10, 16, 18 and 19). In 2001, there were 16 recognised (enlisted with the Municipality) slums in Kalyani with a population equal to 48% of the total population of the town. The number of such slums grew to 52 by 2012, and were recognised by the Municipality (Tarafder and Islam, 2012) and their location and other features recorded digitally.

4.2. Political Backdrop

At the time of the project, CPI(M)[4] or Left Front ruled the state of West Bengal and the Kalyani Municipality. Being a planned industrial town with reputed educational institutions, Kalyani has always occupied a prominent place in state politics. This had its fair share of disadvantages also. Although the West Bengal government was hailed as a pioneer in the decentralisation of power, it continues to hold the urban area in Kalyani as a Notified Area (a special legal status for areas that are making a transition from rural to urban character). As a result, the state continues to deprive the Municipality of its constitutional functions and appoints an Estate Manager (Kalyani Municipality, 2007, Chaudhuri, 2016) (a senior civil servant-cum-administrator) as a custodian of all land in and around the municipality (barring the defence and railway lands) even after two decades of the latter's formation (circa 1995). This meant that the Kalyani Municipality was reduced to maintaining infrastructure in the town and depend on the state machinery for all land-related matter, including infrastructure development, matters related to development in informal settlements etc. This inability of the Municipality is compounded when certain programmes approach the Municipality directly for infrastructure development in informal settlements. It is because the State prohibits the Municipality from taking any decision regarding land and leaves little ground for it to apply for land acquisition because slums, by definition, are not officially recognised/notified[5] settlements in Kalyani and hence, hold no legal land tenure.

4.3. The CLHI Project

Development in Kalyani is guided by the Draft Development Plan; that was prepared in 2007. However, it does not address the issues of land tenure in the town. In 2006, at the behest of the DFID[6], the Municipality took up the task of making Kalyani an 'open defecation-free' (ODF) town under a flagship programme, KUSP[7]. The total investment by DFID in West Bengal under KUSP was close to USD 5.4 million, aimed at improving infrastructure of cities by encouraging household toilets (Kar, 2006).

Looking at the deplorable sanitation situation in the slums of Kalyani, fifty-two slum settlements were identified by the municipality to be included under KUSP. Since, subsidies to selected poor households to encourage them to build in-house toilets (especially in slum

[4] Communist Party of India (Marxist) ruled West Bengal from 1977 to 2011.
[5] Notification of slums are carried out by the State government; it is the first step in their legal recognition.
[6] Department for International Development, Govt. of United Kingdom
[7] Kolkata Urban Services for Poor (a joint programme of DFID and Government of West Bengal)

areas) had proved ineffective, an alternative method of Community-Led Health Initiative (CLHI) was launched to test the Community-Led Total Sanitation approach (CLTS). CLTS was chosen "…*as an entry point strategy to build community capacity and to strengthen internal social solidarity of slums for initiating collective local action*." *(Ibid).*

Under CLHI, the health-department organised information meetings with the community to understand the existing situations and probable solutions regarding sanitation, along with the experts. "Doable" solutions (economic, durable and scientific) were deliberated upon. In addition, behavioural changes were addressed and local community formed groups to stop open defecation in their surroundings (Lüthi et al., 2010). This lead to a movement where people from all the slums got together to choose natural leaders among them to spearhead CLHI in their locality. Within a year of its inception, all 52 slums were ODF and had built household toilets voluntarily without any kind of government support. The project was exceptionally successful in two slums, Vidyasagar Colony (295 households, 1218 people) in the periphery and Harijan Pally (89 Households, 359 people) near the town-core. While Vidyasagar Colony is a refugee colony that came into existence when Bangladeshi refugees fled war in 1971, Harijan pally was settled by migrants from various parts of India (especially Medinipur in West Bengal, Bihar and Uttar Pradesh). Vidyasagar Colony is located on land earmarked for industrial development and Harijan Pally occupies Kalyani University land. Although no BPL families are registered in the settlement, the residents are considered largely poor.

5. The Study

This section gives the details of how Kalyani Municipality engaged in covert planning. The data and information for this study was collected in the summer of 2015. It involved extensive interviews with people associated with the project. These included the erstwhile municipal Chairman, the municipal officers, state officials, members of the 'expert' team and people from the two slums. Observation and transcripts from community meetings were reviewed, coupled with checking of household survey records.

In the early years of 2000s, the West Bengal government set health on high priority. Consequently, all urban local bodies were given the mandate to take actions to improve health of its citizens by improving the condition health facilities in their respective jurisdictions.

Kalyani Municipality utilized this opportunity to address the longstanding issue of poor sanitation services in slums. From its earlier studies, it had found that almost all slum-dwellers were defecating in the open in absence of individual or community-level sanitation services. With its prior experience in community-level sanitation services elsewhere, getting trapped in maintenance issues, the Municipality targeted development of household-level toilets in all slums. However, providing household toilets in slums were not an easy task. According to Chairman, there were a host of problems:

i. Building sanitation services would require land, the acquisition of which was beyond the purview of the Municipality.

ii. Application for land acquisition for developing sanitation for improving health would not be entertained because none of the slums in Kalyani are notified by the State.

iii. Kalyani being an industrial town had large expanse of vacant lands that were being used for open-defecation. The solution of household toilets might not find takers and reduce into a wasteful expenditure. Prior experiences had suggested that toilets provided by governments had been increasingly used for purposes other than sanitation.

iv. Municipality-aided toilet construction would invite the ire of the State for going against its established management system.

Considering the delimiting condition, the Municipality designed a unique strategy. The Chairman roped in its health department and a team of experts to design a community-level health project. In tandem with the mandate of the state, the project sought to impact the health of the people living in the slums of Kalyani by targeting behavioural change. On surface, the project was directly relevant to the state's larger objective and was given a green-signal by the state without any objection. However, underneath, the project served a two-fold purpose. In lieu of the project, the municipality got the funds required to conduct an exhaustive survey of all the slums within its city-limits. It was informed that this helped in the later stage of the project as a symbol of recognition by the government. In addition, health provided a convenient point of entry into the settlements (that considered every state agent with suspicion) rather than sanitation that involved discussion of risky topics like land tenure.

During implementation, common diseases were constantly linked to open-defecation and absence of sanitation in the area. In doing so, the Municipality set a stage for spatial intervention in the future. However, any sudden building activity could have alerted the state. Therefore, the project was progressed in phases. These phases involved people designing small interventions with deadlines and keeping records of their achievements. An example would be setting-up of children vigil groups that would blow whistles at people defecating in the open. It was gathered, this not only deterred the people to defecate in the open during the day but also gave a sense of unity in the groups.

Numerous meetings and group-discussions were held by the experts and the municipality with the community. Stage shows were organised on necessity of health of vulnerable groups like women, children and old people. Sometimes, the municipality invited state officials to these discussions. It was claimed that such events not only encouraged the community in pursue their goal vigorously but also provided a shade of legitimacy to the process.

Convinced by the efforts of the health department and their own people, the community expressed the intention of building private toilets, close to their houses in both the settlements. It was informed that the Municipality had been able to generate demand for sanitation services in the settlements, as they had truly desired. However, they could not apply for construction funds from the state. Hence, the Municipality pitched the idea of simple designs of toilets that would be developed by the people in consultation with the experts. The Chairman confessed that it was a 'gamble' because in absence of formal land

tenure, investment in toilets was unconceivable. Yet, the Municipality went ahead with the plan because (a) the demand came because of "legitimate" processes of community participation, at a scale that the state had never seen and (b) the Municipality had passed the onus of design and development of sanitation in the slums to the community (voters) and the team of experts (paid by the state), thereby technically not challenging the land laws of the state.

Real sparks of covert planning on the part of the Municipality were visible in the construction phase of the toilets. Interviews revealed that investment in household toilets made people think about the extent of land being held by individual families. This triggered spatial reorganisation of settlements and informal delineation of plots by community-heads in presence of Municipal staffs. According to a Municipal officer, this was not only the first spatial imprint of a health initiative, the event also highlighted the capability of communities to plan for their settlements. The Municipality availed this opportunity and provided small grants for constructing a Club house in the settlements "for holding cultural events". The establishment of a club (funded from state money) renewed the zeal of the people and they started mobilizing private funds for building toilets.

The Municipality cunningly extended water pipelines and rainwater drains to the boundaries of these informal settlements. This was done to respect the state norm of providing urban infrastructure services to only formal land holdings and at the same time, making them accessible to the informal settlements. Simultaneously, the Municipality encouraged the women in the settlements to form savings groups under various central and state government programmes. To fast track their application process, the Municipality set up a special cell. With the additional corpus, available at the discretion of the community women, the Municipality encouraged to use the funds in developing roads, drains etc. in their respective slums. It was told that instead of suspecting anything, the state appreciated the women's role in forming savings groups. This further added to the legitimacy of the project and kept the real intentions of the Municipality hidden.

In case of Harijan Pally slum, the Municipality strategically negotiated with the Kalyani University to obtain a 'No Objection Certificate' for informally developing its land to make it "fit" for human habitation. It is important to note that the Municipality was aware that the NOC held no legal relevance as land vested under a university is controlled by the state education department in West Bengal. However, this created renewed vigour among the people and motivated the community to pursue its spatial development and a deeper faith in the Municipality. For the Municipality, the NOC would create a moral barrier between the State and the slum dwellers, considering that the University owned by the Government of West Bengal.

6. Impact

It is from the impact that the true success of the covert planning method by the Municipality can be assessed. The results of the CLHI project can be divided into two categories- spatial impact and institutional impact.

The CLHI project has contributed to the development of the two slums considerably. Under the reorganisation efforts of the community, the land under the slum was divided

(informally) into parcels of 134 sq.m. (approx.) for every resident family. Provisions of roads and drains were kept in the master plan that was developed. The domestic animals have been provided with a community-level shed that is mutually maintained. A primary school was constructed in an excess piece of land for children of the slum and reportedly, it is partly funded by the Municipality. All these have given Harijan Pally an *appearance* of a planned neighbourhood. In Vidyasagar Pally, the drains and roads have been recently redeveloped from the expenses of the community.

Cultural club buildings in both the settlements have been made permanent and are now used as multipurpose halls for marriage and religious festivities. The success and popularity of community-led activities has resulted in voluntary garbage collection groups that collect garbage from door to door on a regular basis. The vacant spaces, earlier being used as grounds for open defecation, have in case Harijan Pally been planted with trees and in Vidyasagar Colony, lay vacant. Some households have invested in making their living quarters more permanent, citing their participation in a "municipal project" has strengthened their tenure status.

It should be noted that all the above developments happened without a formal legal tenure. The Municipality having involved the state, tactfully into the project has limited the state's opportunities of vehement opposition. Also, in absence of overt and disruptive demands during or after the project by the Municipality or the community, the state administration never felt threatened.

Regarding the Institutional impact, it can be said that the state has also come around its stance of denying service provision in informal settlements. It has been reported that under a state-funded project of building individual toilets (Sobar Souchagar), with permanent materials, twenty-two toilets have been built in Harijan Pally. These toilets are registered in the name of the owner. This can be interpreted as the state's effort to provide some sort of tenure security to the slum dwellers and a commendable success of the Municipality in softening the stance of the State with regards to land administration in Kalyani.

7. Conclusion

From the case presented above, it is quite clear that the municipality was aware of the necessities of the marginalised section of the town and adapted a larger project to respond to a host of issues plaguing their settlements. At the same time, its actions exemplify the capability of grassroots agencies to become agents of change and circumvent policies to usher development. The discussion also highlights the confused state of urban management in India and the necessity of comprehensive policy reform.

8. References

Constitution of India (1949) New Delhi: Govt. of India.

74th Constitutional Amendment Act (CAA) (1992), New Delhi: Govt. of India.

Aijaz, Rumi (2007) "Challenges for urban local governments in India", Asia Research Centre Working Paper 19.

Beard, Victoria A. (2002), "Covert planning for social transformation in Indonesia", Journal of Planning Education and Research, Vol. 22, No. 1 (Sept).

Beard, Victoria A. (2003), "Learning radical planning: The power of collective action" Planning Theory, Vol. 2**,** No. 1 (Mar).

Beard, Victoria A. (2012), "Citizen Planners: From Self-Help to Political Transformation" *In:* Rachel Weber & Randal Crane (eds.) The Oxford Handbook of Urban Planning. 1 ed. New York: Oxford University Press.

Bourdieu, Pierre (1986) The Forms of Capital. *Cultural theory: An anthology***,** Sussex, Wiley-Blackwell.

Census of India (2011), District Census Handbook, Nadia, Govt. of India

Chaudhuri, S. 2016. Special school faces land hurdle-Civic body allots plot of estate manager, The Telegraph, 18-10-2016.

Choudhury, Sujit (2011), Application of GIS in urban development plan, West Bengal, India.

Coleman, James S. (1988), "Social capital in the creation of human capital", American journal of sociology**,** Vol. 94.

Friedmann, John (1987), Planning in the public domain: From knowledge to action, Princeton (New Jersey): Princeton University Press.

Harvey, David (2000), Spaces of hope, Berkeley (California): University of California Press.

Kalyani Municipality (2007), Draft Development Plan (20017-2012), Kalyani (West Bengal): Kalyani Municipality.

Kar, Kamal (2006) "Community led total sanitation in slums of Kalyani municipality under Kolkata urban services for the poor (KUSP). Lessons Learnt and Outcome of the Sharing Workshop on CLTS held on 26th May, 2006.

Lin, Nan (2017), "Building a network theory of social capital" in Social Capital, New York: Routledge.

Lüthi, Christoph; McConville, Jennifer and Kvarnström, Elisabeth (2010), "Community-based approaches for addressing the urban sanitation challenges", International Journal of Urban Sustainable Development, Vol. 1, No. 1-2 (May).

Misra, Surya Narayan, Hazary, Subhash Chandra and Misra, Amareswar (1999) Constitution and Constitutionalism in India, Delhi: APH Publishing Corporation.

Putnam, Robert D. (1995), "Tuning in, tuning out: The strange disappearance of social capital in America", PS: Political Science & Politics*,* Vol. 28, No. 4 (Dec).

Rai, Shirin M. (1999), "Democratic institutions, political representation and women's empowerment: The quota debate in India", Democratization*,* Vol. 6**,** No. 3 (Sept).

Ramachandran, M. (2016), India's Urban Confusion: Challenges and Strategies, Ghaziabad (Uttar Pradesh): Copal Publishing Group.

Rangan, Haripriya (1999), "Bitter-sweet liaisons in a contentious democracy: Radical planning through state agency in postcolonial India", Plurimondi: *An International Forum for Research and Debate on Human Settlements*, Vol. 1, No. 2.

Sandercock, Leoine & Bridgman, Rae (1999), "Towards cosmopolis: Planning for multicultural cities", Canadian Journal of Urban Research, Vol. 8, No.1 (Jun).

Sen, Amartya (2011), The Idea of Justice, Cambridge (Massachusetts): Harvard University Press.

Sharma, Deepak (2011), "An evaluation of the 74th Constitutional Amendment Act: A case study of Chandigarh, India", Journal of Administration and Governance, Vol.6, No. 1 (Jul)

Tarafder, Syfujjaman, and Islam, Aznarul (2012), "An Analysis of The Morphological Structure of Kalyani-A Planned City of Nadia District, West Bengal", Journal of Biological Chemistry, Vol.1, No. 11 (May)

Vidyarthi, Sanjeev (2004), "74 th Constitution Amendment Act and Present Economic Growth as Catalyzing Agent for Urban Development", ITPI Journal, Vol. 1**,** No. 3.

WBDMA (2017), Official Web Site of Department of Municipal Affairs, Govt. of West Bengal. *In:* ADMINISTRATION, D. O. M. (ed.). Kolkata: Government of West Bengal.

Research Paper

BREAKING THROUGH RIGID ADMINISTRATIVE BOUNDARIES

Synergies in 'soft' spaces of cooperation

Karina CARIUS DE BARROS, MSc Spatial Planning

Sindi HAXHIJA, MSc Spatial Planning

Abstract

The concept of 'soft' spaces has been introduced in the pursuit of capturing the reality of cooperation practices, marked by continuous attempts to promote new policy scales, initially through the device of fuzzy boundaries. Within such a challenging context - where interests overlap but administrative units do not - the interaction of actors in these areas often remains weak. The study focuses on exploring cooperation motives and implications arising among stakeholders in these 'soft' spaces of interaction. Through informal and semi-formal processes of negotiation employed by several relevant actors, the two case study regions attempt to overcome the clashes between local, national and supranational political and administrative discourses.

Keywords

Soft spaces, regionalization policies, territorial rescaling, relational networks,

1. Introduction

The necessity to address common interests across borders still face rigid administrative boundaries. Financial power, infrastructure coordination, ecological and environmental concerns are under the regulation of the different actors, with their respective hierarchical structures of government and governance. Shared interests thenceforward, in their application, remain limited within distinct administrative unit.

Following the necessity for spatial planning to focus on 'what works' in terms of implementation and policy delivery, the notion 'soft' spaces of cooperation has been in the spotlight of many academics working on territorial cooperation units. The concept of 'soft' spaces is a recently developed one, therefore, the rationale behind the concept is still to be explored. However, most literature has pointed out to functional needs as usual motivation for the emergence of 'soft' spaces. Allmendinger and Haughton (2009), refer to functional needs as a response to challenges of environmental character. In this case, local communities need to come together to address interests from beyond existing territorial concerns, by bringing in new forms of actor networks in order to challenge the complexity of

social issues and institutions. When restrained within fixed administrative boundaries, it becomes more difficult to reflect the geographies of the problem. Governmental structures, fail to address functional linkages within their politico-administrative territories, therefore, in such scenarios, policy-makers and interested parties need to come up with tailor-made solutions, addressing issues from both sides of the border.

Additionally, as also detected by Allmendinger et al. (2015), these spaces of interaction are motivated by the necessity to create a more efficient arena for stakeholder cooperation. In a context where environmental, social and economic issues are interconnected and pass across rigid administrative borders, sectoral and hierarchic forms of policy-making are no longer efficient. When these new actor networks come together they help to tackle territorial issues by indicating for public authorities the right geographical scale and the focus of policy design, by endorsing in this way, specific strategies or goals. This type of 'soft' space becomes an attempt to re-brand regions and redirect the existent vision of the area (Carius de Barros, 2018).

As a reaction on and reflection of this complex and challenging context, where societies are becoming more fluid, the administrative boundaries should follow. From a societal point of view, this study analyses the mechanisms and processes of governance employed by institutions and communities in these cross-border regions. By looking inside and outside the EU borders, it can contribute to both the European Union Community and the neighbouring countries, by deepening the understanding of cross-border processes inside and outside the border. Following this line of thought, cross-border cooperation programs and projects have been developed as a means of proposing more adequate narratives to the context of hard administrative borders and the communities in these areas.

In addition, this paper explores cross-border cooperation initiatives and their supportive frameworks inside and outside the EU, in order to understand and compare the challenges faced in a 'soft' cooperation context and furthermore, to investigate the role and attitude of the EU as a triggering or hindering mechanism. Within its own administrative boundaries, new processes of territorial rescaling which came as a result of EU Regional Policies can be seen as a driver for 'soft' territorial cooperation. However, these soft and informal spatial approaches go hand in hand with hard and formal regulations which affect spatial development (Haxhija, 2018)

Cross-border cooperation across the outer EU borders is, however, embedded in a highly complex context where different historical path, motivations, policy and institutional frameworks coexist with local and regional attempts of promoting development. While CBC within EU may encompass a narrative of unity and 'soft' territorial cooperation, such activity across the EU outer borders are surrounded by 'hard' spaces as security, exercise of influence and external relations (Carius de Barros, 2018).

The empirical research has been conducted by using two different approaches, border areas inside and outside the EU administrative boundaries. It focuses on the network set-up which involves different governmental and non-governmental bodies from both sides of the border and draws upon alternatives to foster their cooperation despite the different cultural, institutional and organizational arrangements. Through informal and semi-formal processes of negotiation employed by several relevant actors, the regions attempt to overcome the clashes between local, national and supranational political and administrative discourses.

Interviews and on-site analysis are the two main methods which have been used during the data collection process.

2. Concept of soft spaces

Alternative forms of policy delivery, in a highly and increasingly complex context of spatial planning, have been discussed by both academics and practitioners. Increasing recognition is given to the fact that recurrent issues in spatial planning, as environmental and social challenges, are often not limited by the governance units commonly used, such as territorial and political borders (Carius de Barros, 2018). In this context, the idea of soft spaces has been explored as a way to explain ”continuous attempts to promote new policy scales” (Haxhija, 2018, pg 5), which aim to overcome the territorial and governance boundaries typical of planning systems (Allmendiger, Haughton, Knieling & Othengrafen, 2015).

The narrative on soft spaces and its surge relates to the New Labour’s approach to spatial planning in the United Kingdom and the process of devolution it sought to promote (Davoudi & Strange, 2009). Further diving into such notion is provided by Allmendinger & Haughton (2009), who explored the growing demand for alternative approaches to planning in complex, multi-stakeholders scenarios:

> So, whilst planning still needs its clear legal ‘fix’ around set boundaries for formal plans, if it is to reflect the more complex relational world of associational relationships which stretch across a range of geographies, planning also needs to operate through other spaces, and it is these we think of as ‘soft spaces’ (Allmendinger and Haughton, 2009, p.619).

Almendinger et. al. (2015) explains such space as ‘new geographies’ that give the opportunity to gather different actors that, though motivated by various reasons, pursue the solution or improvement of complex issues. These spaces may overlay with fixed administrative boundaries, such as institutional frameworks, but may also entirely deny and challenge those (Othengrafen, Knieling, Haughton & Allmendinger, 2015). Soft spaces are, thus, “flexible governance arrangements that aim at overcoming institutional borders and entrenched practices by inserting new ways of doing things” (Telle, 2017, p.94).

The semi- or in- formality of soft spaces is an essential part of their functioning, which allows for a degree of flexibility, considering its non-statutory governance modes (Metzger and Schmitt, 2012). On the other side, however, the interaction of these soft spaces with well established governmental institutions allow for a certain degree of formality that, consequently legitimates such soft spaces and their networks (Allmendinger et al., 2015; Telle, 2017).

The networks involved in the establishment and functioning of soft spaces may be understood as ‘communities of intent’, i.e. constellations of actors cooperating towards certain goals and motivated by specific challenges (Chilla et al., 2017). While such concept suggests an essential bottom-up nature of communities of intent and, consequently, of soft

spaces, it is important to notice the top-down character of processes present in soft spaces (Haxhija, 2018). In the same line, 'soft' and 'hard' spaces should not be approached as opposite and excluding concepts. As Mezger and Schmitt (2012, p.276) explain, this 'soft' nature should not be understood "as an absolute property of certain spatial entities, and not as eternal but, rather, as a contingent stage in the development trajectories of some spatial entities".

Empirical studies have been developed in the attempt of shedding further light on the functioning of soft spaces, especially under territorial cooperation processes. The Tames Gateway Development Corporation, aiming at brownfield conversion and development is an example. Understood as an 'implementation' type of cooperation, as Chilla et al. (2017) clarifies, it is characterized by a strong participatory aspect that leads actors to take larger ownership of the project.

The ESPON Actarea project, for instance, explores several examples of soft territorial cooperation, concluding these often have a cross-border nature. Such findings relate to Chila et al.'s (2017) findings of what the author defines as 'instrumental' cooperation, where policy frameworks lay the ground for the functioning of such spaces. Instrumental initiatives are often of cross-border nature (Ibid).

In the same context, Telle (2017) suggests an analysis of Euroregions under the concept of soft spaces. The author compares two Euroregions, Šumava and Pomoraví, and present those as soft spaces aiming to manage overarching physical and governance issues. Difficulties to overcome the administrative and political boundaries typical of cross-border contexts are part of the processes for both regions in the pursuit of cooperation across borders.

Finally, it is possible to conclude that soft spaces are involved with the attempts to overcome varying barriers typical of formal, rigid administrative spheres. Stakeholders of different nature, motivated by several reasons, build upon shared interests to reach fruitful cooperation in terms of development. Under the concept of soft spaces, the next section will analyse cross-border cooperation in different contexts, within the EU and across its external borders.

3. The EU approach to soft spaces of cooperation

3.1. CBC within the EU

Due to ever-growing globalisation processes, new forms of territorial cooperation have been introduced in the EU, in order for its cities and regions to become more present transnationally and increase their competitive advantage as global players. The EU Regional Policy has been initiated as a result of – however, not limited to – the necessity to manage dynamics in these new forms of territorial cooperation. Within its framework, new funding opportunities have been developed to support cross-border and interregional cooperation networks. In this new territorial context, it becomes difficult for political action to be fully legitimate by serving only to fixed territorial boundaries and its communities. Therefore, new conditions aiming at taking into consideration the practical and dynamic aspects of

relational spaces, ask for more tailor-made policies and place-based practices. Where the current institutional set-up, fails to explain cooperation going beyond administrative units, 'soft' forms of cooperation make sense to be used in order to explain and analyse these new forms of territorial development (Haxhija, 2018).

While the EU, using the EU Regional Policy as a supporting framework, has been one of the main drivers to trigger the establishment of these new territorial complexes, its political and institutional approach is not parallel to its 'soft' territorial approach. The EU Regional Policy is a clear example of this controversial approach. As stated by Davoudi (2007), the EU Regional Policy contributed to the creation of 'soft' spaces by operating at the NUTS2 level, which in most countries is not part of the statutory system. However, its political and institutional approach does not go hand in hand with its 'soft 'territorial cooperative approach, where strict rules are to be met by local and regional actors in order to receive funding, deflecting in this way the bottom-up planning attitude as an integral part of 'soft' spaces. Suffice to say, that within these new spaces of interaction, governmental actors remain the main entities accountable for the negotiation of agreements and programs (Purkathofer, 2016). Having predefined scales, actors and instruments which influence spatial planning create conflicts and tensions when state-bounded territorial and relational networked governance, are faced.

The same controversial approach of the EU towards 'soft' spaces is spotted in what is known as macro-regional strategies. The EU has been the main driver for the emergence of macro-regions such as the Baltic Sea Region, Danube Region and the likes. These new spaces constitute a new type of planning across Europe were collaborative methods shed light into the importance of widening stakeholder involvement beyond traditional power elites and building new institutional capital by involving social networks (Haxhija, 2018). However, the institutions rules and funding instruments upon which they operate are grounded in old and fixed territorial boundaries. Therefore, these new spaces of network among interested stakeholders, lack decision-making powers for its actors and institutions that emerge as a result of cross-border cooperation.

3.2. CBC along the EU outer borders

Cross-border cooperation along the outer borders of EU, on its turn, has surged and functioned according to a different historical path and different motivations by both EU and partner countries. While CBC within EU encompassed an approach of unity and 'soft' territorial cooperation, its practice across the EU outer borders is surrounded by 'harder' issues as security, exercise of influence and external relations.

CBC, in the context of EU outer borders, played a key role in relations between the Union and its neighbours since the 1990's, through programmes such as TACIS and INTERREG (Wassenberg et al., 2015). TACIS, the Technical Aid to the Commonwealth of Independent States, was a programme established by the EU as a means to support growth of the areas recently independent from Soviet Union and Georgia, focusing on sectors such as energy, food and financials (European Commission, 2018). Such initiative did not focus on cross-border cooperation, but did count with it as one of its dimensions.

Cross-border cooperation gained later a more central role in the INTERREG programmes, who were initially intended to foster a borderless EU, thus focusing on its member states.

However, with the enlargement wave in the 2000's, the programme became more relevant to the outer borders, as a tool to promote cooperation among EU and the candidate states (Liikanen, 2008). INTERREG had, however, its paradoxical role. It became an important tool of connection across EU outer borders enabling, for instance, regional development, infrastructure and environmental projects in the second half of 1990s (Järviö, 2012). However, the essential nature of INTERREG meant it remained an exclusively intra-EU financial tool, therefore its funds could not be applied in neighbour countries (Wesselink & Boschma, 2017). For CBC to be implemented across these borders, a combination of different funding mechanisms was necessary. Such arrangements represented itself a difficulty in the process of developing proper spaces of cooperation across the EU outer borders.

Policy frameworks for cooperation across these borders have developed along time, with the start in 2004 of the European Neighbourhood Policy (ENP). The policy built upon the experience of both TACIS and INTERREG (Khasson, 2013), steering cooperation among EU and its Eastern, North African, Middle Eastern and Caucasus neighbours (EAAS, 2016; Kelley, 2006). Through its instrument (ENPI), the policy set a common framework and funding mechanism for cooperation, which allowed for a maximum 90% of EU contribution.

Such framework, although addressing existing barriers such as funding mechanisms, still comprised of hindering elements in the process of developing spaces of cooperation. As Järviö (2012) clarified, the ENP had a strong external aid dimension that contradicted its own efforts to promote mutual and equal cooperation. Herein, such dimension can be understood as a 'hardness' essence, opposing the proposition of a 'soft' cooperation across borders towards regional development.

The co-existence of both aforementioned aspects also resulted in clashes between EU and neighbours. For instance, the relations between Russia and the EU in the context of the ENP represent an example of the struggles of cross-border cooperation between soft and hard spaces. In 2003, Russia refused to become an EU partner within the ENP framework, as Russia interpreted it as an unbalanced type of arrangement, where the EU had a position of influence over the partner country. A special relationship was created among both actors, around "common spaces" (economic; freedom, security and justice; cooperation in the field of external security; and research, education and culture) (Liikanen, 2008). Russia also introduced 50% contribution of financial allocations becoming the only equal funding partner to the CBC programmes with the EU and, consequently, gaining more influence over those (Järviö, 2011). Disagreements between Russia and EU over regulations and financial agreements have, however, represented a barrier to cross-border cooperation, as evidenced by the delay to the start of the CBC programmes across EU-Russian borders and consequent delay to calls for projects and implementation of the 2007-2013 period (Ibid).

4. Case studies

4.1. The Dutch-German case [1]

The Dutch-German case study (Figure 1) cooperates at a cross-border setting focusing on a common natural linkage and asset such as the Rhine river. It includes the province of Gelderland from the Dutch side and the district of Düsseldorf in Nordrhein-Westfalen.

Both countries work with common supranational European legal and institutional framework when it comes to water and environmental related issues (e.g. Water Framework Directive). Despite this, in reality, cross-border water policy in the area faces noticeable disparities from one side of the border to the other, due to different planning modes, different priorities in their respective territorial agenda and different legal and political conditions. For instance, as mentioned by several interested actors there are different norms and rules when it comes to water quality.

Figure 1 The Dutch-German cross-border region (Haxhija, 2018)

In any case, international (EU) regulations or national involvement in transboundary initiatives (ICPR) are mentioned as tools and policy frameworks used to facilitate cooperation. Therefore, as Haxhija (2018) mentions, international legislation tends to serve as a mechanism to stimulate transboundary governance at a regional level by formally institutionalizing cooperation and putting performance obligations.

[1] The case study draws upon empirical data which have been previously collected and analyzed by Haxhija S. 2018., in ''An institutional and cultural perspective on 'soft' spaces of cooperation: Findings from a transboundary Dutch-German cooperation network.''

As it has been confirmed by both German and Dutch regional bodies during the interviews, cross-border governance in the region is quite complex and not easy to coordinate due to imbalances in policy competencies. When dealing with water management issues the Dutch side has a more concentrated approach with its water boards who are the main responsible bodies at a regional level. Despite the fact that water boards should exist seemingly for all countries as regulated in the WFD, the same cannot be applied to the German side, where water competencies are much more fragmented within different levels. Within such different organizational settings, with the German side sharing competences on water issues among several small organizations, the decision-making process for common issues is prolonged (Haxhija, 2018).

Following this line of thought, there is no direct connection between governmental institutions from both sides. This institutional discrepancy poses a challenge to the cooperation process where both sides of the border have difficulties finding their counterparts to cooperate with.

Other elements challenging the cross-border governance management in the area, are disparities in political commitment across different water governance levels in both sides, where the Dutch side is more agile and willing to push forward the cooperation process. As Haxhija (2018) states ''...the upstream-downstream relationships introduce an element of asymmetry and dependence. The dependence lies mainly on the downstream partners, regional Dutch water authorities, resulting in a more active role in cross-border cooperation on the Dutch side''.

On the other hand, both countries lack the right tools to support cross-border cooperation initiatives. The hierarchical and very formalized institutional structure in the German side seems to be slowing down the cooperation process in the two countries. As stated by interviewees in both countries, the Dutch quick, flexible, heterarchical and informal institutional structure is much more convenient. In any case, the problem that arises here is the fact that there is no common entity with full legitimate power to coordinate the cross-border initiative (Haxhija, 2018). Cooperative networks from both sides of the border try to explore and benefit from additional venues which can foster the process. At a regional level, Euregio Rhine-Waal is the only common entity which supports cross-border cooperation in the area. CBCs established in this area benefit from the history that the Euregio has in cross-border trust building and network. Additionally, in a transboundary context, international arrangements can produce common norms and values by encouraging the integration of the interests of the involved countries (Wiering et al., 2010). However, despite the fact that it works as a catalyst to attract CBC initiatives, it is not equipped with enough decision-making powers and its legal framework cannot prevail over those of each respective country.

All in all, the entire cross-border area communicates due to functional linkages such as ecological, social and economic ones. It can be interpreted as a soft space, which at the moment lacks the right formalized tools to legitimate its decisions. However, its constant progress throughout time shows that there are possibilities to 'harden' the institutions and policy strategies which foster the cooperation initiatives in the area.

4.2. The Finnish-Russian case[2]

The present case study approaches the CBC Karelia programme, across the Finnish-Russian borders, analysing more specifically the cooperation project "Saving our joint treasure: sustainable trout fisheries for the transborder Oulanka river system".

The Karelia CBC programme area include the regions of Oulu, North Karelia and Kainuu in Finland, and the Republic of Karelia in Russia (Figure 2). With three crossing points, the 700 km long border counts with 1.3 million inhabitants in low dense, sparsely populated areas (DG NEAR, 2018). Cooperation in the region is ongoing since the first EU programmes of TACIS and INTERREG, and continues today under the ENPI framework.

Figure 2 The Karelia CBC programme region (Carius de Barros, 2018)

The project herein analysed, "Saving our joint treasure", consisted in the pursuit of a joint management system of brown trout fish stock (Salmo trutta), which inhabit the Oulanka river system across these borders. The species, during its life-cycle, navigates across different parts of the ecosystem within the Finnish Oulanka Natural Park and the Russian Paanajärvi National Park (CBC PROJECTS, 2018a; Metsähallitus, n.d.) (figure 2). In itself, the essence of such project is to address an environmental issue that, as typical of such challenges, is not bound by politico-administrative borders. Therefore, the sustainability of such fish stock depends upon cooperation between actors on both sides of the borders.

[2] The case study draws upon empirical data previously collected and analyzed by Carius de Barros, 2018, in 'The Karelia Cross-border Cooperation Programme: A soft space on the Finnish-Russian hard borders.''

Figure 3 'Saving our joint treasure' project - partners and location (Carius de Barros, 2018)

Taking place between January 2013 and December 2014, activities such as the scientific monitoring of the fish population, studies on socio-economic impact for local fisherman, as well as an awareness campaign on the value of the brown trout stock for the community were elements of the project (CBC PROJECTS, 2018a; EUROPARC Federation, 2018). Participants of the project were Metsähallitus, a Finnish state-owned company managing the country's natural parks; the University of Oulu; the Finnish Game and Fisheries Research Institute (currently Natural Resources Institute of Finland), and the Northern Fisheries Research Institute in Petrozavodsk, Russia (KEEP, 2015a). Other partners were the Paanajärvi National Park; the Municipality of Kuusamo in Finland; and several association bodies representing private owners of water areas along the Oulanka river system in Finland (EUROPARC Federation, 2018).

The motivation of such project is mostly based on an environmental challenge, the sustainability of a joint fish stock management. As Carius de Barros (2018, p.37) finds, the shared resource and shared need to guarantee its survival transforms it into a "transboundary matter which, to be effectively handled, must be negotiated across the distinct formal structures of each country".

Nevertheless, the challenges faced by the project were mostly related to the political and administrative barriers posed by the different spheres across the borders. As the project materials mention as a challenge, activities took place "in a time when high level political relationships between the EU (with Finland as a member) and the Russian Federation were quite challenging" (EUROPARC Federation, 2018). An example is the long delay to the

beginning of the programme start, due to disagreements in high-level between Moscow and the EU over the approval of the ENP CBC framework (Carius de Barros, 2018).

Challenges faced related not only due to the shaking relations between EU, Finland and Russia, but also the different regulatory and administrative demands and cultures (Carius de Barros, 2018). For instance, different standards are applied by Finland and Russia in terms of fishing regulation, which makes it difficult to guarantee the sustainability of such fish stock for all regions involved, which is even more detrimental to the Finnish local economy and biodiversity (Ibid). Furthermore, Visa issues hindering the movement of partners across borders, as well as customs barriers to the transfer of equipment were among the challenges the project faced in order to achieve success (Ibid).

Such challenges were faced by actors in several levels of both project and programme and tackled through mechanisms such as negotiation, knowledge exchange and support that characterize a soft approach to overcome the barriers of the outer EU borders context.

At a higher level, for instance, informal negotiations by interested actors, outside the formal discussion tables were essential to bring about the programme itself. According to Carius de Barros (2018, p.41) findings, the approval of the ENPI CBC programmes required an alternative approach by the Finnish Ministry, “a slight of hand”, which appears to involve an informal diplomatic influence over the process, since the agreement itself did not comply entirely with Russian legislation. At the project level, similar processes took place aiming to overcome the hard borders and its typical barriers, for instance, with exchange of information and support between institutions in the pursuit of visas and permits (Ibid). The centralization of power common in the Russian Federation was also a point of struggle for the Russian and Finnish actors alike, who pursued to maintain a strong partnership to compensate for possible complications coming from higher levels.

A bottom-up approach towards developing a space for cooperation is clear, where local stakeholders count on each other to achieve solutions; programme level actors pursue to influence the Finnish-Russian decision making and negotiation; and where Finnish national level actors pursue to influence supranational levels as an intermediate between EU and Russia (Carius de Barros, 2018).

The project has managed to develop a successful study into the dynamics and challenges in the life-cycle of the trout population as it aimed, as well as strategies of management, generating also the proposal of another project in the fisheries field gathering old and new stakeholders (Carius de Barros, 2018). In this sense, the project can be considered to have developed a consistent soft space where actors are continuously pursuing further development through partnerships and the overcoming of shared challenges.

It is in this context that the Karelia CBC programme can be interpreted as a soft space in construction. Stakeholders, public and private, aim to tackle issues of shared interest. While the cooperation is made possible by the ‘hard’ spaces of policy frameworks, such as the ENP, financial mechanisms, high-level agreements between national and supranational levels, these do also lead to hindering processes. Both programme and project level stakeholders constantly engage in semi and informal negotiation and exchange in order to breach the gap left between administrative spheres and promote development.

5. Conclusions

Both case studies, the Finnish-Russian and Dutch-German borders, reveal a type of soft space motivated by the overcoming of shared environmental challenges.

The Karelia study case shows how the 'hard' spaces promoted by EU frameworks, in this case, the ENP, enable cooperation in the sense it provides a common space, institutional parameters and funding mechanisms that allow for the functioning of formal procedures. Nevertheless, at the same time, such 'hardness' often represent a barrier in itself to the activities of cooperation, resulting in the need for stakeholders to work across such barriers and overcome the very frameworks set in the first place. Soft and hard spaces are thus in constant interconnection, where the latter both reinforces and hinders the former.

The Dutch-German case study is based on flexible and spontaneous networks who come together to solve a joint ecological issue. It is true that within such a flexible cooperation network, actors can easily identify relevant issues and partners to work with, as they are driven by common interests. However, working together in such a 'soft' context of planning their cooperation process is hindered by the lack of common norms, rules, procedures and policy frameworks. At the same time, hierarchical forms of policy-making pose a barrier when cooperating in a cross-border context. This relates back to theories of 'soft' spaces, where hierarchical forms of governing cross border regions are seen as less efficient.

In Karelia the creation of a soft space for cooperation is achieved through informal and semi-formal negotiation mechanisms, support and knowledge exchange among stakeholders.

Carius de Barros (2018) concludes, the Karelia CBC programme "can be understood as the enabler of communication between different levels and interests, as well as a regionalization of decision-making".

6. References

Allmendinger, Phil; Haughton, Graham (2009) "Soft spaces, fuzzy boundaries, and metagovernance: the new spatial planning in the Thames Gateway." Environment and Planning A 41.3, 617-633.

Allmendinger, Phil, et al., eds. (2015) Soft spaces in Europe: Re-negotiating governance, boundaries and borders. Routledge.

Carius de Barros, Karina (2018). The Karelia cross-border cooperation programme. A soft space on the Finnish-Russian hard border.

CBC PROJECTS (2018a). Saving our joint treasure: sustainable trout fisheries for the transborder Oulanka river system (KA531). Available at: http://www.cbcprojects.eu/en/projects/707 [Accessed on May 30 2018]

Chilla, Tobias, et al. (2017) "ESPON ACTAREA: Thinking and planning in areas of territorial cooperation Implementation of the Swiss Spatial Strategy and Atlas of Swiss Action Areas."

Davoudi, Simin (2007) "Territorial cohesion, the European social model, and spatial policy research." Territorial cohesion and the European model of society, 81-103.

DG NEAR (2018). Ex-post Evaluation of 2007-2013 ENPI CBC Programmes. Final Report. Available at: https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/ex_post_evaluation_of_2007-2013_enpi_cbc_programmes_report.pdf [Accessed on 01 May 2018]

EEAS (2016). European Neighbourhood Policy. Available at: https://eeas.europa.eu/headquarters/headquarters-homepage/330/european-neighbourhood-policy-enp_en [Accessed on Jun 11 2018]

EUROPARC Federation (2018). Case Study - Saving our joint treasure: sustainable trout fisheries for the transborder Oulanka river system. Available at: http://www.europarc.org/case-studies/saving-joint-treasure-sustainable-trout-fisheries-transborder-oulanka-river-system/ [Accessed on May 30 2018]

European Commision (2018). TACIS. Press Release Database. Available at:http://europa.eu/rapid/press-release_MEMO-92-54_en.htm [Accessed on 13 April 2018]

Haxhija, Sindi (2018). An institutional and cultural perspective on 'soft' spaces of cooperation: Findings from a transboundary Dutch-German cooperation network.

KEEP (2015a). Project – Saving our joint treasure: sustainable trout fisheries for the transborder Oulanka River system. Available at: https://www.keep.eu/keep/project-ext/40897 [Accessed on May 30 2018]

Khasson, Viktoriya (2013) "Cross-border cooperation over the Eastern EU border: between assistance and partnership under the European Neighbourhood and Partnership Instrument." East European Politics 29.3, 328-343.

Liikanen, Ilkka (2008) "New neighbourhood and cross-border region-building: Identity politics of CBC on the Finnish-Russian border." Journal of Borderlands Studies 23.3, 19-38.

Metsähallitus (n.d.). Oulangan Villtaimen - Yhteinen Aarteemme (Oulanka Wild Trout -our joint treasure). Available at: https://julkaisut.metsa.fi/assets/pdf/lp/Esitteet/oulanganvillitaimenfin.pdf [Accessed on May 28 2018]

Metzger, Jonathan; Schmitt, Peter (2012) "When soft spaces harden: the EU strategy for the Baltic Sea Region." Environment and Planning A 44.2, 263-280.

Othengrafen, Frank et al. (2015). Conclusion - what difference do soft spaces? In Soft spaces in Europe: Re-negotiating governance, boundaries and borders (Eds.) Allmendinger, P., Haughton, G., Knieling, J., & Othengrafen, F; Vol. 85. Routledge

Purkarthofer, Eva (2016) “When soft planning and hard planning meet: Conceptualising the encounter of European, national and sub-national planning”. European Journal of Spatial Development, 61, 1-20.

Telle, Stefan (2017) "Euroregions as Soft Spaces: Between Consolidation and Transformation." European Spatial Research and Policy 24.2, 93-110.

Wassenberg, Birte, et al. (2015) Territorial cooperation in Europe: A historical perspective. Publications Office of the European Union.

Wesselink, Edzard; Boschma, Ron (2017) "European neighbourhood policy: history, structure, and implemented policy measures." Tijdschrift voor economische en sociale geografie 108.1, 4-20.

Wiering, M., Verwijmeren, J., Lulofs, K. and Feld, C., 2010. Experiences in regional cross border co-operation in river management. Comparing three cases at the Dutch–German Border. *Water resources management*, *24*(11), pp.2647-2672.

Case Study / Project

Fostering Local Leadership for Climate Resilience in Asian Cities

Olga CHEPELIANSKAIA

Abstract

Asia has been rapidly urbanising: half of the region's population now lives in cities and additional 1,2 billion Asians will move to cities by 2050. This unprecedented urbanisation that often takes place at the expense natural ecosystems, which further exacerbates climate risks in Asian cities, making the urban poor most affected. For example, Bangalore and Chennai respectively lost 80% and 90% of their water bodies in the last 4 decades. As a result, Bangalore regularly faces severe floods since 2000 and the massive 2015 flood in Chennai caused an estimated damage of USD 2.2 billion. Both cities are expected to run out of ground water by 2020. In Manila, heavy floods of 2012 were aggravated by the lack of trees and open soil to absorb torrential rainfall water. These example demonstrate that development encroachments over green and blue areas significantly alter cities' natural coping ecosystems and enhances climate risks. Ecosystem based climate resilience has been globally recognised as viable, cost-effective and generating multiple co-benefits for cities. It requires adopting and implementing ecosystem protective and regenerating urban planning and land use regulations. This requirement, in turn, needs transparent and supportive local governance and leadership, which remains a critical challenge in Asia. Root causes of this challenge are numerous: - Limited capacity and expertise in the field of climate change at municipal levels leads to uninformed decision-making; - Short electoral cycles do not incentivize decision-makers to look into long-term interventions. Land use regulations protecting natural ecosystems are seen as less tangible actions compared to engineering solutions such as installing pumping stations in low lying areas or constructing embankments; - Owing to vested interests, personal goals influence approvals of construction proposals that often compromise on a city's green and blue spaces. Relatively weak checks and balances systems reinforce the matter; - Due to weak citizen awareness and engagement, real estate investors and big businesses tend to actively advocate for their interests, which are often not favourable to shared public ecosystems. International programs rarely target these root causes and, consequently, do not achieve meaningful and durable change.

The paper looks at potential solutions to overcome these challenges and foster local leadership for ecosystem based climate resilience. It screens selected case studies that demonstrate how local leadership for ecosystem based climate resilience not only transformed the city but also boosted the career of the leader and led to up-scaling the example. Indeed, recent international steps such as the Agenda 2030, the Paris Agreement or the New Urban Agenda create valuable opportunities for climate sensitive local leaders to fully display their leadership potential and receive adequate recognition. For example, Surabaya Mayor Tri Rismaharini, successfully transformed one of the most neglected Indonesian cities - Surabaya - to a floodless city known for its parks and public initiatives by converting 20% of the territory into green areas.

As a result, she has been re-elected three times and won several international environmental awards. Surabaya is but one of many successful stories of a successful local leadership in an Asia city, which other cities can learn from. Finally, the presentation examines ways of boosting local leadership for ecosystem based climate resilience in Asia and contributions the international development community, national governments, civil society and the media can bring to the matter. Case studies and considerations shared are a combined result of an on-going research and a field international technical assistance work in over 20 Asian cities and 40 Asian countries, conducted in the frame of projects implemented for international institutions such as the ADB, CDIA, UNECE, UNEP, UN ESCAP or UNDP.

Case Study / Project

Role of planning and governance to better manage European metropolitan areas

SPIMA research

Alfredo CORBALAN

Abstract

SPIMA stands for Spatial Dynamics and Strategic Planning in Metropolitan Areas. It is a research project initiated by 10 cities from EUROCITIES Working Group on Metropolitan Areas (Brussels, Oslo, Vienna, Prague, Brno, Lyon, Lille, Torino, Zurich and Terrassa) and financed by the European Union (ESPON programme). The research has been conducted between 2017 and 2018 by 3 European research centres: University of Wageningen (Netherlands), Metropolitan Research Institute (Hungary) and Norwegian Institute for Urban Research (Norway).

Background EUROCITIES is the network representing major European cities. Chaired by Brussels, its Working Group on Metropolitan Areas gathers several cities willing to exchange and advocate on metropolitan issues. In 2013, the Working Group conducted the "MAIA study" to review metropolitan collaboration and governance in 38 European cities. The study pointed out that spatial planning is one of the three main topics of cooperation in metropolitan areas across Europe but that planning and urban governance practices vary by country and have different impacts in different contexts. In 2017, the Working Group initiated the SPIMA study to go a step further and get recommendations on how to improve their metropolitan planning and governance practices.

Key policy question

With the continuous urban sprawl in Europe and the increased linkages between core urban centres and their suburban areas, cities need to cooperate with others authorities to manage together the main spatial dynamics going beyond their administrative borders. But the current planning and governance schemes seem not appropriate to address these complex challenges at the appropriate functional scale. With SPIMA, the ten cities wanted to get an answer to the following policy question: Which spatial planning policy tools and governance approaches can be useful to plan and manage spatial development at metropolitan level, taking into account the institutional and spatial context of each metropolitan area?

Methodology Approach based on the 10 cities case study and methodology composed of:

- data collections, interviews and analysis of the 10 metropolitan areas.

- Individual assessment of each 10 metropolitan areas and comparative analysis

- Individual, national and European recommendations and guidelines.

Main findings 7 common findings in the 10 metropolitan areas studied:

1. No single definition for the delineation of a Metropolitan area. The research proposes an alternative approach: the 'Metropolitan Development Area' (MDA)

2. Three key planning approaches: strategic, statutory and collaborative. Strategic and statutory planning in the 10 metropolitan areas address metropolitan scale 'to a limited extent'

3. Most common spatial dynamics in the 10 metropolitan areas: urban growth, suburbanization in periphery and densification in the centre

4. Institutional frameworks for cooperation: plurality of arrangements from formal to semi-formal or informal. However, the type of legal status is not itself a determining factor for an effective metropolitan planning.

5. Key challenges to manage spatial development in the 10 metropolitan areas: transport and traffic congestion, multilevel cooperation, shared vision on strategic plans and more political involvement

6. Key success factors to implement a metropolitan planning approach: shared governance and mix of tools allowing dynamic interactions between actors and policies.

7. Attempt to build 2 typologies of Metropolitan areas: one based on spatial characteristics (population and density) ; another on Institutional characteristics (status of metropolitan area and number of municipalities)

Guidelines for metropolitan planning approach

To implement a metropolitan planning approach, SPIMA recommends European cities to address 8 action areas:

1. Defining the spatial scale of the Metropolitan Area

2. Involving the relevant actors

3. Identifying the key challenges

4. Establishing governance process and institutional structures

5. Building administrative and knowledge base capacity

6. Assessing spatial dynamics

7. Defining formalization status of Metropolitan area

8. Ensuring success factors, triggers and incentives

Paper

BEYOND THE PLAN

Building In-House Capacity to Plan, Design and Implement Urban and Territorial Transformations, Case of 'Castries Vision 2030'

Frank D'HONDT, Director Territorial Capital Institute, Greece
Haward WELLS – Director National Integrated Planning and Programme Unit, Saint Lucia

Abstract

This paper showcases the importance of 'in-house' planning and 'rapid planning' to reverse 'planning inertia', steward new leadership as well as to boost local planning capacities to address planning challenges in a strategic and actionable way and to overcoming the deficiencies of the traditional static blueprint 'master-planning'.

Keywords

In-house Planning, Capacity-development, Rapid Planning, Community Visioning

1. Introduction

We start on the premise that 'in-house' drafting of urban policy and planning within a short span of time (months, rather than years) is to be preferred over the conventional wholesale outsourcing to private consultancy, especially for small-island states like Saint Lucia, situated in the Southern Caribbean region. It relates to anecdotal evidence that 80% of the knowledge of a city (or any other territory for the matter) is born by its residing communities, with external advisers or consultants only needed to unlock, broaden, deepen and process that community-based knowledge into a visionary and actionable plan. There is not much theory to backup this premise, but we will share what we found and what we find useful as planning practitioners. We are indeed aware of the need for mutual benefit between the theory and praxis of planning, despite the very contextual character of urban and territorial planning. This in-house/rapid planning approach was recently tested in Castries, Saint Lucia's capital city; thanks to all the stakeholders and individuals who voluntarily contributed to a new people-centred Shared Vision for Castries. The visioning exercise was executed within a compressed timeline of only 4 months and a very constraint budget-frame.

The authors of this article were both highly involved in the drafting of the Castries Vision 2030, in their respective roles as external adviser and domestic chair of the planning team. This paper is also their testament form the practitioners' experience with in-house and rapid planning as means to address the pressing challenges related to depopulation of the core-city, informal housing, urban crime, environmental degradation, traffic congestion and last but not least imminent, the eminent threats triggered by climate change. While the content and output of the plan is worth sharing, the emphasis in this contribution will be on the planning process and concerns related to insufficient and ineffective planning capacities necessary to ensure a stepwise implementation of a Shared Vision that will prepare Castries for its Golden Jubilee as the capital of independent Saint Lucia, in 2029.

2. Castries as a typical Caribbean capital city

With 60,000 inhabitants within the city-region, 20,000 in the core-city and only around 4,000 residents left in the original downtown grid-city, Castries is small in numbers, yet by far the largest city on the island – see Figures 1a/b/c.

Figure 1a: Saint Lucia Urban Structure

Figure 1b: Castries planning area

Less than 10km to the north of Castries is the fisherman's town of Gros-Islet, famous for its weekly street-party every Friday. That village, which was highly frequented by Saint Lucian Nobel laureate Derek Walcott, is well-known for its postcard image of Pigeon island. With the passage of time, Gros Islet was gradually developed by the construction of extensive luxury housing and vast tourism estates. An area comprising a large new marina and a shopping mall was eventually built between Gros-Islet and Castries. That area known as Rodney Bay, developed into the most popular tourism settlement within the north of the island, albeit without a clear urban plan. It resulted not only in undermining the economic basis and residential attractiveness of the nearby capital Castries, but also generated a car-dependent traffic volume which hurts the economy, environment and the well-being of the people, especially those within the core-city of Castries where the streets are choked with cars and mini-buses on a daily basis– see Figures 2a/b.

Figure 2a: Mini-buses stationed most of the day in the downtown area, often idling to keep them cool

Figure 2b: Mini-buses encroaching the city-park

These are just some of the reasons why Castries is in fact decaying. Climate change also adds a whole new level of threat, with Castries at risk of devastating floods from both tropical river streams, a rising sea as well as more frequent and severe hurricanes with storm surges up to four (4) meters -see Figure 3.

Figure 3: Flood risks for Castries City-region. Left: river flooding risk; Right: sea flooding risks 1m & 4m (storm surge)[i]

At the more human scale, residents and visitors of Castries complain that the city is no longer attractive to live, study, shop or just stroll around. The wharf that once harboured banana ships is now mainly a container and imported car terminal which in turn generates a lot of traffic and pollution, while the adjacent cruise-ship harbour receives thousands of tourists on a daily basis during the peak cruise season, yet those visitors hardly spend any money off the ship nor in the city, while infrastructural costs and air pollution are disproportionally high in Castries-see Figure 4.

Figure 4: Cargo-port (right) and Cruise-berths[ii]

Yet, Castries remains a dormant beauty blessed by a unique natural harbour and hemmed in by tropical green hills, with ready access to some fine beaches -see Figure 5.

Figure 5a: Castries natural harbour surrounded by hills and beaches[iii]

Despite significant loss of cultural and architectural heritage due to reckless modernization, Castries will always remain the home of Saint Lucia's two Nobel laureates, author Honourable Derek Walcott and economist Sir Arthur Lewis, as well as the home of some typical Caribbean architecture – see Figures 6a/b.

Figure 6a: Restored Derek Walcott house[iv]

Figure 6b: Brazil street in downtown Castries[v]

3. The need for a new vision

The problems are not new, but they have only worsened since the Government of Saint Lucia (GoSL) endorsed the very first National Vision Plan (NVP) for the island, since independence in 1979. The National Vision Plan was an ambitious and costly project which took several years of preparation and was entirely outsourced, albeit with involvement of some domestic architects and planners (there are very few qualified urban planners and designers in St Lucia). The coffee-table book in landscape A3-format, with great photos, graphics and maps, was ready by 2008 and finally approved by the government in 2009 – see Figure 7a/b.

Figure 7a: Cover of National Vision Plan 2008

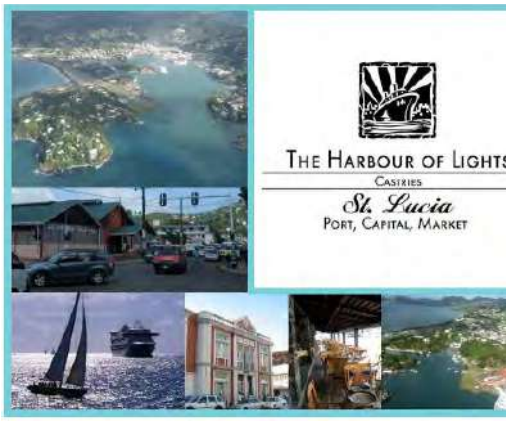


Figure 7b: Branding proposal Castries

The Vision was conceived through the lens of a Miami based consultancy, specialized in tourism and place-marketing. The Plan aimed at boosting Saint Lucia's attractiveness to foreign tourists and tourism related investments whilst maximising the regional share of the growing cruise tourism-market. However, the financial earthquake that devastated Wall Street in 2008, followed by a worldwide financial tsunami, undermined the optimism and appetite to invest in Saint Lucia's Plan and the accompanying bold vision to boost the island's capital city. A lack of political stewardship and professional capacity to readapt the plan and focus public investments towards the same eventually buried the 2008 NVP under a thick layer of dust. Meanwhile the negative trends only got worse and Castries made it onto a chart with Caribbean cruise-ports to avoid; rife of crime and nothing really to see (unless you decide to pay a lot to be driven or sailed to more picturesque places on the island, such as the sulphur springs or majestic Pitons in Soufriere.)

In 2018, 10 years after the conception of the NVP, Prime-minister Alan Chastanet, a well-respected multi-hotel owner and former tourism minister (during the creation of the NVP), decided that it was time to dust off the old vision. Instead of tasking the spatial planning ministry with the review, he endowed the review of the Castries chapter of the NVP to his ministry of Finance, stewarded by the Permanent Secretary of the Department of Finance. - This proved to have been a thoughtful initiative as all ministries have some level of direct dependence or at least a working relationship with the Department of Finance. Stewardship by the - Ministry of Physical Planning would have likely been perceived as 'sectorial' and more detached from the economy and overall national finance/budget cycle. This particular component will be subsequently revisited later on in this paper.

The United Nations Office for Project Services (UNOPS), the UN's building agency which was already operating in Saint Lucia where they assisted with the construction of a segment of a new hospital as well as other critical infrastructures, developed a proposal to help an in-house review of the 2008 plan. The proposal including the designing and setting up a new institutional mechanism to plan and implement the updated plan. However, only the review portion of that proposal was approved, while it was agreed that the implementation mechanism would form part of a follow up stage . Meanwhile UNOPS was also tasked to help with the establishment of a new National Integrated Planning and Programme Unit / NIPP Unit (within the Finance Department), of which co-author Haward Wells was appointed as the director.

4. The planning approach

Principal author Frank D'hondt was contracted as leading planning expert, later complemented by Washington-based urban planner Adriana Navarro Sertich and backed up by the local UNOPS-team led by Christopher Roberts and Fabian Felix. Haward Wells originally worked as an architect at the planning department, it was therefore a logical choice that he was also appointed as chairman of the Castries Planning Team which composed of representatives from relevant ministerial departments. This five (5)member strong core-team was the engine of the planning project and was guided and supported by the Ms Cointha Thomas Permanent Secretary (PS) of the Department of Finance who chaired the Steering Committee (SC) and principal liaison officer to the Prime-minister (PM) on the Visioning exercise – see Figures 8a/b.

Figure 8a: Planning-team meeting in Planning-room

Figure 8b: Discussion with the Prime-minster (standing)

While staffing and resources were being finalized for the abovementioned structures, the lead-expert of the team had already undertaken a preliminary review of the NVP 2008 and drafted a first review note which in summary dismissed the old vision as a document which did not pass- the test of sustainable development as defined by the SDGs, the Climate Accord and the New Urban Agenda. Therefore, with the consent of the Steering Committee, this initial review resulted in a courageous decision to develop a more sustainable and shared vision that would replace, rather than dust off the old 2008 vision for Castries. This illustrates the importance of using the current body of planning knowledge to quickly but critically assess existing policies and plans before simply updating them. It is also important

to stress the fundamental difference between developing a shared vision and a masterplan, which we will further elaborate at the end.

With the project timeline fixed from the inception of the exercise delivery of the final document was scheduled for three months after the start of work. With very limited financial and human resources at hand, an ambitious yet realistic planning approach was required for a success realisation of this exercise. A first critical step was to secure a fixed location (a situation room) where the planning team met and worked, put up maps, created and put up "to-do lists" and invited stakeholders for interactive talks. The space was also the venue for several focus group meetings. It was also at this very same location that two months into the planning works, a critical five-hour long, hands-on meeting, took place between the core team, the Permanent Secretary of the Department of Finance and the Prime Minister of Saint Lucia – see Figure 8b. This proved to have been critical for the ultimate delivery of a final draft-Vision which was eventually endorsed by the country's cabinet of ministers. This indicated the importance of;

i) a dedicated planning room;

ii) an open engagement with the political leadership needed to steward the implementation of the vision.

The second critical step in the planning process was to properly staff and capacitate both the extended Planning Team and the Steering Committee, as the principal authors of the new vision. While the entire operation was initiated and stewarded by the island-government, it was essential to seek and obtain commitment and active involvement by the Mayor's Office. A Mayor is not a very powerful position in Saint Lucia but luckily this Mayor, Mr. Peterson Francis wants to expand the role of the City Council in the redevelopment of the city, thus making him a potentially strong partner for the Prime-Minister as it regards the redevelopment of Castries, and if possible, making him the public face to promote and pursue the Shared Vision.

The third step was to have identified all essential stakeholders and the organization of focus group meetings round clusters of topics that were related to the redevelopment of Castries. In a relatively short space of time, five focus group meetings were held in the 'situation room', followed by a plenary gathering of all focus groups (at an executive level), which was dubbed the first Castries Urban Forum. Thanks to the relentless efforts of the planning team and the addition of new staff to the NIPP unit, the Forum was able to whites the successfully gathering of approximately seventy key stakeholders which included the port authority, Saint Lucia chamber of commerce, vendors association representative, the Saint Lucia National Trust, etc.– see Figure 9.

Figure 9: First Castries Urban Forum

The CUF was co-chaired by the Finance Ministry and the Mayor's Office. The CUF successfully adopted a joint declaration which was prepared by the planning team; – to advocate a people-centred and participatory Shared Vision that is more bottom up than top down. Whilst the time-frame and resources did not all allow for a full-scale participatory planning process with ample access to all residents of Castries and beyond, the CUF at least provided the basis for a multi-stakeholder visioning process. At the CUF, after a briefing, all stakeholders at the gathering engaged in cross-sectoral discussions that elaborated their ideas for a better Castries, based on collective memory-mapping and basic joint-fact finding ;a visioning technique that's well tested all over the world (see e.g. UN-HABITAT, 2012).

Once a draft-report was consolidated, the CUF was reconvened to take stock of the Vision and to have reflected on the -outcome document.

The overall approach to planning was based on the 'Theory of Change' and 'Result Based Management' methodologies. In that sense the Vision is part of a broader strategy to gradually step up the knowledge, instruments, capacities and resources for a participatory strategic planning approach that will result in direct outputs (the Vision report), outcomes (transformational projects implemented) and impacts (a more sustainable land-use and mobility).

As was previously mentioned, an initial expert-review was presented to the Steering Committee, which spurred the final decision to refocus on a new vision rather than having to dust off the old vision. This initial review gradually developed into a more comprehensive review of the NVP, which was in turn informed by the enveloping vision. The final review report was presented as an annex to the new vision, with the request to overwrite the old vision -with the new vision, except for the planning components that were considered as complementary to and compliant with the new vision. Figure 11 is a graphic illustration of what was rejected from the old vision and components that were re-endorsed in that vision.

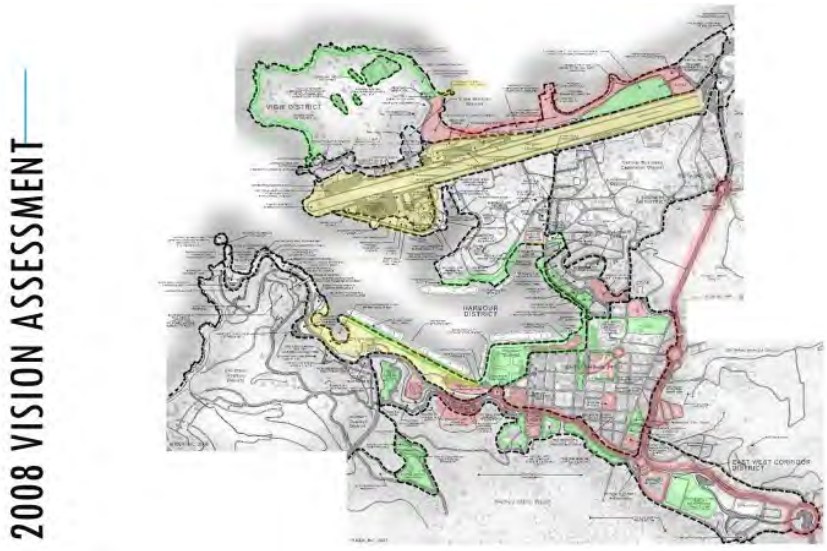


Figure 11: Colour coded review of the Castries spatial outline 2008 (denounced interventions are red-coloured)

From the inception, a draft-content structure of the final report was presented to and approved by the SC as the general guide for the compressed planning works which was to be delivered within that three month period. The initial idea to produce a magazine-styled report did not materialize, however, the final report largely followed the initial content-structure. This assured that the writing-process maintained traction and remained focused. Figure 12 shows the cover of the report which illustrates a more people-centred approach by framing cycling youth around the Derek Walcott square, in downtown Castries.

Lacking the resources for proper imagery, a passionate staff member from the Department of Finance captured drone images of the core-city with his personal equipment, in addition to photos and video's at ground level. Video-recordings were also done of all-important meetings including the presentations of the draft-vision document. This type of material will prove its value in follow up stages of the vision.

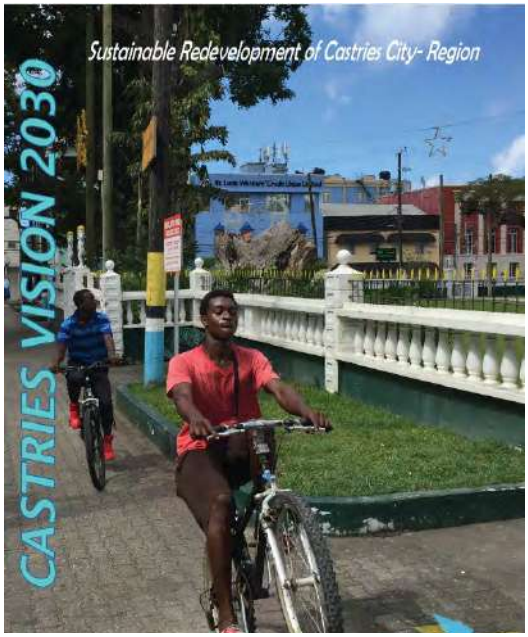


Figure 12: Cover of Castries Vision 2030 report

Finally, a cabinet-note was drafted as per official protocol reflecting the Cabinet of Ministers' wise cabinet-decision to have endorsed the new Castries Vision 2030. The note also included instructions regarding the next steps, as well as some critical conditions beyond the vision plan, such as the need to reform the current planning system, the need for new planning and financial instruments and the need for capacity building as well as institutional innovation.

5. The planning content

The planning report follows a classic sequence of 'past-present-future'. After establishing the planning approach and having introduced the SDGs and NUA as guiding policy frameworks, a chapter was dedicated to the rich history of Castries as a natural harbour, colonized by the French and the British and consequently resulted in a French grid-city surrounded by British military fortresses. This chapter also included the outcomes of the collective memory mapping of all stakeholders involved in the visioning exercise, with a collection of their shared places and the events that constituted their sense of place in Castries and its surroundings. Prominent and mostly elderly people were quoted from their opinions on what should be preserved or restored. There was lots of strong emphasis placed on the lost common and public spaces such as the river, the beaches, the parks and the squares.

The present situation of Castries City-region was captured in a long chapter which attempted to identify some baseline-indicators for what needed to be changed or improved within the new vision document. Given the fact that data were not readily available and that time was limited, planning team members were tasked with the collection of all existing data which was also complemented by the use of relevant expert-analysis. This was essential for evidence-based planning as well as for future monitoring and evaluation purposes. Overall, this chapter on the State of Castries City-region provided convincing arguments necessary for a radical change of gears and the advocacy of 'business as unusual'. At the end of this chapter, a combined SWOT-analysis was presented based on the inputs of the different Focus Groups which was the basis for the definition of three SWOT-strategies which can be interpreted as the following planning or development scenarios;

i) the risky 'offensive strategy'- to bet on tourism as the engine of redevelopment, versus the 'defensive strategy' - to focus all energies on climate resilience;

ii) an in-between 'transformational strategy' -to focus on urban renewal and a more liveable city for its residents

– see Figure 15. These scenarios proved to have been very helpful in the justification of a series of proposed interventions aimed at the implementation of the Shared Vision.

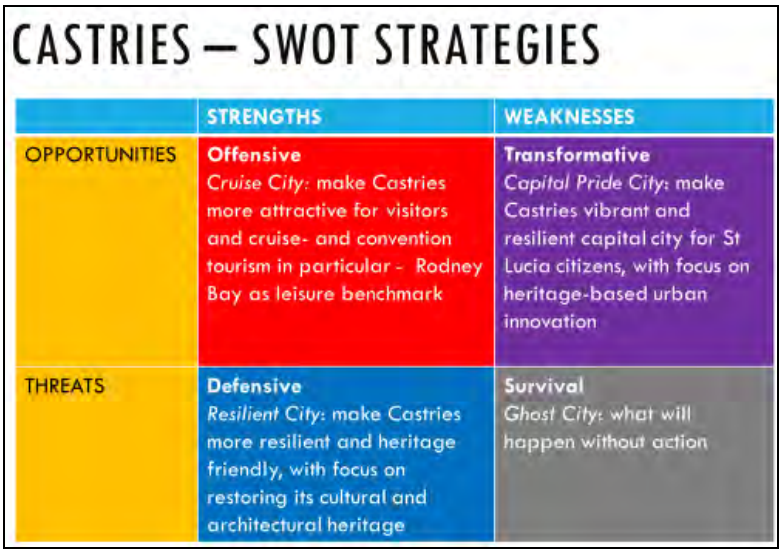


Figure 15: SWOT-Strategies/Vision-Scenario's for Castries 2030

This Shared Vision has been outlined in the next chapter, and it was based on the vision statements t resulting from the Focus Groups and the Castries Urban Forum. An integrated vision statement was derived from ten thematic vision statements. That new statement aligned with the SDGs, the Climate Accord, the NUA and the International Guidelines on Urban and Territorial Planning (IG-UTP) (UN-HABITAT, 2018 & 2018) – see Figures 16a/b.

Figure 16a: Thematic Vision Statements

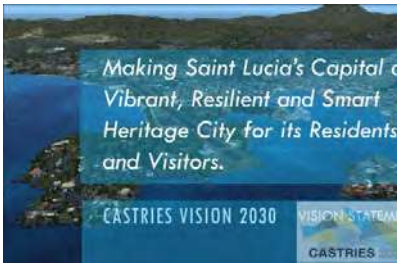


Figure 16b: Integrated Vision Statement

The Shared Vision also included schematic spatial outlines of both the City-region and its Core-city, which was further detailed in the next chapter entitled 'Area-based development'.

Nine strategic focus areas were selected and detailed in terms of development perspectives and desirable spatial interventions – see Figure 17a. This provided a roadmap for a stepwise implementation of the Shared Vision along with ten Transformational Projects, including the necessary regional and international benchmarks for compliance – see Figure 17b.

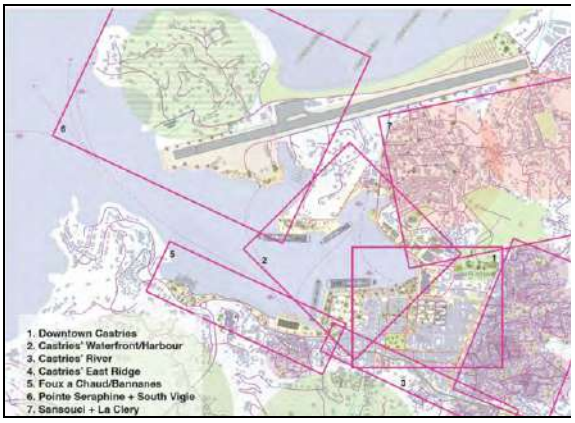


Figure 17a: Area-based development outline and focus-areas

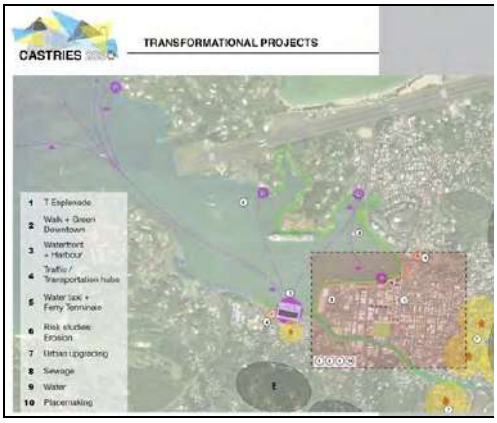


Figure 17b: Overview of Transformational Projects

A final chapter was dedicated to the implementation process of the Shared Vision and it is important to note that this was a glaring omission in the 2008 Vision document. This implementation process includes seven critical parameters necessary for the successful implementation of the vision. Also included was the design, establishment and management

of a specific implementation mechanism such as a Castries Development Agency – see Figure 18.

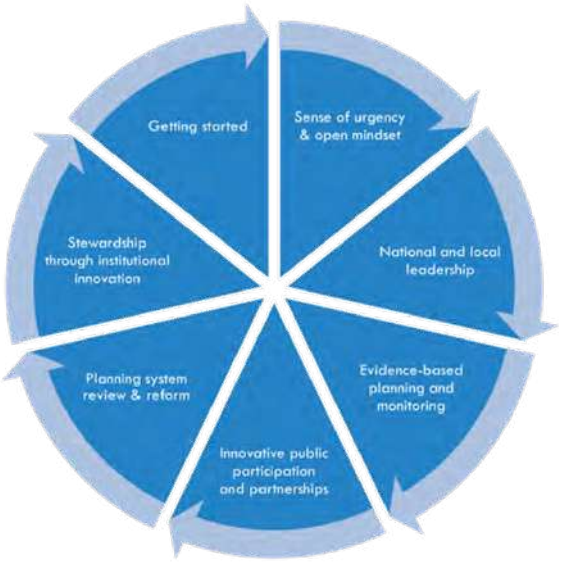


Figure 18: Critical conditions to implement the Castries Vision 2030

6. The executive decision

The draft-report was presented to the entire Cabinet of Ministers by the leading urban expert, backed by other members of the core-team. Whilst the Prime Minister was initially sceptical about the Vision during previous meetings, on this instance, he was instrumental in selling the contents of the vision to other sceptical members of his cabinet. The previously mentioned five-hour long meeting with the island's leader, along with the subsequent reviews to the document after that meeting, greatly aided the way the Cabinet received the final presentation of the vision. The Government of Saint Lucia finally endorsed the Shared Vision as a good basis for further public consultation and as a document that will aid the preparation of a gradual implementation of the Vision, along the line of the proposed transformational projects.

7. The next steps

Immediate next steps include the publication of the Shared Vision and the organization of a larger public consultation drive to rally broader support and to gather more ideas for the actual implementation of the Vision. This consultation process could be best stewarded by the Mayor's Office, however, the Government must also mobilize its efforts island-wide in order to harness additional ideas for the strengthening of the capital city function of Castries.

A crucial next step is to obtain cost-estimates for the Transformational projects and to suggest the financing mechanisms, (both internal and external) for the execution of those projects. Those mechanisms should also incorporate the informal support pledges already received from the World Bank and the Caribbean Development Bank representatives, after having received presentations of the Shared Vision in Castries. Finally, the implementation

mechanism needs to be thoroughly established and made operational at the soonest so as to maintain the positive momentum currently exists around the Castries Vision 2030. As a result of the successful planning approach for Castries, the PS also advocates a similar approach for other cities and territories within Saint Lucia, which will ultimately lead to the gradual revision of the entire 2008 National Vision Plan.

8. Lessons learned

The first lesson learnt was that the planning process design really matters and that it must be well tailored to the local context, the local planning culture and the local planning capacities. A second lesson was that pre-set timeframes and limited budgets for delivering planning products (as was the case for the Castries vision) is not necessarily compromising the quality of those planning products, provided that in-house and local 'agents of change' can be mobilized and empowered.

A third lesson learned was that investing time and trust in political leadership (both at central and local level) can pay dividends when it comes to buying into the planning process. Without the stewardship of both the PM and the Mayor, the planning project would have probably been a more traditional technocratic piece of work. However, the downside to this approach is that a number of planning issues risk being 'over-politicised' as part of the political bargain and can consequently undermine the sustainability factor of the vision. In the case of the Castries Vision, there were indeed a number of 'contentious' issues that to date remain unsolved and may consequently result in the government pursuing developments that are contrary to the Shared Vision.

In this instance a remedy is to at least increase the transparency of decision making, as it also remains a democratic right to make the wrong decisions. Having considered the short-project duration and the low-budget for the execution of a that vision as well as the realisation of a strategic plan for an entire city-region; it is safe to say that such an approach cannot truly be a bottom-up undertaking, nor a an exercise of full participation. . We therefore admit that this was a mistake in the initial process design, however, we must t also acknowledge the unintended change of scope, as the initial exercise comprised only the review of the old vision and not the development of an entirely new vision.

Local planning-process innovations such as the Castries Urban Forum and the open-door planning room guaranteed way more stakeholder consultation relative to the 2008 vision exercise. The final lesson learnt was that all stakeholders involved in this planning project agreed, (whether from Castries or other parts of Saint Lucia) that this in-house/in-sourced multi-stakeholder planning approach worked much better than the outsourced master-planning approach that was applied in the old but binding, 2008 National Vision Plan. The approach even inspired the Finance PS to consider future proposals for the replication of this approach for other areas of the island.

This approach has also inspired the Caribbean Development Bank to extend an invitation to members of the planning team for their participation and presentation of this vision at the next Caribbean Urban Forum, which will be an excellent opportunity to share this invaluable experience with peers within the wider Caribbean region. UNOPS is well placed to link the Castries experience with its similar experience in Willemstad (Curaçao), where the organization supported community and expert-based Visioning workshops that lead to a

roadmap for the localising the New Urban Agenda through an Urban Transformation policy. – see Figure 19. Peer-learning and city to city cooperation are also essential instruments to be incorporated into the planning process design and budget.

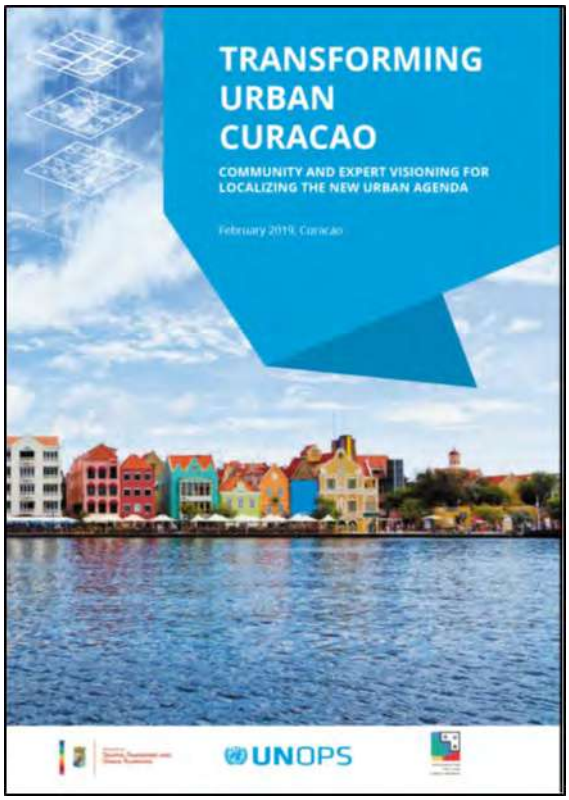


Figure 19: Cover of Curaçao Urban Transformation report co-produced by the Curaçao Ministry of Planning, UNOPS and ISOCARP

This brings us to the larger debate about in-house versus outsourcing of strategic planning projects. As was previously mentioned, there appears to be limited material to support the theory on this issue, at least not in the spatial planning domain. Most of the professional and academic discussion is focused on technically related outsourcing from public to private entities. More on this is elaborated in D'hondt's contribution to ISOCARP Review 15 – 'Beyond the Plan: Building In-House Capacity To Plan, Design And Implement Urban And Territorial Interventions – Learning From Practices From West To East' (ISOCARP, 2019). Outsourcing is generally well understood, while the difference between insourcing and in-house might need some clarification.

In our view, in-house is simply performing a planning activity by contractual staff members of the planning authority or institution, e.g. a national, regional or local planning department, eventually with the help of other departments within the same mother organisation, e.g. the national, regional or local government, or its administration. In-sourcing however, could be considered as a variant of in-house with the help of external experts, whether from private or related public sector. The main difference between out- and in-sourcing is that out-sourced planning tasks are typically executed by a planning consultancy with the bulk of the work done outside of the planning authority, while in-sourcing typically involves planning experts that help to execute the bulk of the work inside the planning authority. Planning actors can apply both in-house/out-house options but a line is drawn between wholesale outsourcing on the one hand and partial outsourcing on the other hand.

In the case of the latter, planning actors execute more than approximately half of the planning work in-house, complemented by in-sourcing and/or out-sourcing – often labelled as the hybrid model. In general, there are two main questions to be answered at the start of a planning activity, namely;

i) whether to opt for the 'in-house', the 'outsource' or the hybrid model?

ii) whether the needs and specific activities for outsource and/or insource should be defined in case of the hybrid option?

Lessons learned from Saint Lucia (and Curaçao) experiences is that these Small-Island States simply do not have the resources to develop all the capacities and skills needed for in-house planning. The resulting dependency on outsourced plans and designs is often more harmful than helpful. Temporary in-sourcing of experts through agencies such as the UN or the World Bank is certainly a smarter way to complement in-house capacities, however, too often the gains are of a temporary nature. Hence, a more sustainable in-house/in-sourcing capacity development pathway could be explored by looking at capacity support mechanisms at the regional level for the Caribbean, or more practically according to the various language preferences of the region (primarily English, French, Spanish, Dutch and/or Papiamentu) – e.g. a Caribbean Urban and Territorial Planning Institute can be established under CARICOM and can comprise different language branches.

9. Conclusion and recommendations

Our cities and territories need good planning and management to thrive while keeping our planet healthy. Planned urbanisation and territorial development provides an avenue for sustainable social and economic development. In 'Leading Change- Delivering the New Urban Agenda through Urban and Territorial Planning', international planning experts strongly advocate to engage in urban and territorial planning processes that are strategic and participatory, with plans that are simple, clear and rapid (SALGA/UN-HABITAT, 2018). However, the high rate of urban growth far outpaces the capacity of many governments and other institutions to plan and manage this growth in a sustainable, effective and efficient manner. In the slipstream of the New Urban Agenda, many scholars have already pointed to the dangerous gap between planning expectations and planning capacities, both in numbers and quality. In her key-note speech at the 52nd ISOCARP world congress in Durban, Vanessa Watson, planning professor at Cape Town University said: "Planning is located as a central implementing tool in the Agenda but is it an approach to planning which can achieve these very high expectations?" (WATSON, 2016). Governments, education providers as well as the planning community will need to step up and scale up efforts to boost the planning capacities needed for basic in-house planning and well stewarded in/outsourcing, not only to advance more sustainable territorial development but as well as to prevent a looming discredit of the planning discipline as not being able to deliver on its promises as expressed by SDG11, the NUA and the IGUTP.

The IGUTP includes a recommendation to: "Design a human resource development strategy to strengthen local capacities, to be supported by other spheres of government, as appropriate; Reinforce institutional and human capacity development at the local level in the areas of planning, design, management and monitoring, through training, exchanges of experience and expertise, knowledge transfers and organisational reviews."

In the handbook to apply the IGUTP (UN-Habitat, 2018), 'planning capacity needs' are considered as essential capacities and skills to meet the planning challenges of a certain territory, while the 'planning capacity aspirations' also look beyond these current needs and towards desirable planning capacities to aspire more ambitious goals on medium and long term. In both cases, capacity development needs to be planned and implemented; this is best referred to as 'Capacity Planning'.

Typically, 'capacity building' often means training. Certainly, this is a major component of Capacity building, however, if decision makers, managers, professionals and technicians are

to operate at full capacity, they need more than just their own capabilities. They need a conductive and supportive institutional and organisational environment. Therefore, capacity building must embrace the following three basic aspects:

i) human resource development;

ii) organisational development; and

iii) institutional development[vi].

Should we look beyond the confines of traditional professional boundaries and state institutions, beyond attempts to micro-manage land-use and the discredited top-down technocratic master plans; then we can discern a new set of skills for planning and managing urban and territorial development which comprises the following: i) Analytical and cognitive skills; ii) Communication, negotiation and inclusion skills; iii) Strategic action skills; iv) Management skills; and v) Monitoring and learning skills[vii].

Equipped with these understandings and tools, a re-thinking of planning capacity support for quality in-house planning is at stake to implement the commitments made through the New Urban Agenda, including: "We will promote the strengthening of the capacity of national, subnational and local governments, including local government associations, as appropriate, to work with women and girls, children and youth, older persons and persons with disabilities, indigenous peoples and local communities, and those in vulnerable situations, as well as with civil society, academia and research institutions in shaping organisational and institutional governance processes, enabling them to participate effectively in decision-making about urban and territorial development."

This will need a parallel two-track approaches which should entail the following:

i) governmental planning capacity development support to local authorities, to central level authorities and agencies in addition to existing governmental capacity providers; and

ii) non-governmental planning capacity development support: legal and planning advice and support for individuals, communities, civil society organisations, business community. This includes planning education and research, as well planning advocacy and awareness (media).

To that this end we advocate territorial platforms (at regional, national and even transnational levels) for capacity planning and development that will provide the institutional support mechanism to address the growing capacity and human capital deficit to implement the Sustainable Development and New Urban Agenda's. These platforms should address both governmental and non-governmental capacity needs and aspirations, as an intermediate agent between national and local governments on one hand, and civil society, the business community and communities on the other hand; while interacting with and seeking occasional support from both the international community and the education and research sectors.

10.References

Albrechts, L., 'Enhancing Creativity and Action Orientation in Planning', in The Ashgate Research Companion to Planning Theory, Conceptual Challenges for Spatial Planning', by Patsy Healey, 2016

Hague et al., 'Making Planning Work – A guide to approaches and skills', Practical Action, 2006

Healey, P., 'Planning in relational time and space: Responding to new urban realities', in G. Bridge and S. Watson (Eds), A

SALGA/UN-HABITAT, 'Leading Change- Delivering the New Urban Agenda through Urban and Territorial Planning', 2018

United Nations, 'New Urban Agenda', 2017

UN-HABITAT, 'Urban Trialogues, Localising Agenda 21, Visions_projects_co-productions', 2004

UN-HABITAT, 'Visioning as Participatory Planning Tool, Learning from Kosovo Practices', 2012

UN-HABITAT, 'International Guidelines on Urban and Territorial Planning', 2015b

UN-HABITAT, Handbook International Guidelines on Urban and Territorial Planning', 2018

Van Den Broeck, J., 'Strategic Structure Planning', in 'Urban Trialogues, Localising Agenda 21, Visions_projects_co-productions', UN-Habitat, 2004

Vogelij, J., 'Effective Strategy Making, Co-designing scenarios as a tool for effective strategic planning', ABE DELFT 07, 2015.

Watson, V., 'Sustainable Development Goal 11 and the New Urban Agenda: can planning deliver?' (https://isocarp.org/activities/isocarp-annual-world-congress-2/52nd-isocarp-congress/keynote-speakers/)

[i] Source: UNOPS/CHARIM
[ii] Source: https://www.cruisemapper.com/ports/castries-port-461
[iii] Source: https://marinas.com/view/harbor/lxteeq_Castries_Harbor_Castries_St_Lucia
[iv] Source: http://www.cityofcastries.org
[v] Source: https://www.nationsonline.org/oneworld/map/google_map_Castries.htm
[vi] See for more in HAGUE et al., 'Making Planning Work – A guide to approaches and skills', Practical Action, 2006
[vii] Ibidem

Case Study / Project

Metropolitan Governance in Southern Europe:

Working Across sSectors and Boundaries

Jose Alvaro Antunes FERREIRA, Joana ALMEIDA, Pedro PINTO

Abstract

Metropolitan areas have long been understood to benefit from the existence of regional governance structures. However, some large urban areas still lack effective coordinating agencies. In the case of Lisbon, Portugal, the legal framework has been steadily refined since 1991 to task the Metropolitan Area with a set of mandates, but has yet to be granted a compatible framework in terms of coordinating power and human/financial resources. Portugal, in comparison to others European countries, suffered a late urbanisation and even more recent metropolization. The accelerated, formal and informal growth of the metropolitan area was achieved through the intervention of a broad but not well-coordinated group of actors with very high costs of effectiveness and efficiency, penalising the quality of metropolitan life. The future, and roles, of metropolitan areas in the country have been entangled in the politically-sensitive debate surrounding regionalisation. Inter-municipal collaboration tends to occur only in contexts of cross-border, mutually beneficial, specific projects and/or where there were incentives for collaboration (such as additional funding).

Our study of comparable southern European metropolitan area governance structures is focused on analysing the scope of their mandates, in terms of sectors and level of planning, management and legislative authority, and highlight a set of 'best practices' for tackling the new political, institutional, and economic contexts. Thus, this paper provides an updated state of the art by critically scrutinising of metropolitan governance models in similar economic, political and cultural contexts. We seek to answer the following questions: What governance models exist in Southern Europe? How do they work? Who is involved? How do public and private entities interact throughout the process? From this analysis, we develop proposals on how to improve metropolitan governance structures.

The methodology is based on the review of literature (legal documents, academic papers) with the objective of identifying the variables to be analysed and the relevant case studies, which is complemented with interviews with experts and stakeholders of each country to refine the information on the inner workings of each metropolitan area governance structure. Four case studies located in Southern Europe were selected considering some governance principles and comparable criteria based on the demographic and economic dimensions as well as metropolitan challenges that they face. We focus especially on answering the question of how/if metropolitan governance structures promote inter-sectoral cooperation and coordination, and how multi-jurisdictional collaboration is conducted. Southern Europe countries have recently furthered metropolitan areas administrative/legislative powers, often accompanied with the creation of elected government bodies, such as a metropolitan mayor or a metropolitan assembly.

Increasing the visibility, transparency, and accountability of regional coordinating authorities therefore appears to be a trend in several southern European countries. These metropolitan areas are now host to a constellation of new actors (private lobbies, interest groups, NGOs) and

emerging societal challenges (aging, climate change, mobility, e-government, economic crisis, immigration, housing, among others) that are often incompatible with fragmentary, sectoral action, requiring instead concerted solution across sectors and involving multiple jurisdictions. Best practices suggest that the creation of truly collaborative networks can, and should be, promoted by the metropolitan areas. These entities should hold a role as mediators between different stakes, and as facilitators of cooperative action, while not foregoing their authority as decision-makers. From our comparative analysis, metropolitan governance structures will become effective only when vested with the appropriate resources (funding, expertise, decentralised authority).

Case Study / Project

Mapping institutions and actors in urban coastal management of Jakarta's Bay

Arif GANDAPURNAMA, Irene SONDANG, Ahmad ZUBAIR, Nala HUTASOIT

Abstract

The coastal is one among the densest area of the cities. Along with rapid development, there are environmental and social pressures. Environmental risk has been an unavoidable part for a long time, and the reduction effort still happened until now. The climate change impact has also contributed greatly to the losses and damages that occur in the coastal area. It is also forecasted that, if global warming continues at its current rate, some areas in Jakarta will be inundated by 2050 (Firman 2010; Measey 2010). Furthermore, many other areas in North and Central Jakarta are likely to be submerged in the future, which will cause major suffering for residents as a result of the physical and socio-economic impacts (Firman 2010).Meanwhile, social cohesion as a result of development and degradation of environmental conditions is also growing day by day. Various types of interests has direct the coastal development to many things depending on stakeholder's interests. Coastal management of Jakarta Bay has a multi-level basis, with different levels of intervention. Engagement between the government, private sector, non-governmental organizations (NGOs), international NGOs, and community-based organizations seeks to fill the gap in coastal management. However, the complexity of its roles and functions has resulted in difficulties in coordination and implementation of programs in Jakarta's Bay. One of the impacts of the absence of a comprehensive understanding of coastal management in Jakarta's Bay is the resistance from any stakeholder and inefficiency of the development program. To see through this context, planning policy and governance of implementation are two of many ways to identify the direction of development along with the stakeholder's interest in urban coastal management. Modified from the United Cities and Local Government analysis in several cities in European and American cities that the dynamic relationships between the government, civil society and the market are bringing about far-reaching changes in traditional ways of governing including implementation the public policies of coastal planning and management. It's not only through coastal society to social service delivery but also through the formation of associative networks, i.e. public-private partnerships which shape policy decisions. Associative networks are contributing to the emergence of a new style of governing based on participation, co-operation and shared responsibility. This research has a comprehensive understanding of governance on Jakarta's bay. Having a mixed method methodology through content analysis and actor mapping tools, this paper describes a network of interactions between state and non-state actors regulating the planning process until implementation in the coastal development of Jakarta. By doing this methodology, we divided into six steps that modified from a concept of actor's interaction to find the linkage among the actors such as 1. Categorize the topics include frame it in an appropriate questions, 2. Identify the actors and grouping with the categorization, 4. List the roles of the actor's internal and external way, 3. Connecting through links between actors, 5. Define influence, motivations among actors, 6. Harvest observations and possible actions of actors. Not only the actors, we also defines the policy from national, province, local until collective agreement that run in practical daily life. Based on the findings, the interrelationships of each actor are complicated so that several policies and plans appear that are not well coordinated. Meanwhile, coastal communities with limited access try to be independent in facing existing problems.

Research Paper

"YENI ISTANBUL": THE EXPANSION OF A GLOBAL CITY

Dimensions of the new mega projects in global cities situated at the periphery of North-American and West-European capitalist economies from a governance and planning process perspective: case study of Istanbul Airport

GEAMBAZU, Ion Mincu University of Architecture and Urban Planning; Romania

Abstract

The spread of neo-liberal political and economic ideology and the proliferation of global capital have created new opportunities and challenges for cities everywhere (Sassen 2012). Within the urban planning discourse, it is generally assumed that globalization leads to the same type of transformations and urban development trends everywhere in the world. However, it cannot create a certain prototype for spatial development or a new spatial order for cities. Rather, it gives a variety of spatial patterns, also called "global urban forms". Recently, these forms have identified themselves spatially within a series of "mega-projects", their intensity being felt in today's global cities, North-American and West-European, but with a domino effect, especially in the cities situated at the periphery of these capitalist economies. Total global megaproject spending is assessed at USD 6-9 trillion annually, or 8 percent of total global GDP, which denotes the biggest investment boom in human history. Never has systematic and valid knowledge about mega projects therefore been more important to inform policy, practice, and public debate in this highly costly area of business and government. It is argued that the conventional way of managing mega projects has reached a "tension point," where tradition is challenged and reform is emerging (Flyvbjerg, 2011). These kind of projects often take place within fragmented and entrepreneurial forms of governance (Harvey 1989; Healey 1997; Gordon 1997a, 1997b; Feldman 1999; Feinstein 2001; Granath 2005; Butler 2007) represented by public-private partnerships, in a societal environment of increased capital mobility and inter-urban competition (Malone 1996). Hence, it is argued, that mega projects have been examples of new governance styles and policy targets, but also object of intensive local planning debates and conflicts based on different actors (authorities, planners, residents, environmental groups, developers, etc.) holding an equal number of views (Hoyle, 2002) which are often difficult to reconcile. Strongly linked to the 2023 Vision of Turkey, the 3rd airport, Istanbul Airport is one of the mega projects that will bring Turkey among top 10 economically powerful countries. Istanbul

Airport distinguishes itself from a myriad of other build-operate-transfer projects by its governance dynamics and planning process. The study employs discourse analysis through which extracts lesson from the decision-making process that will inform planners in Istanbul and beyond.

Keywords

Urban governance, planning process, mega projects, Istanbul, discourse

1. The new mega projects

1.1. Definition and characteristics of the new mega projects

It is known that mega projects have been constructed since ancient time, if we should look at the Maya cities in Mexico or the pyramids in Egypt or the road networks of the Roman Empire, but the first time they were acknowledged as a concept, was in 1970's in order to describe large scale projects by Canadian government and the American contractor Bechtel, who is also the company that constructed The Channel tunnel between England and France, the longest undersea portion of any tunnel in the world. (Merrow et al., 1988)

After WWII, the Fordist state engaged in a series of *"mega projects"* for the restructuration of urban tissue, the efforts to create a modern society with express ways and high rise buildings. Jane Jacobs (1961 pg. 25), ironically named those efforts and the city:

"radiant garden city beautiful". In the "*great mega-project era*" of the 1950s and 1960s (Altshuler and Luberoff, 2003), the projects were monolithic constructions with little attention for citizen participation and environmental issues. Overcoming the social movements of 1960-1970s, the restrictions of the government and the decentralization associated with neoliberalism, these types of developments unwind, but they do not totally disappear (Altshuler si Luberoff 2003). Surpassing these critics on the left, critics on the right argue that these developments were an unnecessary intrusion of the forces of the government and led to unjustified expropriations of private property (Anderson 1964).

Today's infrastructure mega projects play a key role in nothing less than the creation of what many see as a new world order where people, goods, energy, information and money move about with unprecedented ease. Here the politics of distance is the elimination of distance. (Flyvbjerg, B., Bruzelius, N. and Rothengatter, W., 2003) Mega projects are central to the new politics of distance because infrastructure is increasingly being built as mega projects. Thus, the past decade has seen a sharp increase in the magnitude, frequency and geographical spread of major infrastructure projects, supported by a mixture of national and supranational government, private capital and development banks, namely multibillion-dollar infrastructure projects such as airports, high-speed rail, urban rail, tunnels, bridges, ports, motorways, dams, power plants, water projects, oil and gas extraction projects, information and telecommunications technology systems, and so on.

Never in the history of humankind have we built more, or more expensive, infrastructure projects. To put it in numbers, the size of infrastructure projects has grown by "1.5 to 2.5 %

annually in real terms of the past century "(Flyvbjerg, 2014, p.4). "This is the "tension point" where convention meets reform, power balances change, and new things are happening. In short, it is the place to be as a megaproject planner, manager, scholar, student, owner, or interested citizen." (Flyvbjerg 2014, p.22)

But how big is actually this whole mega project industry? McKinsey Global Institutes (2013) evaluated it with a spending need of a total of 57 trillion in between 2013-2030 (McKinsey & Company, 2013). The Economist estimates a total of 20 trillion until 2030[1] and calls infrastructure mega projects "the biggest investment boom in history".(Flyvbjerg, 2014, 2017) Furthermore, these type of projects have proven themselves recession proof, the downturn of 2008 was not even close abating to their relentless drive and with so many resources and side effects tied to them, their study, understanding and management has never been more important. (Flyvbjerg el al., 2003; Flyvbjerg, 2011,2014,2017)

Leher and Laidley (2008) make a distinction between 'old' and 'new' mega projects[2] in the development of urban economies. The current mode of large-scale urban development is different from its predecessor in so far as its focus is flexible and diverse rather than singular and imposing. However, the diversity that the new approach offers, forecloses upon a wide variety of social practices, reproducing rather than resolving urban inequality and disenfranchisement, shifting from collective benefits to a more individualized form of public benefits. (Leher and Laidley, 2008)

The 'new' mega-projects take the form of vast complexes characterized by a mix of uses, a variety of financing techniques, and a combination of public- and private-sector initiators (Lehrer and Laidley, 2008). The construction of new transport infrastructures, or the extension of existing ones, and complex building projects are examples of these new mega-projects (Diaz Orueta and Fainstein, 2008). They involve a transformation of urban space, its built form and its specific land use and changes the social practices in these urban landscapes (Van Marrewijk and Yanow, 2010;Lehrer and Laidley, 2008;Del Cerro Santamarıa, 2013b). Importantly, new mega-projects are often undertaken by state actors operating in collaboration with private interests in the pursuit of gentrification of city-regions within a competitive global system (Lehrer and Laidley, 2008;Del Cerro Santamarıa, 2013a: xxx).

[1] https://www.economist.com/finance-and-economics/2015/08/27/building-works

[2] in their work Old Mega-Projects Newly Packaged? Waterfront Redevelopment in Toronto, 2008, where they study the particular development of Toronto's waterfront.

1.2. Performance paradox and impact in megaprojects

The paradox is that when actual versus predicted performance of mega projects are compared, the picture is often dismal. At the same time as many more and much larger infrastructure projects are being proposed and built around the world, the poor performance of the majority of them is striking in terms of economy, environmental issues and public support. Much often the cost overruns are so high that projects who were planned to boost the economy become the main reason for its fall. (Peter W. G. Morris and George H. Hough, 1992; David Collingridge, 1992; Joseph S. Szyliowicz and Andrew R. Goetz, 1995; Mark Bovens and Paul 't Hart, 1996; Hall; Flyvbjerg, 2011).

A study of 130 mega projects constructed, but also under construction, comprising infrastructure mega projects solely of: road ways, rail ways, airports, metro lines, sea ports, rapid transit, bridges, tunnels and hybrid ones that encompass construction of new transportation means together with urban development, is made for this study with the scope of enlarging the findings in the literature review and test their accurateness. The projects are chosen with a conception year from 1950s until today, excluding statistical outliers. In line with the literature review it is clear, also with this study, that although 1950s and 1960s are considered to be the "mega project era", there is powerful increase in their development number after the 1980s until today. (Figure 1,2)

The main differences between the already constructed mega projects and the ones in construction is the growing budgets, not as trend line, but as a quantitative percentage of much costlier mega projects. While the trend considering the costs for the projects already constructed is decreasing, the new wave of mega projects, starting with mostly 2000, is rising, excluding the possible cost overrun until the completion of the project, which could lead to a sizable growth itself. The most expensive project under development is the High Speed 3-Northern Powerhouse Rail (39 billion $ with an unrealistic 8 years estimation time until its finalization) and for the category of the already constructed ones, it is the AVE - Spain's high-speed railway network (44 billion $, within 24 years), the average of both categories being between 20-25 billion $ and more than 50% under 5 billion $.

In contrast with the literature review, there is a decrease considering the period of time taken for the realization of mega projects, this being relatable to the technological advancement or the more efficient management tools employed in the planning process. Also, there is a big difference between the highest values of the constructed and under construction mega projects: The King Shaka International Airport is completed after 40 years, with the cost of 1 billion $ and having a break from 1982 until its revival in 1990 and the Berlin-Brandenburg International Airport is the lengthiest so far for those under development, with already 24 years so far for the planning process and 11 years' delay from the initial finalization date. Breaks within the planning process are due to due to poor construction planning, execution, management, as well as corruption[3] , which lead to a cost overrun of 7 billion $. (Figure 1,2,3,4)

[3] https://en.wikipedia.org/wiki/Berlin_Brandenburg_Airport

Looking upon the graph on types of mega projects, the most expensive constructed mega project is the AVE - Spain's high-speed railway network and lengthiest is the Panama Canal. When we look at both trend lines of these types of projects, we can observe that any delay in a rail mega project becomes costlier than any delay in a canal mega project and taking into account all trend lines, airport mega projects are the costliest in terms of any setback or suspension. (Figure 3)

For the ones under construction, the representative is the costly mega project Stuttgart 21- Germany (hybrid-railway and urban development) with a cost overrun of 2 billion euros and delay of 2 years so far and many problems considering the governance dynamics with opposition and heated debate on costs and benefits and environmental concerns[4] (Figure 4)

In a comparison of costs and the development period on the type of mega project, constructed and under construction: road ways, rail ways, airports, metro lines, sea ports, rapid transit, bridges, tunnels and hybrid ones, the main conclusions are: the disappearance of the canal projects, the presence of sea ports mostly the construction of new touristic ports lately, the abrupt decrease in construction of bridge, road, metro line and airport projects and the increase in rapid transit, tunnel and hybrid projects. (Figure 3,4)

If we look at the most expensive projects under construction from the last three types of project that lately gain popularity, they are: Stuttgart 21- Germany (hybrid-railway and urban development) stated before; WestConnex- Sydney, Australia (tunnel) with a cost overrun of 8.6 billion $, in 2017 the projects third and final stage being abandoned, highly criticized on economic, social and process grounds and being subject of escalating public protests from academics, architects and resident action groups[5]; Grand Paris Express- France (rapid transit) with an unclear target date as 2030. (Figure nr.3,4)

Just as Merrow et al. (1988) stated before, interestingly, developing countries did not do better or worse than developed countries in executing mega-projects, the trend lines are close in terms of performance considering costs overruns and time spent of project development, although in literature review Flyvbjerg (2011,2014) differentiates them in the railway sector. (Firgure nr. 5)

[4] https://en.wikipedia.org/wiki/Stuttgart_21#Debate_and_opposition
[5] https://en.wikipedia.org/wiki/WestConnex#Opposition

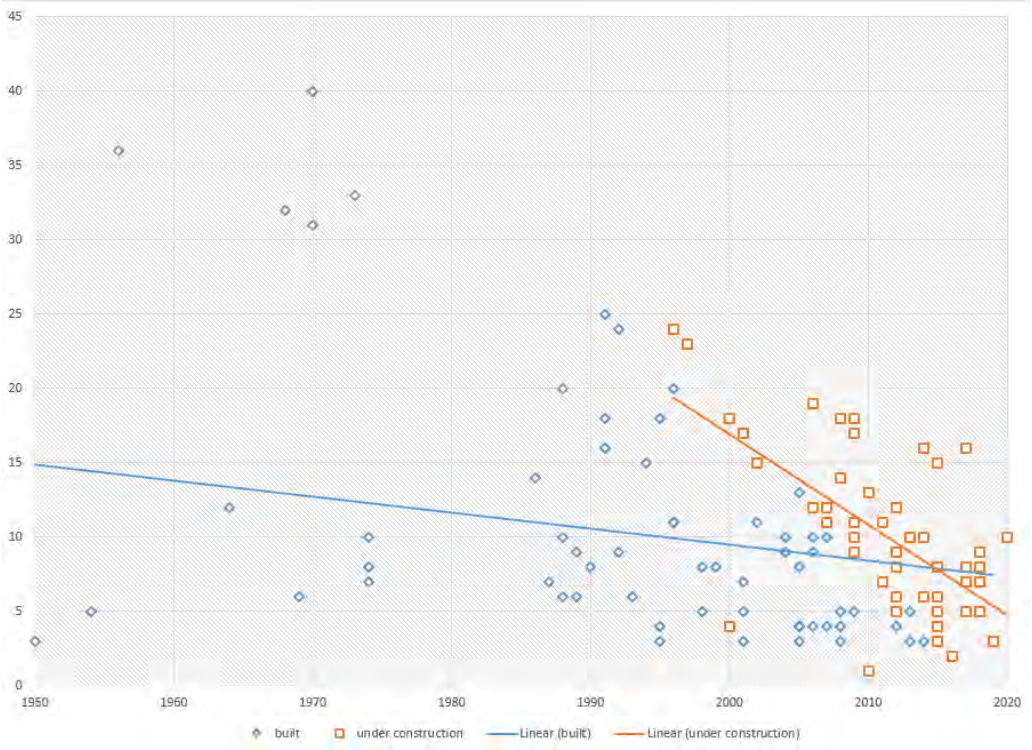


Figure 1 graph on built and under construction infrastructure mega projects (1950-2020) X axis: period, Y axis: time line

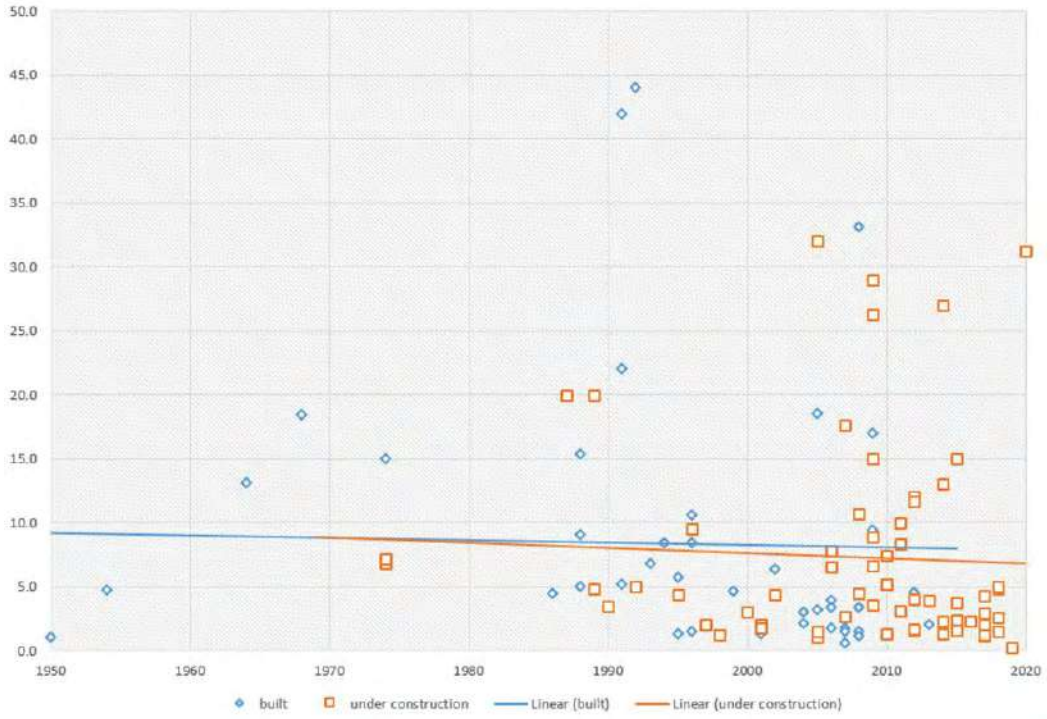


Figure 2 graph on built and under construction infrastructure mega projects (1950-2020) X axis: cost, Y axis: time line

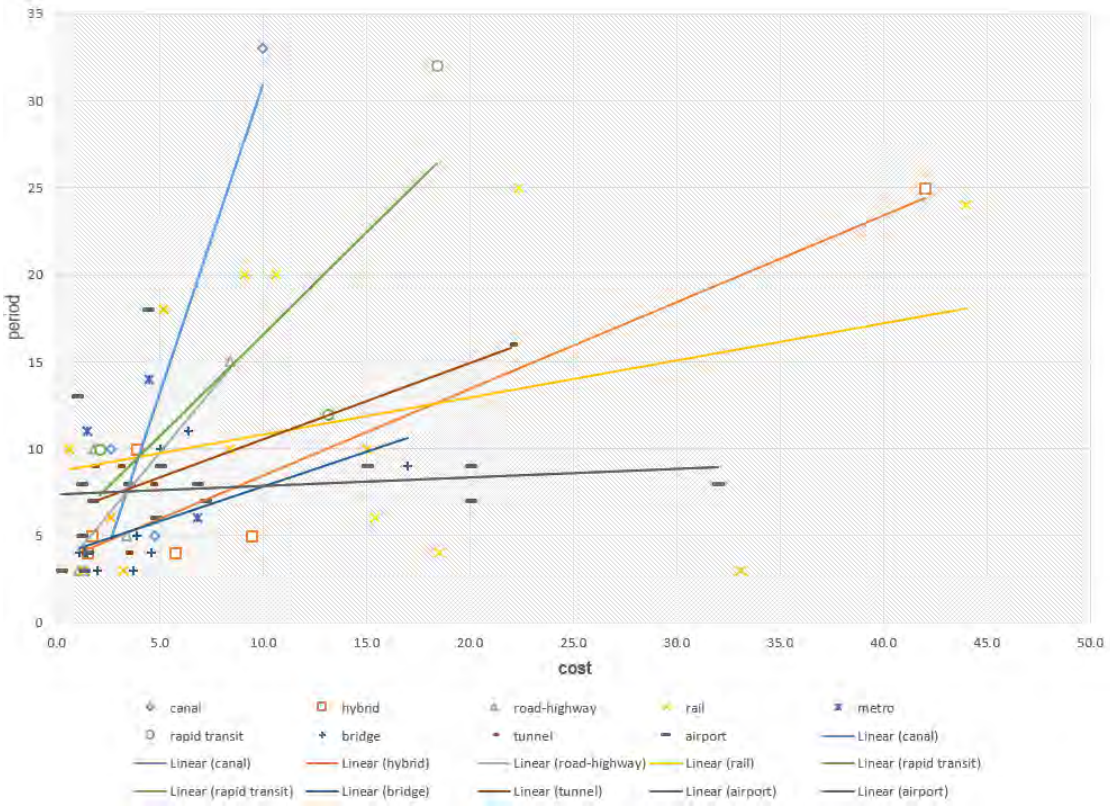


Figure 3: graph on built type of infrastructure mega projects (1950-2020)- X axis: period, Y axis: cost, legend with types of mega projects;

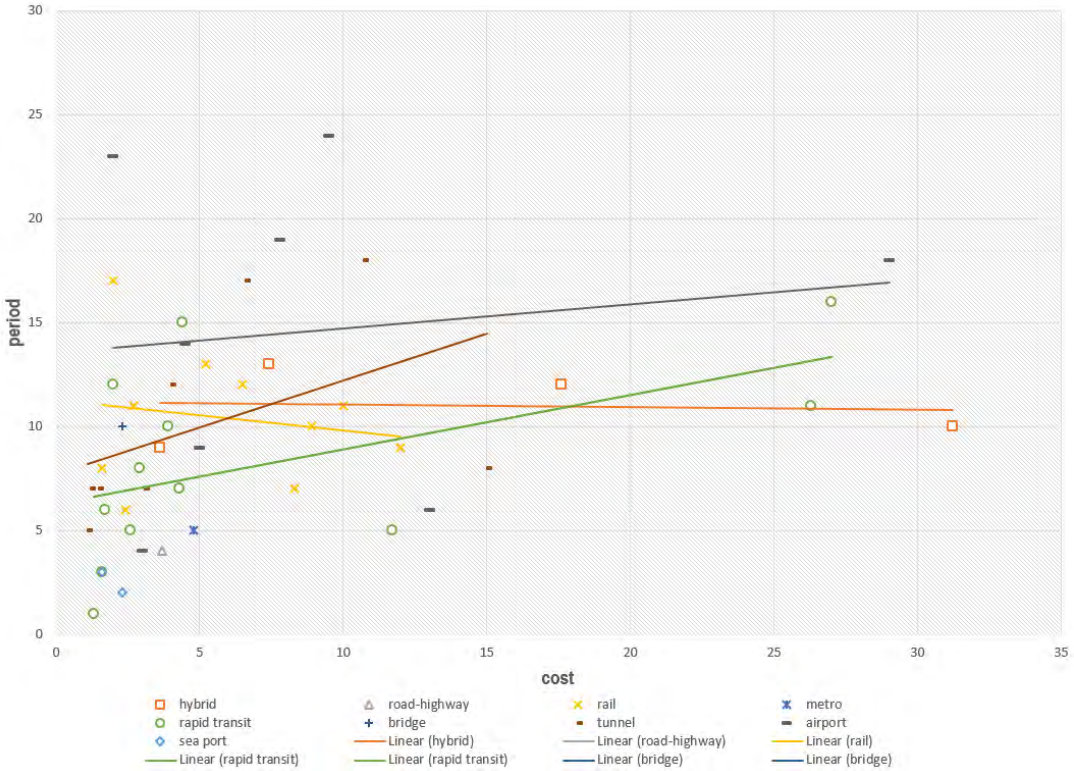


Figure 4: graph on under construction type of infrastructure mega projects (1950-2020)- X axis: period, Y axis: cost, legend with types of mega projects;

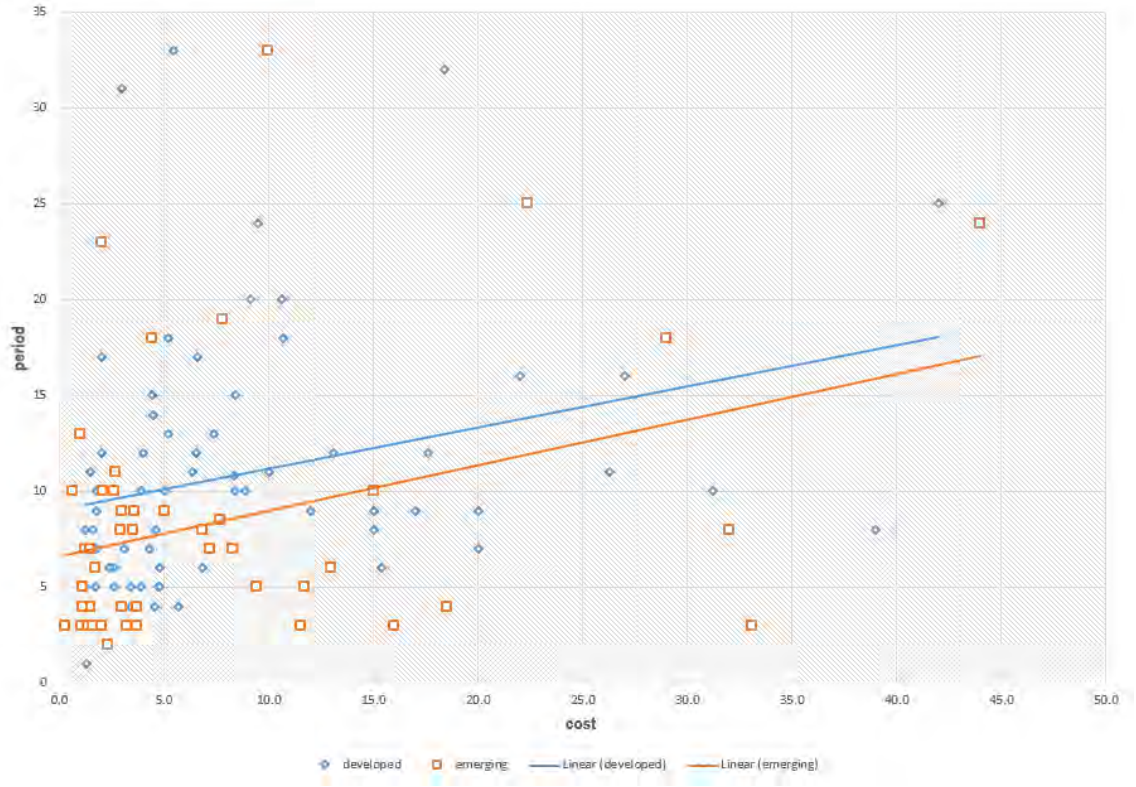


Figure 5: graph on infrastructure mega projects done in developed and emerging countries (1950-2020)- X axis: period, Y axis: cost, legend with types of mega projects

Generally, these developments have been critically examined by many scholars, many of which share the belief that the mega projects are often not addressing the underlying, deep-rooted problems of the cities and furthermore, ignoring the socially and economically unstable landscapes in which they often occur, veritably contributing to the escalation of inequality, polarization and deprivation in the city (Harvey 1989; 2005; Brownill 1990; Gordon 1997b; Hoyle 2000; Saarinen and Kumpulainen 2005; Butler 2007).

Often environmental and social effects of projects have not been taken into account during project development, or they have been severely miscalculated, such problems often destabilize habitats, communities and mega projects themselves, if not dealt with carefully. (Westport, CT: Praeger Publishers, 1998; Paris: OECD, 1993; Roger W. Vickerman, 1994)

Hirschman (1995: vii, xi) calls mega projects "privileged particles of the development process" and points out that often they are *"trait making*", that is, they are designed to ambitiously change the structure of society, as opposed to smaller and more conventional projects that are "*trait taking*," i.e., they fit into pre-existing structures and do not attempt to modify these. The framework of "*exceptionality*" associated with these initiatives favors a more autonomous, if not autocratic, dynamic marked by special plans and projects that relegate statutory norms and procedures to a secondary and subordinated place.

"Exceptionality" is a fundamental feature of the new urban policy, based on the primacy of project-based initiatives over regulatory plans and procedures. These changes involve, as stated before, among other things, the emergence of new policy tools, actors, and institutions, and they have important consequences for urban policy-making in general and for local democracy in particular, considering the increasing inequality in access to decision-making. Therefore, Brenner and Theodore (2004) argue that an important analysis aspect to identify the impact is the role of the state in these kinds of interventions (provision of subsidies, land or special treatment in the tax, etc.) and the level of involvement and its loyalty towards the goals for the public. Mega projects differentiate themselves by the way they combine social and environmental goals with the economical ones, the planning process and impact, reflecting in the same time the level of commitment that the host city has towards the concept of social equity (Fainstein 2009).

1.3. Performance paradox and impact in megaprojects Governance and planning process in mega projects

In literature on mega projects, power, politics and conflicting and opposing interests are generally excluded (Clegg and Kreiner, 2013;Hodgson and Cicmil, 2006). An exception is Flybjerg et al. (2003) who suggest that a main cause of overruns is a lack of realism in initial cost estimates (see revious sub-chapter), motivated by vested interests of partners. Therefore, in his analysis in all continents and despite the differences of geography, political background, social or cultural aspects etc., he identifies a main common characteristic which is misinformation and lack of transparency considering the governance dynamics (Flyvbjerg et al. 2003). Civil society does not have the same say in this arena of public life as it does in others. Mega-projects often come draped in a politics of mistrust, characterized often by a 'democracy deficit'[6] . People fear that the political inequality in access to decision-making processes will lead to an unequal distribution of risks, burdens and benefits from projects. The general public is often skeptical or negative towards projects; the main causes of the mega projects paradox to be inadequate deliberation about risk and lack of accountability in the project decision-making process (Åsa Boholm and Ragnar L¨ ofstedt, 1999; James Bohman 1996)

One of the main issues that is both complex and likely to stir controversy is the question whether mega projects should be publicly or privately led. Understanding the appropriate roles of the two sectors is fundamental to the identification of a process for appraisal and decision making that will ultimately work in the public interest. For major infrastructure projects one could argue an either/or position on public versus private leadership: either such projects should be placed entirely within the public sector – for example in a government department, an agency or a state-owned enterprise – to ensure accountability through the rules of transparency and public control that apply to the public sector; or such projects should be placed entirely in the private sector – for example by means of build-operate-transfer or other concession arrangement – to ensure accountability through competition and market control (Flyvbjerg, Bruzelius and Rothengatter, 2003)

It is argued that two main types of accountability define liberal democracies:

- public-sector accountability through transparency and public control
- private-sector accountability via competition and market control. (Flyvbjerg, Bruzelius and Rothengatter, 2003; Priemus, Flyvbjerg and Wee, 2008 p.138)

According to Clegg and Kreiner (2013) power in mega-projects has to be understood as relational effects, not as sources that can be held by partners. Project design, including contractual arrangements, and project cultures play a role in determining how managers and partners cooperate to achieve project objectives to a greater or lesser extent (Van Marrewijk

[6] term coined by Scandinavians- who like other people around the world have experienced the construction of one megaproject after another during the past decade.

et al., 2008). Therefore, Cicmil and Hodgson (2006b), suggest a more critical approach to understand the planning process of projects by exploring how the relationships between individuals and the project organization are produced and reproduced, how power relations create and sustain social relations.

2. Analyzing planning through discourse

The study of discourse is an important way of understanding how power is mediated in planning, capturing what planners do, how they respond to challenges, how are the planning problems being constructed, how are the solutions prioritized and how are the political pressures handled (Forester, 1989; Healey, 1992b; 1996; 1999; Innes, 1995; 1998) Discourse is a broad exchange of ideas and points of view among various individuals in a particular situation. In urban planning, a discourse might include the set of working papers, plan documents, media coverage, written or spoken statements expressing points of view on issues and proposed ways of addressing them and it has important implications in the policy analysis and planning itself.

Critical theories of Habermas, Derrida, and Foucault often provide the substantive underpinnings of discourse analysis. Many scholars such as Healy (1992b) and Forester (1989) have placed their **planning analysis within the communicative rationality of Habermas[7],** referring to the capacity to engage in argumentation under conditions approximating to an ideal speech situation ('discourse', in Habermas' terminology), with the

aim of achieving consensus (Dews, 1998).

Boyer (1983), on the other hand, employed Foucault's idea of a `genealogical' framework [8]to study how planning evolved over years. In *Dreaming the Rational City*[9], she focuses on the "apparatus of planning: what Focault has defined as the relationships among a set of distinct elements such as professional discourses, governmental institutions, administrative procedures, regulatory laws, legal concepts, architectural forms and plans, scientific statements, and moral proclamations" (p.xi) and on what happened once planning was called upon making cities "new areas for public policy" and " to maintain and preserve sound

[7] "communicative rationality carries with it connotation based ultimately on the central experience of the unconstrained, unifying, consensus-bringing force of argumentative speech, in which different participants overcome their merely subjective views and, owing to the mutuality of rationally motivated conviction, 11 assure themselves of both the unity of the objective world and the intersubjectivity of their lifeworld" (Habermas, 1984, p. 10, cited in Rienstra and Hook, 2006, p.11).

[8] Foucault's genealogical history seeks to deconstruct what was previously regarded as unified (i.e. history as a chronological pattern of events emanating from a mystified but all-determining point of departure), while also attempting to identify an underlying continuity which is the product of "discontinuous systematicities".

[9] *Dreaming the Rational City* is both a history of the city planning profession in the United States and a major polemical statement about the effort to plan and reform the American city. Boyer shows why city planning, which had so much promise at the outset for making cities more liveable, largely failed. She reveals planning's real responsibilities and goals, including the kind of "rational order" that was actually forseen by the planning mentality, and concludes that the planners have continuously served the needs of the dominant capitalist economy.

capital investments already committed to infrastructure and real estate from areas experiencing blight, abandonments and disinvestment" (Boyer, 1983, p.207)

Fairclough (1992; 1995) and Fairclough and Wodak's (1997) critical discourse analysis is derived from Foucault's archaeological and genealogical works as well, exploring the nature of discourse and its relationship with power.In contrast to the Hegelian and Marxist philosophies of history, 'genealogy' is *not* a *holistic* project but a *perspectival* one. Foucauldian genealogy is an history of tracing 'origins' and unearths the *force relations* operating in particular events and historical developments. Foucault describes his genealogy as an "effective history".[10] (Focault,1984, cited in Sembou, 2011, p.2)

Flyvbjerg (1998) who studied extensively mega projects, employs the Foucauldian, Nietzschean, and Kantian notions of power in planning discourse and arrives to the conclusion that rationality is often determined by power and not by ideals of reason or democracy. Varied applications of discourse analysis in the urban policy context are demonstrated, Mienhof and Richardson's (1994) collection of essays explores the discourse on poverty in Britain in the 1990s drawn mainly from the mass media.Other approaches for studying discourses include the use of `rhetoric' (Throgmorton,1993), `framing' (Rein and Schon, 1993), and storytelling (Forester, 1989; Kaplan, 1986;Mandelbaum, 1990; 1991).

The idea of a `discourse coalition' is put forward by Hajer (1993), which he presents as a group of actors who share a social construct.

"A discourse coalition is the ensemble of a set of story lines, the actors that utters these story lines, and the practices that conform to these story lines, all organized around a discourse." (Hajer 1993, p. 47).

To dominate a given political realm, a discourse coalition must fulfill two conditions:

- "it dominates the discursive space (discourse structuration) that is, central actors are persuaded by, or forced to accept, the rhetorical power of a new discourse;
- this is reflected in institutional practices (discourse institutionalisation) that is, the actual policy process is conducted according to the ideas of a given discourse." (Hajer 1993, p. 48).

In the *Discourse Coalitions and the Institutionalization of Practice: The Case of Acid Rain in Great Britain*[11], Hajer writes about how different were the approaches to the environmental politics discourse in the post-World War II period in the context of Keynesian welfare state and the neoliberalist era under Prime Minister Margaret Thatcher in Britain. It had, of

[10] M. Foucault, "Nietzsche, Genealogy, History", in *The Foucault Reader*, ed. P. Rabinow (Harmondsworth: Penguin, 1984), pp. 87-90.

[11] Chapter of the book The Argumentative Turn in Policy Analysis and Planning edited by The Argumentative Turn in Policy Analysis and Planning edited by Frank Fischer and John Forester

course, much more popularity during the first period, considering the values of the state concerned a growth economy based on a social contract between capital and labor in contrast with the Thatcher's aim of reinforcing the industry's competitiveness. (Hajer 1993, p.70)

Linked to these coalitions, Moore Milroy's (1989) deconstructing discourse analysis reveals what was unsaid in planning policy, a certain "tacit" knowledge. Deconstruction is a useful method for studying how planners construct plans that are plausible to the profession and the community and its results can subvert the logic of planning. The strategy of deconstruction is interested in what has been left out, the method uses norms not as guarantors of goodness or plausibility but precisely the opposite, as problematic categories requiring analysis. In Culler's words:

"One frequently finds general agreement, but consensuses adduced to serve as foundations are not given but produced—produced by exclusions of this sort." Milroy 1989, p.316)

In a Habermasian formulation one might ask the question "What are planners recommending here?" in order to see how the proposals are attention-shaping. Specific utterances are interpreted in terms of the model of communicative behavior. In the alternative one instead asks "How is it that these prescriptions are plausible?".

A systematic approach to deconstructing and analyzing arguments in planning has been proposed and refined by various scholars (Dunn, 1993; 1994; Fletcher and Huff, 1990; Gasper and George, 1998). In each of these instances, an argument is deconstructed and mapped by means of some form of diagrammatic representation.

According to Toulmin[12], arguments are composed of some combination of five components:

- Claims (ideas that the arguer would like the audience to believe)
- Grounds (ideas that lend support to the claim and make it more likely that the audience will believe it)
- Warrants (logic of the argument)
- Backing (reasons why the audience should believe the warrant)
- Qualifiers (modify the claim by indicating a degree of reliance on, or scope of generalization of the claim, given the grounds, warrants, and backing available)
- Rebuttals (possible exceptions to the conditions under which a claim holds)

[12] Stephen Toulmin in work The Uses of Argument (1922), indicates three major, necessary parts of an argument, along with three additional, optional parts. The three major parts are the claim, the support, and the warrants.

Although there has been much written about the method and its potential value in planning scholarship and practice, there is less evidence that it has actually been used to produce substantive advances. (Kumar and Pallathucheril, 2004). Kumar and Pallathucheril developed a graphical discourse index that is used in this research, with minor modifications according to the specific empirical case study of this thesis, Istanbul Airport. Claims are arranged along the X-axis in chronological order. For the case study, the chronological order represents the planning process and has milestones identified as critical stages or phases in the project. The Y-axis is used to group claims according to which relevant actor to the planning arena made them. The actors are identified during the decision making process of the project. Taking both X-axis and Y-axis into account, the location of an iconic shape on the index represents a type of claim made by a particular participant at a particular time. Finally, iconic shapes are linked together by lines with arrowheads that indicate how and when original claims and sub claims were supported or rebutted during the discourse. In addition to discerning between the main claims and sub claims, the claims are further classified into their types, such as:

- Designative - claim is used to establish the existence (or nonexistence) of an entity, concept, condition, or action
- Definitive- claim used to define the characteristics that a given action, condition, entity, or concept has or does not have
- Evaluative- claim that assigns value (positive or negative) or judges the relative value of a given action, condition, entity, or concept
- Advocative- claim that calls for a course of action (Fletcher and Huff,1990)

Kumar and Pallthucheril (2004) note that the distinction between an argument and a discourse is highly important as one represents a particular idea or intent to a course of action and the latter is a constellation exchange of ideas among the actors involved. Thus, a dimension of the context, the involvement of actors, institutional and organizational structures is introduced. Considering the particular situation of design review, multiple arguments and counterarguments are made in different points in time during the planning process and decision-making process, by elected officials, professionals and the larger public. Therefore, these arguments are all related to each other in a certain percentage and these relations are represented by the arrows in the model suggested by Kumar and Pallthucheril.

Using this method, the authors have identified many fallacies within the discourse of a particular study case[13], arguments that are persuasive, yet defective. These fallacies appear when the grounds that support the claims are missing or are false or are based on uncertain beliefs. They can be deliberate or accidental, honest or dishonest, considering the distortion in communication (Forester, 1989) and usually result in an inconsistent decisions-making process and adversity in the planning process (Kumar and Pallthucheril, 2002)

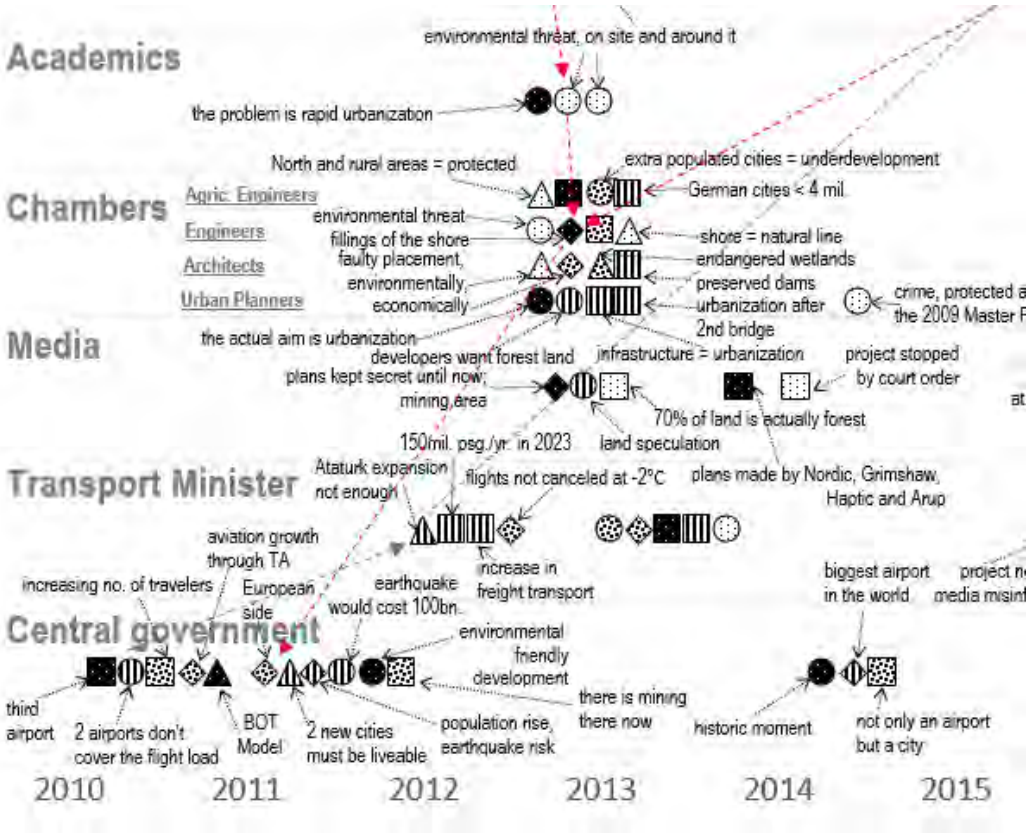


Figure 1 Extract from the discourse index of Istanbul Airport

[13] The design review of Historia (see Kumar and Pallthucheril- Fallacious argumentation in design review 2002)

3. Istanbul, context of planning

3.1. New urban policy in Istanbul

Turkey, as other developing countries has been experiencing a neo-liberal reconfiguration that is now in its final stage. First the liberalization phase in the 1980s, second the implementation of neo-liberal reforms in the post-1990s period and with the year of 2000, a process of configuring a new market-friendly and regulatory role of the state, by abandoning the institutions of the old state, began (Temizel 2007; Dincer 2011a; Enlil 2011; Erbas and Erbil 2012). Since the 1980s, national policy intended to make Istanbul the focal point of a neo-liberal strategy approach to integrate the Turkish economy with global markets. These economic transformations were visible also in the accelerating transformation of urban space, making Istanbul the showcase of the country's new era of internationalism (Enlil 2011; Uzun 2010). In the pace of decentralization as a solution for more effective forms of governance, in 1994, the authority to make and approve plans concerning estates included in the privatization program, was transferred from local authorities to the High Council of Privatization (OIB). This not only provided exceptional development rights to the owners of these valuable properties located in city centers, but also marginalized the authority of the traditional planning and administration institutions, creating major social, economic and cultural impacts (Dincer 2011a; Erbas and Erbil 2012). By 2000, other leading structural changes as integration of urban fringe to the core, de-industrialization, urban sprawl, renewal of historical areas and re-development of brown field areas have been introduced through a complex agenda of urban regeneration policies into the urban planning practices. The central government created additional laws to enable urban renewal as an exclusive planning tool and therefore making it a debated planning issue in the last decade. (Temizel 2007; Dincer 2011a) Engagement of institutions of central government in decision-making over planning at local scale, transforms the clash of interests in many projects from being the small scale impacts of social, economic or environmental concerns regarding planning to actual questioning of the whole planning system in Istanbul, Turkey. (Dincer 2011 a, 2011b; Enlil 2011; Ergun 2004)

While the purpose of the many projects initiated by the government seems to be in the name of upgrading the built environment and improving the living conditions of the poor or creating new infrastructure for the city, they are made within a top-down approach to planning, reducing to just a transformation of physical space and neglecting the social, economic and environmental dimensions. These aspects along with the unwillingness of government to allow any participation of civil society become the focus of discontent and protest of many engaged in resistance. (Erbas and Erbil 2012; Temizel 2007). Strong opposing governance forms come together: non-governmental organizations, neighborhood associations, Chamber of Architects and Urban Planners and urban social movements are formed with the aim of more justice and inclusionary process in planning. This situation culminated with the events of 28 may 2013 when thousands of people fought against the

"*neo-liberal urban development agenda of the government*" (Taksim Dayanismasi 2013)[14].

3.2. 2023 Vision

In 2011, Turkish president Tayyip Recep Erdogan officially announced the Justice and Development Party's (AKP's) "2023 Vision", aiming to make it one of the world's 10 largest economies by its centenary in 2023.

However, the vision was a much older idea, but on local scale, just for the city of Istnabul. Three months after the 1999 earthquake, without even approving the Earthquake masterplan, "2023 vision" for Istanbul appeared on the agenda. It was actually a strategy called "mega transformation" ("Mega dönüşüm") that was presented before and now with a change of name puts forward "mega transformation projects", "neighborhood transformation projects related to earthquake disaster" and these were pointed to be the main way development path. (Yapici, 2017) It is already in those times that was decided that Istanbul becomes a "corridor city", a goal declared by Topbas, mayor of Istanbul Metropolitan Municipality (Istanbul Büyükşehir Belediyesi-IBB). Mucella Yapici, secretary of Chamber of Architects Istanbul relates that moment with all the transport projects Istanbul did and has in plan to do: 3rd bridge, Marmaray, 3rd airport, Istanbul Canal Project, etc.

The AKP introduced the 2023 Vision in 2011 during the general elections that resulted in Erdogan's third term as prime minister. Critics says that the ambitious goals, which include a 10% yearly average growth rate to reach $2.6 trillion in GDP, are idealistic promises made by a leader seeking electoral success, Jean-Pierre Lehmann, professor of international political economy at Oxford University's Centre for Economics and Foreign Policy Studies says (Kayagil- G20, 2015)

Lehmann also points out that the obsession with growth targets, at the possible expense of society, could prove dangerous and harmful. The AKP's path to growth and social development has been inconsistent, with policymakers looking at these economic targets as an end rather than as a response to the more important question of what type of society the country wants. This is clearly apparent in the already stagnating economy, the high political instability and the tensions caused by unclear and ill-defined strategies in combatting citizen dissatisfaction.

3.3. Istanbul Airport mega project overview

Strongly linked to the 2023 Vision of Turkey, the 3rd airport, now with its name Istanbul Airport is one of the mega projects that will bring Turkey among top 10 economically powerful countries. Istanbul Airport opened its first stage on 29th October 2018, which took place on the 95th anniversary of Turkey's establishment as a republic. For the first time in the history the celebration of the Republic is held in Istanbul rather than Ankara.

[14] Online Source: http://taksimdayanisma.org/?lang=en

When fully completed, Istanbul Airport will be the world's major hub of transport and aviation, as well as having the globes biggest duty-free area. Replacing the Istanbul Ataturk airport, ultramodern architecture and technology have been used with the aim of getting passengers quickly and smoothly to their chosen destination.

The airport is under construction on an area of 76.5 million square meters to the north of Istanbul, 35 km away from the city center and promises to be the world biggest airport biggest airport and largest "Build-Operate-Transfer" project in the history of the Republic of Turkey. (CAPA, 2016; IGA website).With an annual passenger capacity of 200 million (DHMI, 2013), it will respond to the growing needs of the city, which can no longer be fulfilled by the two existing airports - Ataturk, with 37 million annual passengers, and Sabiha Gökçen, with 13 million (Turkish Forum Archive, 2010). Furthermore, this project is planned to be extended by an airport city (CSB, 2014) with a central innovation district, hotels, retail and commercial office space, logistic centers, an expo and convention center, public space, and metro and high-speed rail connections to Istanbul and beyond (CAPA, 2016). On its journey to become "the hub for global aviation", Istanbul Airport will emerge as a strong player in cargo transportation as the trade axis shifts to the Asia-Pacific region. Istanbul Airport will render Turkey an attraction center not only in passenger transport, but also in trade.

Istanbul Airport will distinguish itself from a myriad of other build-operate-transfer projects thanks to the added value it will offer for the Turkish economy. Following the completion of all phases in 2025, the total direct and indirect employment will go as high as 225,000 employees and the household income will rise up to 4.4 billion dollars.

The project in numbers looks like this:

- total investment- €10.2 billion
- 3500 ha (1100 ha services, 165 pedestrian bridges, 8 control towers, parking for 70000 cars, 1 mall, 1 aviation medical center
- 200 million passengers- 90 million phase one (that is finished)
- 300 different destinations
- 12 awards (design architecture, economic and environmental and social sector)
- 3,109 suppliers
- revenue flow into the Treasury in 25 years- €22.2 billion + VAT
- 21,500*- total employment (as of 31 dec 2016)- 225,000 employees in total; indirect Employment- 1.5 million; direct Employment- 100,000
- household income will rise up to 4.4 billion dollars

3.4. Institutional and legal framework- İGA (Istanbul Grand Airport)

IGA was founded on October 7, 2013 to construct and operate Istanbul Airport for 25 years. The İGA journey started on May 3, 2013 when DHMI (General Directorate of State Airports Authority of Turkey) awarded the contract for construction and operation of Istanbul Airport to the Cengiz-MAPA-Limak-Kolin-Kalyon Consortium. Having won the bid for the project, the consortium founded a new company under the name "İGA". Each of the investors has an equal share of 20% in İGA. Cengiz-MAPA-Limak-Kolin-Kalyon Joint Venture operates in different industries nationwide and around the world including construction, energy, tourism, mining, port and airport management. The consortium has undertaken eight airport construction projects so far.

"Already awarded for its design and value-added projects before its opening, the name of Istanbul Airport will be written in golden letters in the history of aviation as "the world's largest airport built from scratch." -message from the Board of Directors of IGA. But beyond this message, it is not surprising to see how the new airport development is presented and marketed as a victory for the whole country, the political sublime together with the technological sublime are known features of megaprojects.

"Bugün aslında biz sadece bir havalimanı değil, bir zafer anıtı inşa ediyoruz." Recep Tayyip Erdoğan (2018) - "Today we are not building just an airport, but rather we won a victory"- a fragment from the speech of Recep Tayyip Erdogan at the opening ceremony of Istanbul Airport. *"Yeni Türkiye'yi İnşa Ediyoruz"*- The statement "We are building the new Turkey"- is also the message present on all billboards and commercials regarding the new airport.

Nordic and partners, architecture office, developed the concept design of the airport and describe the Istanbul New Airport as celebrating the city's long history as the gateway between two worlds. However, they do not accept the affiliation with the decision over the area chosen for the project, the north forest area of the city, also protected area in the 2009 Masterplan or the non-transparent planning process and deaths on the constructions site due to neglect.

3.5. Impact of the Istanbul Airport mega project

Environmental and social impact assessment are two of the key issues in megaproject development. For environmental and social effects of projects, one similarly finds that such effects often have not been taken into account during project development, or they have been severely miscalculated, such problems often destabilize habitats, communities and megaprojects themselves, if not dealt with carefully. (Westport, CT: Praeger Publishers, 1998; Paris: OECD, 1993; Roger W. Vickerman, 1994) Serious issues are identified in the project for the Istanbul Airport. The first EIA report was prepared in 2013, by AK-TEL Engineering Co., on behalf of the Ministry of Transport, Maritime and Communications (MTMC). Although it received a positive decision from the Ministry of Environment and Urbanism (ENVIRON, 2015), the construction was halted by Istanbul's Fourth Administrative Court, due to claims on the project's negative environmental impact. A new EIA report was put into effect in 2014, emphasizing the necessity for a new airport (CSB, 2014).

Deforestation is a serious concern when the scale of the projects is taken into consideration. 80% of the total project area of the third airport consists of forested land (Gürtler, 2016). There are also problems connected to ecosystems. UCTEA warns that Istanbul will be deprived of water as the construction site of the third airport threatens ecologically protected and sensitive areas including water basins (CAPA, 2016). Additionally, the third airport is planned on the migration routes of birds, which is hazardous for the ecosystem. This not only violates the Bern Convention (1979), but also causes possible airplane crashes (Arslangündoğdu, 2014).

Consequently, ENVIRON was commissioned by IGA (Istanbul Grand Airport) for the preparation of the Environmental and Social Impact Assessment (ESIA) in order to support funding applications to international financial institutions. With this report, the present (before project) state of the Project Site has been determined, the significance of the potential environmental and social impacts has been evaluated, and the mitigation measures likely to be taken in order to minimize the defined impacts of the project have been introduced. In line with the Environmental Management and Monitoring Program specified in the Environmental and Social Impact Assessment (ESIA) Report prepared by Ramboll Environ (UK) and the Environmental and Social Action Plan (ESAP) prepared by the Lenders' Technical Advisor (LTA), the Environmental Management Department continues to carry out inspection and audit works with respect to checking of the site compliance with Turkish Environmental Legislation, IFC (International Finance Corporation) Standards, the Equator Principles, and TS EN ISO 14001:2015 EMS requirements, and planning and site application of the necessary actions.

İGA put together the 2016 Sustainability Report in light of the principles of GRI G4 Core. Corporate governance, environmental sustainability, business and social management practices at international standards are collated in a report, with a view to offer a powerful contribution to the development of the sustainability culture in Turkey as well as the sustainable development of the country. As part of the Stakeholder Engagement Plan, more than 100 Meetings Involving 46 Stakeholders were made.

Unfortunately, the number is extremely low for the size of the development and looking closely at the stakeholder list and considering that the Sustainability Committee, established by Sustainability Organization İGA, is chaired by the Company's CEO Yusuf Akçayoğlu, we can easily deduct that it is not a participative and an equitable process. İGA Sustainability Committee is the decision maker in the process of identifying the corporate sustainability priorities for the 2016 Sustainability Reporting process.

Since neoliberal urban policies prioritize urban growth and investments in order to comply with global flows, public interests are frequently overlooked (Baysal, n.d.). In the case of these mega-projects it is possible to identify two types of constraints – (1) the destroying forestlands or farmlands belonging to the state treasury for the same purpose, mentioned before and (2) the urgent expropriation to empty lands for construction. A problem affecting the community is related to property rights.

Consequently, Northern Forests Defense (2015) underlines that megaprojects violate property rights through urgent expropriation. Centralized government and top-down

mechanisms facilitate this process, whilst legal frameworks remain insufficient to secure the rights of citizens.

Therefore, in addition to documentation and the education of the public, the Istanbul Chamber of Architects and environmental NGOs applied to the court for a stay of execution for the mega-projects. Marschall and Aydogan (2015) mention that 75 lawsuits were filed against the various mega projects (including the Northern Marmara Motorway, the Third Bridge and the Third Airport) by the Chamber of Architects from 2007 to 2012. Nevertheless, the construction work was not halted despite the decision of the court in favor of cancellation. Moreover, in some cases the decisions for cancellation by local administrative courts were annulled by higher courts.

3.6. Istanbul Airport mega project discourse index

The discourse index was created by reviewing 300 news related to the development of the Istanbul Airport project, from different sources: iga website, Sabah daily (as being the most widespread newspaper, also available in English), but also opposition newspapers like Radikal or Diken. Moreover, 20 interviews were made with actors involved and against the planning process: urban planners, engineers, economists, lawyers, architects, academics, ngo representatives, chambers representatives, etc. Their expertise was also carefully chosen as strongly related with the subject: urban planning, environmental aspects, political science, sociology, economy, judiciary, etc.

By looking at the graphic, still a work in progress, one can identify easily the fallacies made throughout the discourse, how some arguments have rather a political motivation to it than a technical one. Moreover, one can identify how arguments support themselves, but also how some actors can contradict themselves throughout the discourse. For example, the Ministry of Transport has a good line of presenting the projects as environmental- friendly, but it also presents the EIA (environmental impact assessment plan) as a waste of time. Fallacies in the discourse mean fallacies in decision making.

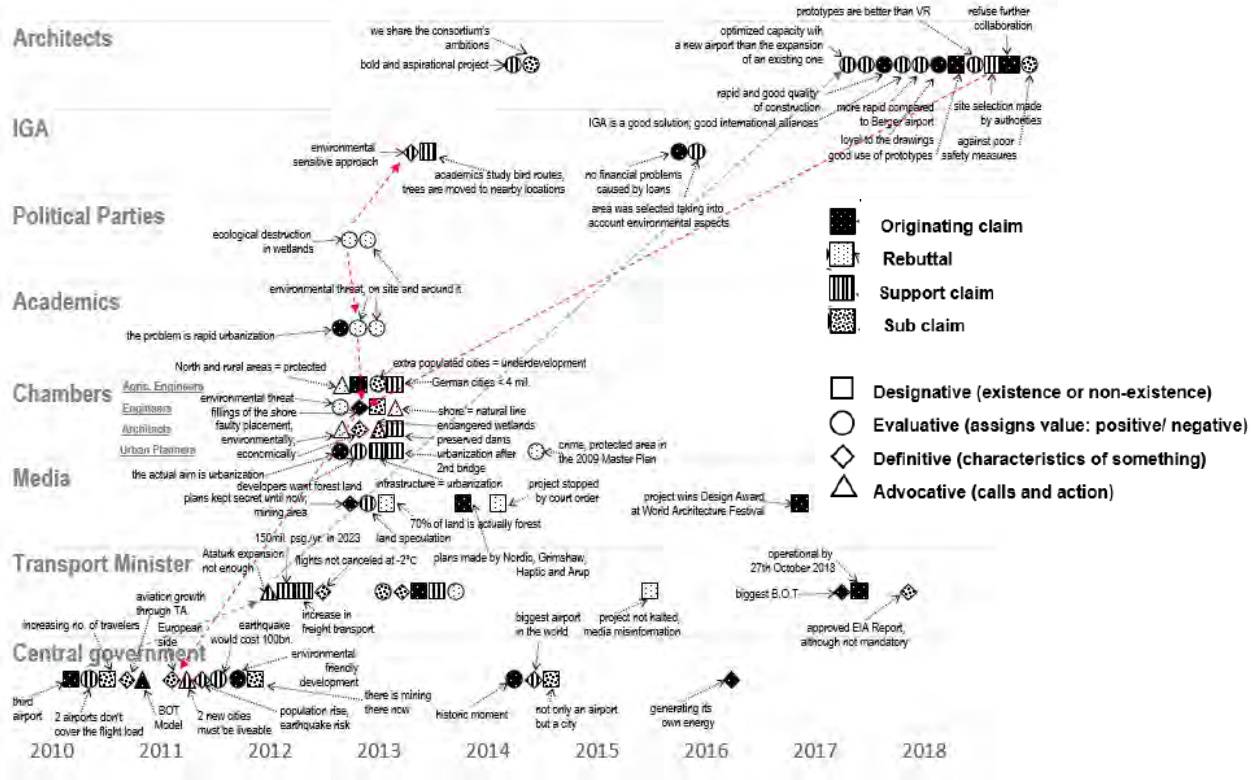


Figure 2 Discourse index of Istanbul Airport

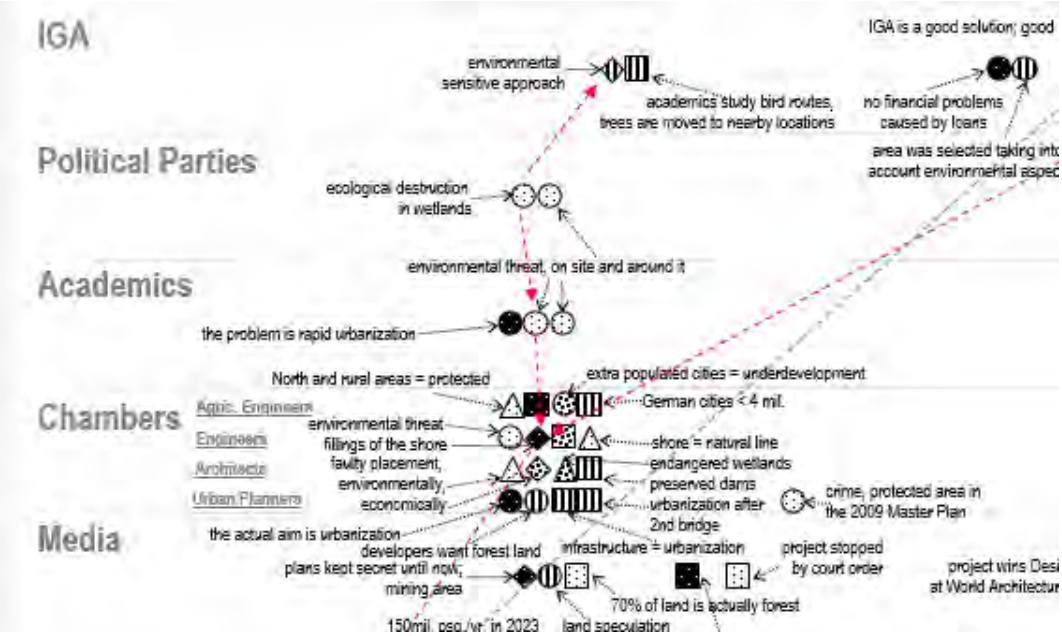


Figure 3 Extract from the discourse index of Istanbul Airport

4. References

Altshuler, A. and D. Luberoff (2003) *Mega-projects*. Brookings Institution,Washington, DC.

Bachrach, P. and Baratz, M. S. (1962).'Faces of Power'. *The American Political Science Review*. **56(4)**.947-952.

Brenner, N. and N. Theodore (eds.) (2004)*Spaces of neoliberalism. Urban restructuring in North America and Western Europe*. Blackwell, Oxford.

Butler, T. (2007). 'Re-urbanizing London Docklands: Gentrification, Suburbanization or New Urbanism?'. *International Journal of Urban and Regional Research.* **31(4),** 759- 779

Brenner, N. (2000).'The Urban Question as a Scale Question: Reflections on Henri Lefebre, Urban Theory and the Politics of Scale'. *International Journal of Urban and Regional Research*. **24(2).** 362-378

Brownill, S. (1990) Developing London's Docklands: another great planning disaster?. Urban and Regional Development Series. Sage Publications. 104-105

Bruns, J. (2012). Hafencity Hamburg: Making a New Downtown. Online source: http://learningcitiesplatform.files.wordpress.com/2012/07/lcp-hafencity-hamburg-june-2012s.pdf; Last date of access: 11.10.2013

Butler, T. (2007). 'Re-urbanizing London Docklands: Gentrification, Suburbanization or New Urbanism?'. *International Journal of Urban and Regional Research.* **31(4),** 759- 779

Butuner, B.(2006). 'Waterfront Revitalization as a Challenging Urban Issue.'42nd. *ISoCaRP Congress.*1-11.

Castells, M. (1978) *City, class and power*.Macmillan, London.

Crilley, D. (1993) Mega structures and Urban Change: Aesthetics, ideology and design' . *The Restless Urban Landscape* . **1(1).**127-164.

Davis, M. (1990) *City of Quartz*

Fainstein, S. (2000). 'New Directions in Planning Theory'. *Urban Affairs Review.* **35(4)**.451-478.
Fainstein, S. (2001).'The City Builders: Property Development in New York and London, 1980-2000. 2nd ed. Lawrence: University Press of Kansas. 160-185
Fainstein, S. (2009). Mega-projects in New York, London and Amsterdam'. *International Journal of Urban and Regional Research*
Feldman, M. (1999).'Urban Waterfront Regeneration in the Baltic States: The Case of Tallinn', in Hedegaard, L. , Lindstrom, B. , eds. *The NEBI Yearbook 1999 North European and Baltic Sea Integration***.** Berlin: Springer. Ch. 2. 121-135
Flyvbjerg, B. (2004). 'Five Misunderstandings about Case-Study Research', in C. Seale, G. Gobo, J. F. Gubrium and D. Silverman, eds. *Qualitative Research Practice*. Sage. Thousand Oaks. 420-34.
Forester, J. (1999).*Planning in the face of power*. Berkley: University of California Press.
Gans, H.J. (1991) *People, plans, and policies*. Russell Sage, New York.
Goodwin, R.(1999). 'Redeveloping Deteriorated Urban Waterfronts: The Effectiveness of U.S. Coastal Management Programs', *Coastal Management,*27(1999), 239-269
Gordon, D. L. A. (1997b). *Battery Park City: politics and planning on the New York waterfront*. Amsterdam, Gordon and Breach.
Gordon, D.L. A. (1997a).'Managing the Changing Political Environment in Urban Waterfront Redevelopment'. *Urban Studies*.**34(1)**, 61- 83
Granath, K. (2005). *Beggar or Chooser?42 years of waterfront development in Baltimore Inner Harbor. What did Baltimore learn?*. Ph.D. Baltimore: Institute for Policy Studies, Johns Hopkins University, Baltimore.
Hall, P.G. (2002) *Cities of tomorrow*. Third edition, Blackwell, Oxford.
Harms, H. (2009). 'Changes on the Waterfront - Transforming Harbor Areas'. *The Future of Shrinking Cities - Problems, Patterns and Strategies of Urban Transformation in a Global Context*. **1 (1)**, 37-49. Online source: http://www.rop.tu-ortmund.de/cms/Medienpool/Downloads/The_Future_of_Shrinking_MG-2009-01.pdf ; Last date of access: 10.11.2013
Harvey, D. (1973).*Social Justice and The City*. Oxford: Blackwell Publishers. Online Source:http://oneboxofturkishdelights.files.wordpress.com/2013/07/david-harvey-social-justice-and-the-city.pdf
Harvey, D**. (**1989).' From managerialism to entrepreneurialism: The transformation in urban governance in late capitalism'. *Geografiska Annaler***. 71 B (1)**, 3-17
Harvey, D. (1992)The Condition of Postmodernity- An Enquiry into the Origins of Cultural Change. 2nd ed. Oxford: Blackwell Publishers.
Harvey, D.(1991) 'A view from Federal Hill'.The Baltimore Book: New Views of Local History. Philadelphis: Temple University Press, 226-249.
Harvey, D.(2008).' The Political Economy Of Public Space', in A. Zieleniec, eds. *Space and Social Theory*.London: Sage. Ch.4.
Healey, P. (1997).*'Collaborative planning- Shaping Places in Fragmented Societies'*. 1st. New York: Palgrave Macmillan.
Healey, P. (2003).' Collaborative planning in Perspective'. *Sage*. **2(2)**, 101–123

Healey, P. (2006).*'Collaborative planning- Shaping Places in Fragmented Societies'*. 2nd ed. New York: Palgrave Macmillan.
Hinsley, H. and Malone, P. (1996).'London Planning and Design in Docklands', in P. Malone, eds. *City Capital and Water.* London: Routledge. Ch.3.
Holland, J.H. (1995)*Hidden Order: How Adaptation Builds Complexity,* New York: Basic Books.
Hoyle, B. (2000). 'Global and Local Change on the Prot-City Waterfront'. *American Geographical Society*. **90 (3)**, 395-417.
Jacobs, J. (1961) *Death and life of great American cities*. Vintage, New York.
Lefebre, H. (1968) Le Detroit a le ville.
Levine, M.V. (1987a). 'Response to Berkowitz: Economic Development in Baltimore: Some Additional Perspectives',Journal of Urban Affairs**, 9 (2)**, 133-138.
Levine, M.V. (1987b) Downtown Redevelopment as an urban growth strategy: A Critical Appraisal of the Baltimore Renaissance, *Journal of Urban Affairs***, 9(2).**103-123.
Loftman, P. and Nevin, B. (1995) 'Prestige Projects and Urban Regeneration in the 1980s and 1990s: a review of benefits and limitations', *Planning Practice & Research*, **10(3-4**). 299-316.
Logan, J. and H. Molotch (2007). *Urban Fortunes*, 20th anniversary edition. University of California Press, Berkeley.
Malone, P. (1996). *City Capital and Water.* 1st ed. London: Routledge.
Marshall, R. (2001). 'Comlexity on the Urban Waterfront', in R. Marshall,eds. *Waterfronts in Post-industrial Cities*.London: Spon Press.
Massey, D. (1994). A global sense of place: From Space, Place and Gender. *Minneapolis University of Minnesota Press*
Meyer,H.(2004).*' City and Port: Urban Planning as a Cultural Venture in London, Barcelona, New York, and Rotterdam. Changing Relations between Public Urban Space and Large Scale Infrastructure'. International Journal of Urban and Regional Research.* **28(1).**229-233
Millspaugh, M. L. (2003). 'The Inner Harbor Story'. *Issue of Urban Land*. **1 (1)**, 36-41.
Molotoch, H.L. (1987).'The city as a growth machine: Toward a political economy of place'. *Journal of Sociology*. **82(2).**309-32.
Mumford, L (1938) Technics and Civilisation
Mumford, L. (1967) My myth of The Machine.
Mumford, L. (1937) "What is a City?", in LeGates, R.T. and Stout, F., eds., (1996) *The City Reader*, London: Routledge.
Sassen, S. (2001).'Global Cities and Developmentalist Sates: How to Derai What Could Be an Interesting Debate: A Response to Hill and Kim'. *Urban Studies*. **38(1)**.2537-2540.
Swyngedouw, E., F. Moulaert and A. Rodríguez (2004) Neoliberal urbanization in Europe: large scale urban development projects and the new urban policy. In N. Brenner and N. Theodore (eds.), *Spaces of neoliberalism. Urban restructuring in North America and Western Europe*, Blackwell, Oxford.
Swyngedouw, E. (2005). 'Governance Innovation and the Citizen: The Janus Face of Governance-beyond-the-State'. *Urban Studies* **42**(**11**) , 1991-2006

Swyngedouw, E., Moulaert, F. and Rodriguez, A. (2002) Neo-liberal urbanization in Europe: large-scale urban development projects and the new urban policy, Antipode, **34 (3)**, pp 542-577.
Orueta, F.D. and Fainstein, S. S.(2009). 'The New Mega-Projects:Genesis and Impacts.International'. *Journal of Urban and Regional Research.* **1(1).** 760-766
Parker, S. (2003). *Urban Theory and the Urban Experience: Encountering the City*. 1st Ed. New York: Routledge. Ch.7. 120-140.
Virilio, P. (1977) Speed and Politics: An Essay of Dromology.
Yin, R. K. (1994).' *Case Study Research. Design and Methods*'. 2nd ed. Thousand Oaks: Sage.

Research Paper

DYNAMICS OF PUBLIC URBAN WATERFRONT REGENERATION IN ISTANBUL

The case of Halic Shipyard Conservation

Serin GEAMBAZU, Ion Mincu University of Architecture and Urban Planning; Romania

Abstract

In the process of globalization, building on the particular spatial scenery of the waterfront, cities tend to refresh their strategies of development to adapt new trends of urban life with huge urban waterfront regeneration projects. These usually focus on a target of maximum marketing and construction of a new image-vision, which aims to represent the city in the global agenda. This aspect is depending on bigger changes in the urban context, the shift in government structures to entrepreneurial forms that involve externalization of state functions (Swyngedouw 2005; p. 1998). The rationale behind the phenomenon of waterfront regeneration and the global embracement of it is now "widely recognized if incompletely understood" (Hoyle 2001 pp. 297), as the relevant literature is based on case studies with focus on the examples of North American and European cities.

The goal is to contribute to the more general, theoretical contention of urban waterfront regeneration in developing countries in understanding their dimensions in terms of governance and planning. The research tackles urban waterfront regeneration in Istanbul, Turkey by studying the most recent initiative of urban waterfront regeneration along Halic /The Golden Horn, the Halic Shipyard Conservation Project.

The theoretical framework that underpins this study is derived from the discourse on new forms of urban governance including private, public and civic actors (Paquet 2001) that influence planning processes and project outcomes. To evaluate the planning process from a comprehensive governance perspective, indicators include: the legal framework, decision-making process, actors and their relations (Nuissl and Heinrichs 2010) and as normative the perspective of an inclusive planning approach (Healey 1997, 2006) helps to evaluate the planning process of the project. As urban waterfront regeneration literature is mostly based upon case study approaches, a critical overview of international examples is conducted. Both primary and secondary data is collected through: literature review, review of laws, review of official documents and land-use plans, an internship, 31 interviews, 91 questionnaires, participatory observation, a workshops, observation and photographs.

The aim is to assess to which extend the top-down governance forms, but also bottom-up grass root empowerment influence the planning process and project outcomes, giving

recommendations for an inclusive planning approach. The second aim is to evaluate the urban waterfront regeneration project studying its impact on the neighboring community. Bedrettin Neighborhood is chosen for analysis and its position in the planning process along with its needs are exposed. The thesis argues the modes in which along with clear targets for the improvement of the quality of life for the neighboring community, the urban waterfront regeneration project, Halic Shipyard Conservation Project, will be able to escape the current deadlocks and collisions between government, investors, resistance and local community and might have a chance to actually set an urgently needed precedent of a new planning culture in Istanbul.

Keywords

urban waterfront regeneration, governance, planning process, Istanbul

1. Introduction

The spread of neo-liberal political and economic ideology and the proliferation of global capital have created new opportunities and challenges for cities everywhere, especially in the so called "global cities". Over the last decades, many cities worldwide have promoted urban waterfront regeneration for a variety of reasons building on the particular scenery of these sites. The success of the first well known urban waterfront regeneration project, Baltimore Inner Harbor regeneration (1960), has served as a prototype for cities around the world with the desire to position themselves in the race to become Global Cities (Harvey 1989) by providing strategically located high-quality investment opportunities to attract global capital, or by constructing attractive spaces to promote tourism and leisure. Nowadays, almost every city at water's edge is engaged in regeneration projects with strong political impetuses and interest from various parties: authorities, developers and neighboring communities (Hoyle 2001). These developments have been critically examined by many scholars, many of which share the belief that urban waterfront regeneration is often not addressing the underlying, deep-rooted problems of the cities and furthermore, ignoring the socially and economically unstable landscapes in which they often occur, veritably contributing to the escalation of inequality, polarization and deprivation in the city (Harvey 1989; 2005; Brownill 1990; Gordon 1997b; Hoyle 2000; Saarinen and Kumpulainen 2005; Butler 2007; Healey 1997; Gordon 1997a, 1997b; Feldman 1999; Fainstein 2001; Granath 2005; Butler 2007).

It is generally assumed that globalization leads to the same type of transformations and urban development trends everywhere in the world. However, it cannot create a certain prototype for spatial development or a new spatial order for cities. Rather, it gives a variety of spatial patterns, also called "global urban forms". This standardization (or 'nothingization', as Ritzer calls it) takes place in many aspects of urban life of global cities everywhere and destroys what is there most alive, the identity and socio-economical constructions of the place. Furthermore, what Relph (1976) and Augé (1995) advice within the popular terminologies of non-places and settings of placelessness is about the construction of spaces which are produced and have their identity extremely embedded in the market dynamics.

Places on where the lack of authenticity with community non-involvement in the construction of the setting has become a normal issue.

The article is studying urban waterfront regeneration as a complex urban intervention, specifically its special governance, resistance and impacts on the neighboring tissue, which could be considered a prism through which broader societal transformation processes and related planning challenges can be understood. The case brought forward is the recent urban waterfront regeneration along Halic/ The Golden Horn, in Istanbul, Turkey.

2. Urban waterfront regeneration in Istanbul: Halic/ The Golden Horn

2.1. Context of planning and institutional framework

Since the 1980s in Turkey´s milieu, national policy intended to make Istanbul the focal point of a neo-liberal strategy approach to integrate the Turkish economy with global markets. This was visible also in the accelerating transformation of urban space, making it the showcase of the country's new era of internationalism (Enlil 2011; Uzun 2010, Çınar, C et al, 2006; İnalÇekiç and Gezici, 2005; Keyder, 2005; Karadag, 2010).

Under this context, during the last thirty-five years, investments have been located within the city in order to change the local landscape pushing it towards the global city image. Therefore, the city has been expanding with multiple mega-projects and naturally, a strong representative symbol of the global, emerged: *waterfront regenerations i*n the valuable "soft" space of inner city usually modifying natural coast profiles.

These territorial changes have been not only modifying natural structures, they have generated such a special urban form by the transformation or even replacement of the original communities and their identities. Behind the consolidation of new waterfronts, local populations are experiencing struggles and contradictory emigrational patterns in the inner city; dynamics that have been usually explained by secondary data, statics and within many articles uniquely pointing on the production of geçekondus. However, it is still not evaluated what happened in those spaces where is a coexistence of new migrants moving to the developments and local populations that are being affected by market dynamics.

In order to understand the planning processes of the regeneration of Halic's waterfront, a reflection is done upon the peculiarities of Istanbul's urban regeneration policies and the institutional framework at city and national level that have facilitated it. Urban regeneration is steered as a tool for development within a special legal framework (Law of Conservation-Law No. 2863) and while the purpose of the projects seem to be in the name of upgrading the built environment and improving the living conditions of the poor, the top-down approach, reduce the projects to just transformation of physical space and neglecting the social, economic and environmental dimensions, which along with the unwillingness of government to allow grassroots participation in the planning process become the focus of discontent and protest.

2.2. Halic/ The Golden Horn: a fragmentized waterfront

Halic, a 7,5 km bay of the Bosphorus strait and the cradle of settlement since the birth of the city, is heavily industrialized and contaminated in the 1970s and since then experiences a long process of transformation along its waterfront.

In line with popular North- Western examples of urban waterfront regeneration at that time, this process is triggered by Mayor Dalan in 1983, who famously stated his mission:

„The water of the Halic will be as blue as my eyes'" (Radikal Newspaper).

The project is sponsored by World Bank and the industrial waterfront is transformed into a huge vacant land which becomes large green park areas (Enlil 2011). Behind the environmental concerns, there was also an economic motivation to bring Istanbul between the competitive global cities with a vision of a "Cultural Valley". The following forced de-industrialization process of the 1980s is impressive and did indeed improve Halic from an environmental perspective, but the clearing process was pursued with a heavy-handed, top-down governmental approach to planning and the legacy of mayor Dalan is contested among academia, civil society, non-governmental organization and experts in planning: The project created an approximately 50m wide strip of vacant land– a great opportunity in terms of offering open green spaces for the city- but destroyed 100 Ottoman-era buildings and an additional 30,000 structures, displaced neighbourhoods within 50-100 m along the shoreline (Köksal 1996, 2005; Yerliyurt 2008; Bezmez 2008) and most importantly brought mass unemployment and poverty in the backstage neighbourhoods populated by former dock and shipyard workers (Köksal 2005; Bezmez 2008; Yeliyurt 2008; Enlil 2011).

The following initiatives to regenerate Halic's waterfront showed no intention of resolving the social and economic burning issues of the neighbouring communities. Within the same top-down planning approach, as in the 80's clearance intervention, urban waterfront regeneration projects are ad-hoc initiative of different bodies of the government depending on ownership and planning rights over the land. Therefore, within privileged legal means facilitated by different governmental bodies and by a national policy on urban regeneration, developments for middle-high income citizens are created:

"With empty convention centres in the middle of poor neighbourhoods, a few art galleries right beside demolished historic buildings, and newly built museums next to squatter housing". (Bezmez 2008 pp. 817).

Although the attempts to transform Halic with the vision of a "Cultural Valley Project" are not different from other urban waterfront regeneration projects around the world, in terms of process, they can't be explained through just one clear framework of public-private partnerships, intense processes of urban entrepreneurialism or gentrification as other classical North-Western examples. As a response to this regime of urban regeneration (Dincer 2011a; Dincer 2011b) urban social movements are formalized in Neighbourhood Associations or non-governmental organization taking an active role in the planning process. (Kerimoglu and Gezici 2010; Dincer- 2011b;Bezmez 2008)

2.3. Decision making process

Social justice has the dimension of a process rather than an outcome and therefore the planning process is of a particular importance to portray “governance of place” (Healey 2003). "The extent to which opportunities for participation are picked up in reality is an important indicator of balancing interests, even though is primarily the privileged, most articulate and directly concerned elements of society that attempt to participate in public decision-making processes ". (Heinrich and Nuissl 2011)

This sub-chapter is an overview on the decision-making process for the urban waterfront regeneration of Halic Shipyards (Tersane-i Amire Arsenal), the latest urban waterfront regeneration development along Halic.: a first attempt in regenerating Halic Shipyards is presented, followed by the current state, two urban waterfront regeneration projects in on-going process of transformation. These urban waterfront regeneration projects are: Halic Shipyard Conservation Project (Haliç Tersanesi Rölöve, Restitüsyon, Restorasyon, Yeni Kullanım ve Peyzaj Projesi) in the area of Halic shipyard and Halic Port Project (Halic Yat Limani Projesi) in the area of Camialti and Taskizak shipyards.

The first attempt to officially create a plan to regenerate the area of Halic, Camialti and Taskizak shipyards is in 2011, when all three shipyards come under the authority of Istanbul Metropolitan Municipality (IMM). The final goal is to create a comprehensive urban regeneration project and reconnect Beyoglu district with its waterfront along the Halic.

Being declared as a Conservation Area, the development is managed by the Department of Historic Environment Protection (DHEP, in Turkish Tarihi Cevre Koruma Mudurlugu is the representative body of Istanbul Metropolitan Municipality in the areas declared for conservation. It is empowered by the Decision No. 313 in 04/06/1999 and has a management role within the project, making sure that the project it is accomplished in line with the requirements of the Law of Conservation), which focuses on the restoration of the historical buildings on the site and change of the current functions in new ones according to the needs of the citizens. DHEP designates through a bid the task of making and designing the plans to Istanbul Metropolitan Planning (IMP- Bimtas S.A., is a semi-private company and also a research centre for Istanbul Metropolitan Municipality. It has long lasting collaborations with academia, neighbourhood associations and wide experience in planning in Istanbul, it is the company that made the last Master plan of Istanbul 2009 and many other important development projects).

In line with the requirements of the Law of Conservation, the Conservation Board No. II is added to the decision-making process. This Board is linked directly and represents the interest of the Ministry of Culture and Tourism, has great power on the project’s outcomes, evaluating the plans and being able to cancel them.

The plans done for a preliminary project (in Turkish "avan proje") start on January 2011 and finish in June 2011, but without any request for participation from the citizens side and no reflection on the surrounding neighbourhoods. The proposed functions for the area are: cultural, recreational, social services and commerce functions and are approved by the Conservation Board No. II in July 2012. The next step in planning process after the preliminary project, according to Main Law of Construction (Law No.3194), is the implementation project (in Turkish: “uygulama projesi”) which did not continue with all

three shipyards. Here a shift in the governance forms of the project changes the planning process along with rising concern on the project's future outcomes: just one of the shipyards went further to the implementation phase under the name of Halic Shipyard Conservation Project, when the area of the other two shipyards is being privatized. Holding the ownership of the land of Camialti and Taskizak shipyards, the Ministry of Transport Maritime Affairs and Communications (MTMAC) decides to withdraw the project from the authority of IMM.

In 2013, a new urban waterfront regeneration project is declared for privatization and classified by the Prime-minister Tayyip Erdoğan as: "*miraculous project*" ("muhteşem proje") which appears with the name: Halic Port Project. The urban waterfront regeneration project is initiated by the MTMAC, under the Law of Privatization, known as Built Operate and Transfer (Yap Islet Devret- Law. No. 3996) and is approved by Higher Council of Privatization (HCP); this also being possible because, according to the Law of Privatization, since 1994, the authority to make and approve plans concerning estates included in the privatization program was transferred from local authorities to the HCP.

The area is given to auction and is announced in the Official Paper (Resmi Gazete, page 28646) on 13 May 2013. The tender is taken on 2 July 2013 by ''Sembol International Investment'',''Ekopark Tourism" and "Fine Otelcilik Girişim Group"(Sembol Uluslararası Yatırım-Ekopark Turizm-Fine Otelcilik Girişim Grubu) for 49 years: 4 years for building and 45 years for usage. The requirements of the project are given beforehand to the investors, being decided by the MTMAC and approved by the HPC. These are: *"two yacht ports, two five stars' hotels, small shops, offices, museums, culture and a congress center".* Taking into account these foreseen outcomes of the project, it can be argued that this development is not designed for the interest of all citizens of Istanbul or the neighbouring community, but rather for tourists and high-middle income class. The promised outcomes of the project are presented in the media through the political discourse as the only information channel for citizens and therefore raised a big wave of criticism from academia and other expert's side, questioning the way decision is being taken.

Therefore, the planning process is lacking transparency and the Privatization Law gives central government power to privatize public land without any consideration of the civil society. Also local municipality has been taken out from the planning process and also the 1/1.000 plans that should be done for the Camialti and Taskizak shipyards are developed by the private investor, this raising questions concerning the conservation of the shipyards.: The only actor from the government side having decision power over the outcomes of this project remains the Conservation Board No.II.

In contrast, the area of Halic shipyard is developed further by IMM within the Halic Shipyard Conservation Project**.** Major actors in the planning process here are: IMM, the initiator of the project, owner of the land and also the provider of the finance in realizing it; the DHEP managing the project, having mainly the responsibility to assure the conservation and restoration of the historical monuments in the area; the Conservation Board No. II, representative of Ministry of Culture and Tourism, having also the main responsibility to assure the conservation and restoration of the monuments; IMP in charge of the plans and design of the project and also IDO (Sehir Hatlari) - a private company of public transport on water, having currently the tender over the area of Halic shipyard**.**

In the interviews with representatives from the planning department of IMP, the team planning Halic Shipyard Conservation Project, it is revealed that the outcomes of the project

will take into consideration the previous suggestions and that the project will respect the 1/1000 Plans of Beyoglu in terms of conservation of the shipyards, along with the recommendations of implementing cultural and recreational activities. Moreover, creation of green spaces is emphasized, the vision being to open the waterfront for the broad public, the citizens of Istanbul. Proposed strategies concerning the development are: *"conservation of the buildings, enhancing the transportation in the area, introduction of recreational and exposition areas, bringing the city to the waterfront, protection of green spaces and ensure the participation of the local people of the area."*

However, the project contains no analysis of impact assessment such as: environmental, economic or social, this showing the physical focus of urban waterfront regeneration in planning, putting in doubt the success and purpose of this project. There is also no information provided for the broader public about the project or the request for any collaboration from the citizen's side. The chance to challenge decision making is possible at the end of the project. As all projects made by municipality, also this one is presented to the community at the end of the planning process, plans are hanged in the Istanbul Metropolitan Municipality building and within 30 days the interested parties have the right to contest the project through court. This leads to questioning the outcomes of the project because of this type of non-transparent planning process that leaves no input from the citizen's perspective.

Therefore, as seen and criticized in other examples of projects along the Halic, the project could also potentially enhance existing socio-economic problems, a matter that will be presented in the following part of the article, by analysing the neighbouring community in rapport to the project.

Looking at the current state of the transformation of the three shipyards, there are two urban waterfront regeneration projects with different governance forms. The area of Camialti and Taskizak shipyards is under the authority of a private investor and it can be argued if the project will benefit the broader public of Istanbul. The area of Halic shipyard remained under the authority of the government, but the planning process is un-transparent and the project is not shared or questioned within the interested public. In an attempt to compare the projects from the perspective of the information available, paradoxically, the Halic Port Project is much more known by the public than the project made by the municipality because of the exposure in the media. However, there is a major gap of good quality information for citizens regarding both projects.

This was reflected in the questioners conducted with the neighbouring community, academia, planners from Istanbul Metropolitan Planning and citizens participating to forums organized by the representatives of the resistance to the regeneration of the shipyards. An urban social movement appeared on 23 August 2013 under the name of Halic Resistance (Halic Dayansimasi). Other opposing parties are: Bedrettin Neighbourhood Association, Chamber of Architects, Chamber of Urban Planners, Assembly of Architects and Engineers, Chamber of Shipbuilding Engineers, Academia and other urban social movements.

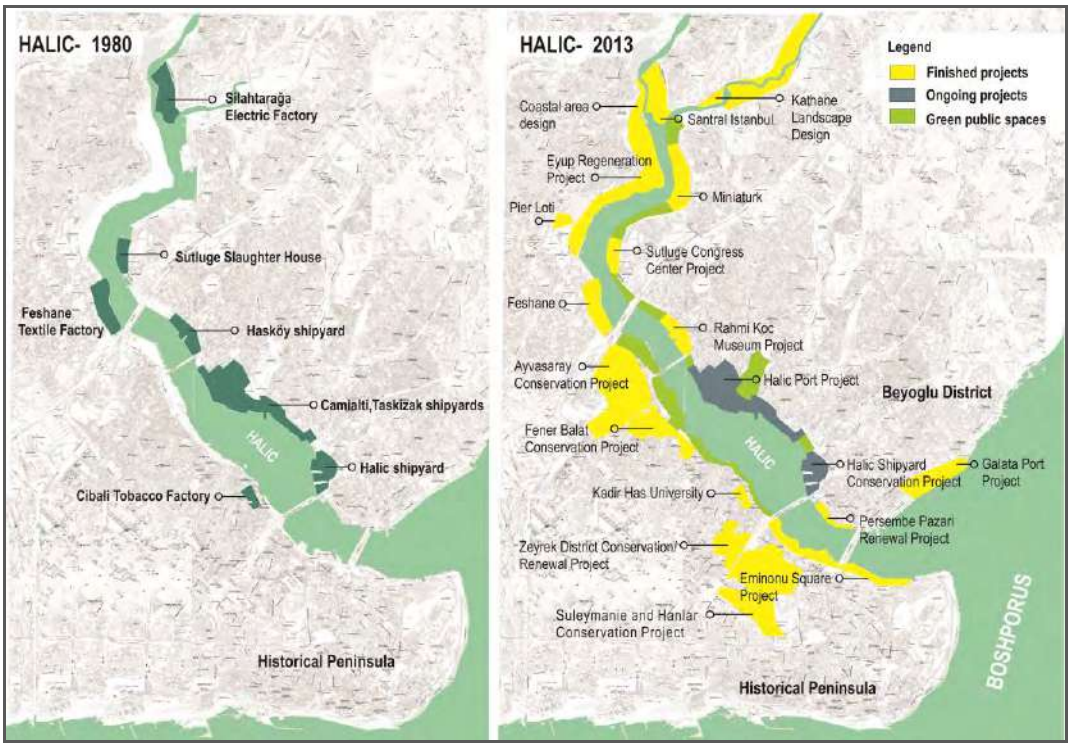


Figure 1 Change of Halic's waterfront from 1980s until 2013

Source author

2.4. Governance dynamics

With the new more entrepreneurial forms of governance, also new arrangements articulating state - civil society relationship come forward (Swyngedow 2005). In urban waterfront regeneration, urban social movements formalized as community groups or non-governmental organizations, coming often from the neighbouring communities and other interested or affected parties become a source of ideas and influence the pace and pattern of development. They encourage, restrain, warn and provide qualitative overviews. (Krausse 1995; Cau 1996).

These new actors engaged in opposition, observed and identified within the period of this research, are social movements representing partly defined groups of civil society, chambers of experts in field of planning and community organizations: Halic Resistance, Academia, Bedrettin Neighbourhood Association, Chamber of Architects, Chamber of Urban Planners, Chambers of Mechanical Engineers, The Lawyers Association, Union of Chambers of Turkish Engineers and Architects, Neighbourhood Associations and also political parties, such as CHP. However, three main groups of actors in this opposition are chosen to present their interests and roles as they have been most active since the beginning of the planning process: Chamber of Architects, Bedrettin Neighbourhood Associations and the platform where all and others meet, the social movement- Halic Resistance.

Chamber of Architects is the first actor which opposed to the regeneration of the shipyards and gave support to others that came along during the planning process. According to the 6235 Act of Union of Chambers of Turkish Engineers and Architects, the Chamber has the right to sue development projects which are not benefiting the rights of the society. The main reason to be against this regeneration, from their perspective, is that it will create displacement in the neighbouring community, the shipyards will not be conserved and moreover the project will not benefit the needs of the citizens. Although the Chamber of Architects is practicing advocacy planning, it is still a centralized institution that evaluates projects from its expert perspective and has a focus on the concern of conservation of heritage, the monuments existing on the site of the shipyards. The Chamber is also stigmatized as being against all development projects and not seeking solutions, being in conflict with the government, outcome of many law suits against this type of projects. It's the discourse tended to focus towards the cancelation of the projects, but not militating for inclusion, transparency and information, outcome of the mistrust towards " *the neo-liberal agenda of the government and all the mega-projects triggered by it."*

So non-governmental organizations funded in 2005 in order to fight with legal means against urban regeneration project for the community of Bedrettin Neighbourhood, is Bedrettin Neighbourhood Association. As Mr. Cem Tuzun, the representative of Beyoglu Neighbourhood Associations, explains:

"**to** *defend the rights of the citizens against a neoliberal agenda of the government" ; "to keep surviving in our neighbourhoods*". The aim is to fight in court against any regeneration project that could put in danger of displacement the community. "*We want to defend the place where we live, the place where we worked so much for. We took our water from the polluted Halic and we survived Dalan's demolitions. We don't want to go from here and we will fight against this neoliberal agenda*." says Suleyman Songur, representative of Bedrettin Neighbourhood.

Halic Resistance urban social movement is the platform were all interested parties meet and militate against the regeneration of the shipyards. This social movement militates for: *the importance of the shipyards from the conservation point of view* and also its *production potential*. Moreover, it is against the "*clear neo-liberal transformation of the shipyards*". One of the initiators of the movement, Dr. Arh. Gul Koksal calls these urban regeneration projects as: **"***the hegemony of the government***".** As a core, a board was created from representatives of: academia, Chamber of Architects, Chambers of Mechanical Engineers, Bedrettin Neighbourhood Association and former workers at the shipyards. Decisions are taken during meetings or in innovative ways through social media and mail groups. On 19.11.2013 a petition to Conservation Board regarding the clearance of Taskizak and Camialti shipyards was given as a violation of the Law of Conservation. This event builds on the efficiency of the movement in monitoring the development of the shipyards, report any violation of the law and call responsible bodies to action. However, it also depends on the Chamber of Architects for its legal fight, being the institution with the right to sue the urban regeneration projects. In addition to the aforementioned, because of the informal means in which the resistance is reaching the information, false beliefs can be spread to wide public, fact revealed also in the interviews with the participants at the meeting of the movement. Also 45% of the participants come to the meetings not only to support the resistance, but also to inform themselves about the regeneration projects. Therefore, the need of

information is underlined regarding these projects and here is the point where this kind of movements gain popularity for being open to participation and sharing knowledge.

The new actors engaging in resistance have no power in decision making over the projects, but they have influence on the planning process due to their actions. The collaborative networks and their innovative ways of decision taking makes them strong actors that have to be taken into account. These collaborations can challenge or conceivably stop the project. Opposition can be seen as an opportunity in increasing democracy, challenging the projects by creating debate and trying to reach a broader public, being always in contact with the media. Still, their demands in the project cannot be taken as indicator for the needs of the all citizens of Istanbul, rather they can be used as an indicator to the need of change in the planning process towards more transparent and inclusive one and can be used to improve the project.

2.5. Relationships and positions of the actors

Relationships of the actors are "*crucial in understanding the direction of the planning processes*."(Nuissl and Heinrichs 2010). The relationships were established as outcome of the interviews conducted by the researcher and through participatory observation. When mapping the relationships, there are two clusters of actors that do not come together, this situation is reflected on the clash of interests and gap between civil society representatives and the government. One group represents the actors involved directly in the planning process and the other represents the strong opposition. The first ones have hierarchical vertical relationships by territorial responsibility of different governmental bodies and market based relationships by contractual agreements. The other group in opposition to the project is represented by collaborative and horizontal relationships of the non-governmental organizations, social movements and other civil society representatives.

Analysing the actors in opposition and the horizontal network-like relations, overlapping interconnections among them can be observed. The boundaries between these actors are hard to be defined as they cooperate and interconnect with each other rapidly, using innovative means of communication in exchanging of opinions and in deciding common action. When the main actors from opposition, and ones involved in the planning process are considered for their relationship, there is a long lasting conflict between them which resulted from the interviews conducted with representatives of both sides, this making also harder for the two groups to come together. It can be argued that even though the resistance is engaging with the community into a fight against the urban regeneration agenda of the government, undertaking an advocacy planning role, it is also creating a barrier between state and citizens. (Figure 2)

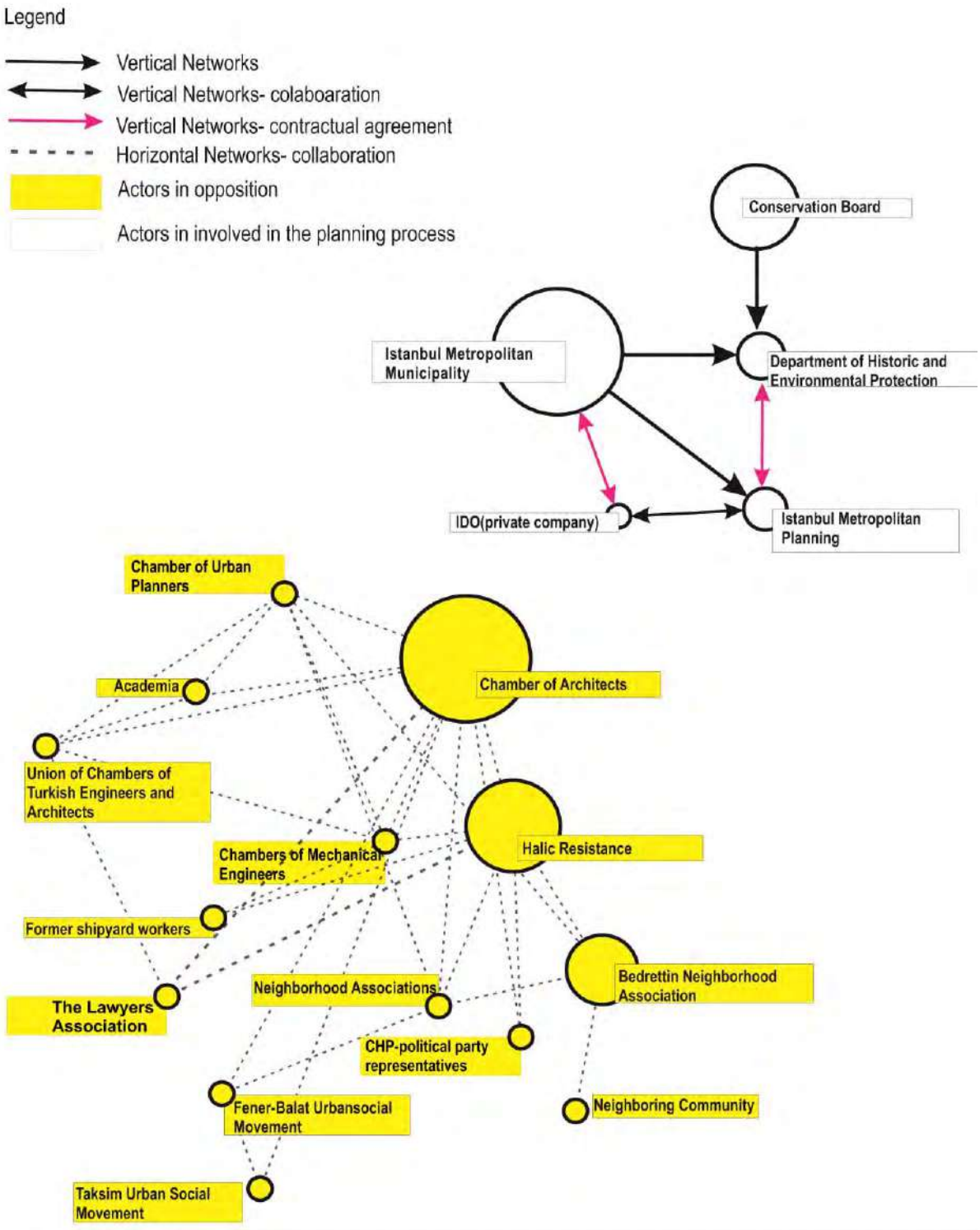


Figure 2 Relations among actors in Halic Shipyard Conservation Project;

Source author (adapted after computer mapping with graphscommons: http://graphcommons.com/graphs/1417)

A stakeholder analysis has been developed as an outcome of the questionnaires and interviews realized with representative of the institutions involved in the planning process, but also with the representatives of the social movements, civil society, neighbouring community, non-governmental organizations, planning experts and academia- mostly all 91 total participants to the interviews and questionnaires in this research. The methodology was taken from the study: Governance and Multi stakeholder Processes by Nancy Vallejo and Pierre Hauselmann (2004)- a product of the Sustainable Commodity Initiative, a joint venture of the United Nations Conference on Trade and Development and IISD. The purpose was to find first the most interested and most powerful actors in the planning process. Than recommendations are given according to the methodology and the results from the questioners are represented in the matrix below. (Figure 3)

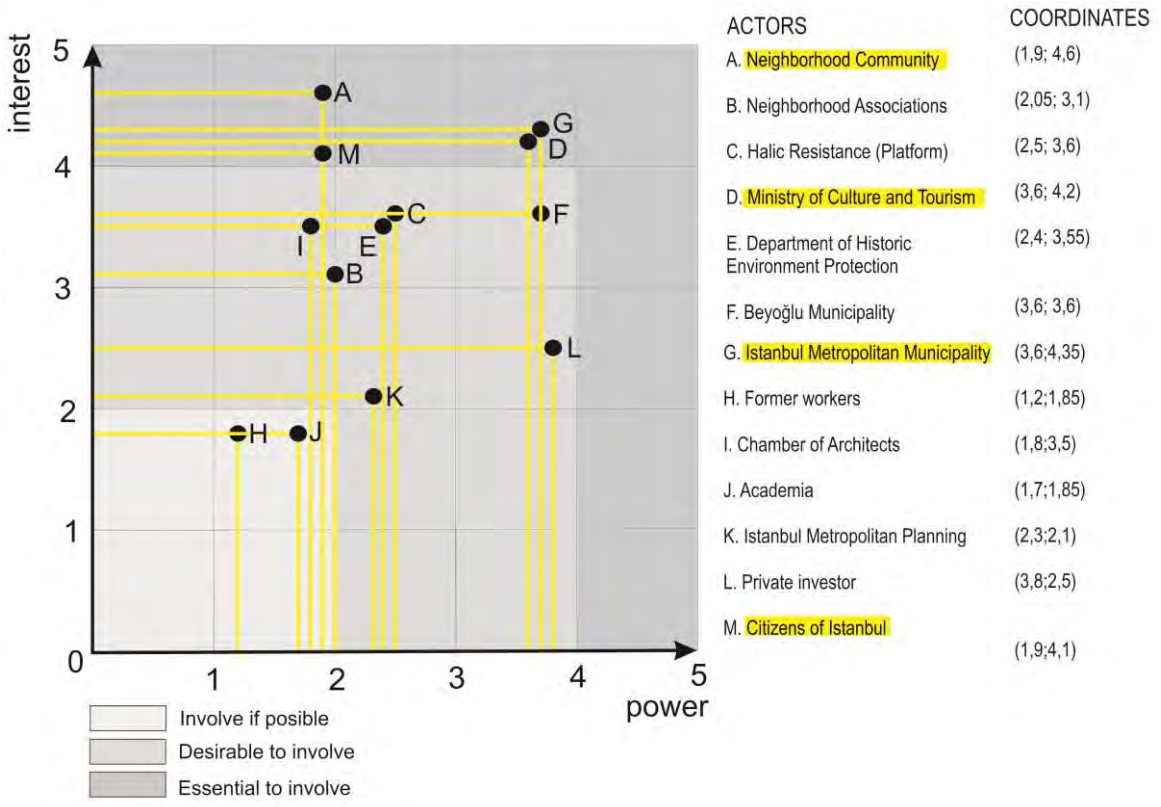


Figure 3 Stakeholder analysis made with the help of civil society

Source author

Methodology:

The last part of the questionnaires conducted had the purpose to identify the interest and power of certain actors involved or opposing the studied project. This exercise provides the researcher with the perception of who should be included in the planning process by placing the actors according to their *power*- ability to influence the project or *interest*- the influence of the project on the actor.

This method was taken from the study: Governance and Multi stakeholder Processes by Nancy Vallejo and Pierre Hauselmann (2004)- a product of the Sustainable Commodity Initiative, a joint venture of the United Nations Conference on Trade and Development and IISD. In the matrix below are recommendations according to the methodology. (Fig. No. 03)

The participants were requested to rate the actors in terms of their power and their interest with marks from "1 to 5". Grading systems from "1 to 5" were chosen, because they are also used in schools in Turkey, making the task of filing of the questioner easier. Power was defined as: actors having the power over decision-making and decision-taking over the project, planning process and outcomes, influence on the project through financial means or having particular knowledge about it. Interest was defined as: actors that are affected by the project outcomes or that have a gain in the project

The actors identified were: Neighbouring community, Neighbourhood Association (Bedrettin Neighbourhood Association), Halic Resistance, Ministry, Department of Historic Environment Protection, Beyoglu Municipality, Private sector, former workers at shipyards, Chamber of Architects, Conservation Board, Istanbul Metropolitan Municipality, Istanbul Metropolitan Planning, Citizens of Istanbul and academia. Also a section for 'other' was left out for the participants to be completed with other actors interested, affected or involved by the project.

The total number of respondents was 81 and they were divided in six representative groups: the government, non-governmental organizations, academia, private sector, urban social movements and the community. A simple mathematical formula was used for calculating the final results, the same share was given to each of the 6 groups.

The answers for every 13 actors were calculated separately, having also two variables -- power and interest:
[0,x; 0,y] in order to place them on a matrix with the axes: x0y.

The formula for every answer was:
[(1+2+3+....+n) / n] *6= x
1,2,3,.....n = the response of one respondent regarding one actor
n= number of the respondents
(1+2+3+....+n) / n = the final grading of a certain group (government, NGOs, academia, private sector, urban social movements and community)
x= the final grade for interest

The same procedure is in the case of power:
[(1+2+3+....+n) / n] *6= y
1,2,3,.....n = the response of one respondent regarding one actor
n= number of the respondents
(1+2+3+....+n) / n = the final grading of a certain group (government, NGOs, academia, private sector, urban social movements and community)
y= the final grade for power

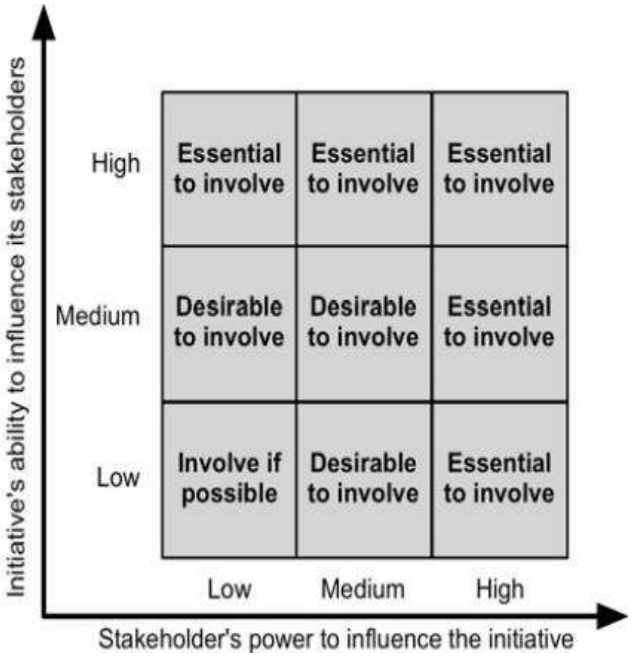


Figure 4 Directions to involve actors in Stakeholder Analysis by power and interest

Source: Governance and Multi stakeholder Processes by Nancy Vallejo and Pierre Hauselmann (2004) pp.4

3. Conclusions

3.1. Evaluating the planning process

Halic Shipyard Conservation project is initiated and subsidized by IMM, but the central government has regulatory power over the project outcomes, due to the special national laws designated for urban regeneration. Private sector is added to the decision-making process by IMM, but local government, Beyoglu Municipality, the district in which the project is done, is missing from the planning process. Although the project is made for the public interest, it was found that there is no consideration of giving information or chance for participation to the most interested parties: the neighbouring communities or the citizens of Istanbul. Looking at the decision-making process, the first attempt to officially create a plan for regenerating the area of Halic shipyard was together with Camialti and Taskizak shipyards, but as a result of the deficiencies in legal framework giving total rights to owners of land and central government, the latter ones were privatized.

The lack of information and broadly-based rights of influence are manifested by this opposition that is part of a broader fight against the "neo-liberal agenda of the government". The neighbouring community's need of information and the lack of trust towards projects initiated by the government brings it closer to the actors in resistance. The collaborative networks and their innovative ways of decision taking can challenge and even conceivably hazard the project.

The planning process of this particular urban waterfront regeneration was found therefore as not inclusive, not transparent and not giving opportunity to challenge decision-making in the planning process. Therefore, it can be argued that what could be a good project creating public space and reconnecting the urban tissue of Beyoglu district with its waterfront, will fail to reach its true potential in benefiting the neighbouring community and also the broad public of Istanbul. This due to its exclusive governance, the top down approach to planning and the legal framework given by the national policy on urban regeneration.

At the first glance, urban waterfront regeneration in the context of Istanbul reveals the same features of the popular contested cases of North and Western examples .The privileged governance structures identified in the literature review of urban waterfront regeneration projects aiming economical gain over the conception of a new city image and planning focusing on mostly physical transformation, ignoring the social problems of the neighbouring sites and not taking the opportunity to resolve them can be seen also in the case study.

However, the form in which these outcomes reveal themselves, are different. Much of the literature on urban waterfront regeneration warns about the entrepreneurial governance forms, the private-public partnerships and the active role of private sector in the development of the projects, which lead to displacement of the communities, gentrification and other negative impacts. In the context of Istanbul, the leading factors are an entrepreneurial government and also a national policy on urban regeneration designated by the central government. In contrast with other urban waterfront regeneration projects around the world, which reveal citizens struggle with displacement, job opportunities, social housing opportunities and public space at waterfront as reasons for opposition, the case study presents also other encompassing motivations. The strong and constantly growing opposition is also part of a leading strategy of the citizens of Istanbul to get back the rights to the city. This is owed to long term accumulation of tensions facing the current urban

planning practices in Istanbul, Turkey. The resistance, therefore, is not outcome of the particular regeneration of Halic shipyard or the privatization of the other two shipyards, Camialti and Taskizak shipyards (part of Halic Shipyards- Tersane-i Amire Arsenal), but rather of a bigger picture of urban regeneration projects done in Istanbul.

Hence, there is a waterfront regeneration project made for public interest, but the rights of the future users of the space, of the neighbouring community and mostly of the citizens of Istanbul are in this way lost behind a neo-liberal agenda of the central and local government, un-transparent planning processes and the fight of the strong opposition parties gaining ground of governance landscape.

3.2 Recommendations

In term of urban waterfront regeneration there is a clear need for success not only by those at the top. Levine suggests equity in planning and democratized redevelopment agenda process that target residents in greatest need and policies that better link this regeneration to neighbourhood's economic needs. (Levine 1987b) Unfortunately there is no necessary linkage between economic growth and social equity.

One may argue that only through a change towards a more inclusive planning approach, along with clear targets for the improvement of the quality of life for the neighbouring community, the studied urban waterfront regeneration projects will be able to escape the current deadlocks and collisions between government, investors, resistance and local community and might have a chance to actually set an urgently needed precedent of a new planning culture in Istanbul.

The top down-governance forms have to combine with the bottom-up governance forms in order to achieve a physically and socially successful development. The citizens of Istanbul must be informed and included in the decision-making process in the planning process. The Municipality of Beyoglu has to be incorporated into the planning process, defining the link with the citizens from the district in which the project is done.

Taking into account the importance of the area by its location and accessibility, but also its cultural and historical value at local, national and international level there is a need in having a broader voice of influence and expertise into decision-making from various planning experts and academia. The management bodies in urban waterfront regeneration were found of great importance, scholars designating them as the reason for success of these interventions. The narrow approach to urban regeneration focusing on physical transformation given by the national policy, verified by Conservation Boar No.II and managed by the DHEP has to be enlarged and has to take into consideration more factors through impact assessment studies of social and environmental aspects.

Lastly, the project has to include the neighbouring community in the planning process and its needs considered. By including the community in the planning process, the project can also resolve old social and economic problems left heritage since the forced deindustrialization of the area, thus, creating more heterogeneous environments in the city. The project can help to improve the quality of life for the neighbouring community with creation of: public green spaces, culture and education facilities, health facilities and also playgrounds for children.

Also job creation is proposed, but this only by keeping production going at the shipyard. It has been proved in other waterfront regeneration projects around the world that the jobs from cultural, tourism and other retail activities were absorbed by middle income population. All these points can be achieved only by involving directly the community in the planning process and in the implementation phase. It was found that the neighbouring community is open to communication, and is willing to give input that will enrich the projects outcomes and therefore it can be engaged into participatory planning methods in the further planning process.

Considering the bigger picture of urban regeneration; will the citizenship struggle of Istanbulities will overcome and change the current approach to planning of an entrepreneurial government and the market forces is a question that we should pursue. However, what we are facing in the case of Istanbul can be resolved just by democratic mechanisms within the planning process, by understanding the territory as political and social construction. We have to focus on change and how to make it happen because as one of the respondents explained, we want to "keep *surviving in our neighbourhoods*".

Under current conditions, urban waterfront regeneration in the context of Istanbul presents a different picture from a number of similar interventions of this type studied in the existing literature. In order to come with a comprehensive theoretical framework that explains present-day urban waterfront regeneration and how these kinds of mega-projects shape urban spaces, it necessitates the analysis of different localities in distinct geographical settings.

4. References

Augé, M . (1995). *Non-Places, Introduction to an Anthropology of Supermodernity*. London-New York: Verso.

Bezmez, D.(2008).'The Politics of Urban Waterfront Regeneration: The case of Halic (the Golden Horn), Istanbul'. *International Journal of Urban and Regional Research*. 815-840

Brownill, S. (1990) Developing London's Docklands: another great planning disaster?. Urban and Regional Development Series. Sage Publications. 104-105

Butler, T. (2007). 'Re-urbanizing London Docklands: Gentrification, Suburbanization or New Urbanism?'. *International Journal of Urban and Regional Research.* **31(4),** 759- 779

Çınar, C., Çizmeci F., Köksal A. (2006). *The New Address of Social Polarization in Istanbul: Gated Communities*. Paper presented at 42nd ISoCaRP Congress, Cities Between Integration and Disintegration, 14-18 September 2006, YTU, İstanbul.

Dinçer, I. (2011a).' The Impact of Neoliberal Policies on Historic Urban Space: Areas of Urban Renewal in Istanbul'. *International Planning Studies*. **16 (1)**, 43-60.

Dincer, I (2011b).'The Dilema of Cultural Heritage- Urban Renewal: Istanbul, Suleymaniye and Fener-Balat'. 14th Internationa Planning History Society Conference

Enlil, Z. (2011).'The Neoliberal Agenda and the Changing Urban Form of Istanbul'. *International Planning Studies*. **16(1).** 5-25
Erbas, E. (2000).' Port Regeneration and Sustainable Urban Development, The Case of Galata Port

Erbas,A.E and Erbil,T. (2012). The Impact of Neoliberal Policies on Historic Urban Space: Urban Renewal in Istanbul: Neoliberal Challenges and Practices of Urban Regeneration Projects in Istanbul. *Real Corp 2013 Tagungsband*. **1 (1)**, 587-591.

Fainstein, S. (2000). 'New Directions in Planning Theory'. *Urban Affairs Review.* **35(4)**.451-478.

Fainstein, S. (2001).'The City Builders: Property Development in New York and London, 1980-2000. 2nd ed. Lawrence: University Press of Kansas. 160-185

Feldman, M. (1999).'Urban Waterfront Regeneration in the Baltic States: The Case of Tallinn', in Hedegaard, L. , Lindstrom, B. , eds. *The NEBI Yearbook 1999 North European and Baltic Sea Integration***.** Berlin: Springer. Ch. 2. 121-135

Forester, J (1999). The Deliberative Practitioner: Encouraging Participating Planning Processes. 2nd ed. Philadelphia: UCL Press.313-363

Gordon, D. L. A. (1997b). *Battery Park City: politics and planning on the New York waterfront*. Amsterdam, Gordon and Breach.

Gordon, D.L. A. (1997a).'Managing the Changing Political Environment in Urban Waterfront Redevelopment'. *Urban Studies*.**34(1)**, 61- 83
Granath, K. (2005). *Beggar or Chooser?42 years of waterfront development in Baltimore Inner Harbor. What did Baltimore learn?*. Ph.D. Baltimore: Institute for Policy Studies, Johns Hopkins University, Baltimore.

Gunay, Z. and Dokmenci, V.(2012).' Culture-led regeneration of Istanbul waterfront: Golden Horn Cultural Valley Project '. *Cities.* **29(1).**213-222

Harvey, D. (1973).*Social Justice and The City*. Oxford: Blackwell Publishers. Online Source:http://oneboxofturkishdelights.files.wordpress.com/2013/07/david-harvey-social-justice-and-the-city.pdf

Harvey, D**. (**1989).' From managerialism to entrepreneurialism: The transformation in urban governance in late capitalism'. *Geografiska Annaler***. 71 B (1)**, 3-17

Harvey, D. (1992)The Condition of Postmodernity- An Enquiry into the Origins of Cultural Change. 2nd ed. Oxford: Blackwell Publishers.

Harvey, D.(1991) 'A view from Federal Hill'.The Baltimore Book: New Views of Local History. Philadelphis: Temple University Press, 226-249.

Harvey, D.(2008).' The Political Economy Of Public Space', in A. Zieleniec, eds. *Space and Social Theory*.London: Sage. Ch.4.

Healey, P. (1997).*'Collaborative planning- Shaping Places in Fragmented Societies'*. 1st. New York: Palgrave Macmillan.

Healey, P. (2003).' Collaborative planning in Perspective'. *Sage*. **2(2)**, 101–123

Healey, P. (2006).*'Collaborative planning- Shaping Places in Fragmented Societies'*. 2nd ed. New York: Palgrave Macmillan.

Hoyle, B. (2000). 'Global and Local Change on the Prot-City Waterfront'. *American Geographical Society*. **90 (3)**, 395-417.

Hoyle, B. (2001).'Waterfront Revitalization in an East African Port-City'. *Cities,* **18(5)**, 297–313

İnalÇekiç, T and Gezici, F. (2005). *Spatial Impacts of New Housing Trends in the Periphery of the Istanbul Metropolitan Area.* Retrieved August 30, 2013, from http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa05/papers/41.pdf

İnal Çekiç, T and Gezici, F .(2009). *Gated communities leading the development on the periphery of Istanbul metropolitan area.* ITU A|Z. VoL.6 ,N°.2 pp.73-97.

Karadag, R. (2010). *Neoliberal Restructuring in Turkey: From State to Oligarchic Capitalism.* MPIfG Discussion Paper 10/7.Cologne: Max Planck Institute for the Study of Societies.
Keyder, C. (2005). *Globalization and Social Exclusion in Istanbul*. International Journal of Urban and Regional Research. N° 29, pp.124–134.

Kerimoglu, E. and Gezici, F. (2010)'Culture, tourism and regeneration process in Istanbul'.*International Journal of Culture, Tourism and Hospitality Research*.**4(3)**.252-265

Köksal, T. G.(1996).*Haliç Tersaneleri'nin Tarihsel Teknolojik Gelişim Süreci ve Korum a Önerileri*. Master.İTÜ Fen Bilimleri Enstitüsü.

Köksal, T. G.(2005*) İstanbul'daki Endüstri Mirası İçin Koruma ve Yeniden Kullanım Önerileri*.. PhD. İTÜ Fen Bilimleri Enstitüsü

Levine, M.V. (1987a). 'Response to Berkowitz: Economic Development in Baltimore: Some Additional Perspectives',Journal of Urban Affairs**, 9 (2)**, 133-138.

Levine, M.V. (1987b) Downtown Redevelopment as an urban growth strategy: A Critical Appraisal of the Baltimore Renaissance, *Journal of Urban Affairs***, 9(2).**103-123.

Loftman, P. and Nevin, B. (1995) 'Prestige Projects and Urban Regeneration in the 1980s and 1990s: a review of benefits and limitations', *Planning Practice & Research*, **10(3-4**). 299-316.

Marshall, R. (2001). 'Comlexity on the Urban Waterfront', in R. Marshall,eds. *Waterfronts in Post-industrial Cities*.London: Spon Press.

Nuissl, H. and Heinrichs, D. (2011). 'Fresh Wind or Hot Air- Does the Governance Discourse Have Something to Offer to Spatial Planning?'. *Journal of Planning Education and Research*. **20(10)**.1-13

Orueta, F.D. and Fainstein, S. S.(2009). 'The New Mega-Projects:Genesis and Impacts.International'. *Journal of Urban and Regional Research.* **1(1).** 760-766

Öztaş, N.(2005).Türkiye'de Kentsel Dönüşüm ve Haliç Örneklemesi. Yüksek Lisans Tezi.Mimarsinan Güzel Sanatlar Üniversitesi

Saarinen, R. and Kumpulainen, S.(2006).' Assessing social impacts in urban waterfront regeneration'. *Environmental Impact Assessment Review*. **26 (1)**, 120–135

Swyngedouw, E. (2005). 'Governance Innovation and the Citizen: The Janus Face of Governance-beyond-the-State'. *Urban Studies* **42**(**11**) , 1991-2006

Swyngedouw, E., Moulaert, F. and Rodriguez, A. (2002) Neo-liberal urbanization in Europe: large-scale urban development projects and the new urban policy, Antipode, **34 (3)**, pp 542-577.

Yerliyurt, B. (2008).' Kentsel kiyi alanlarinda yer alan sanay Bölgelerinde dönüsüm stratejilerinin Degerlendirilmesi;Haliç – tersaneler bölgesi'. PhD. Yildiz Teknik Universitesi.

Case Study / Project

Visual Communication and the Mediatized City

From Billboards to Offices of Urban Planning in Cairo

Mennatullah HENDAWY

Abstract

Visual communication in urban planning and design disciplines is the main form of creating as well as exchanging their ideas and interpretations about the urban environment, not only among planners/architects, but also between them and the general public. Many urban scholars in Egypt also addressed the role of visualizations and graphics in planning as well as its communication (i.e. Selim (2015) and Abotera & Ashoub (2017)). Today, by simply walking in the streets of Cairo or opening one of the national TV channels, one get captured by hundreds of real estate ads that share certain characteristics that can be summarized in two points; promoting moving out of Cairo and buying a new apartment or villa in a new city or a nearby compound, and the use of almost the same visual symbols (i.e. 3d models of the apartments overlooking a big green area, swimming pools, shopping centers....etc,) that resembles how the future city looks like. The above introduction exposes the significant role visualizations play in planning and designating cities, however, to what extent these dominant narratives and visuals impact/construct the professional planning practice, is still under-researched. This is interrogated in this paper through adapting an assemblage ontology and using Actor- Network-Theory (ANT) starting from the street urban-visual experience and going backward to one of the micro publics that creates it (planners and planning offices). This paper adapts a reverse/ backward process trying to unravel the layers behind the construction of street billboard. Using ANT, urban visualizations and media are perceived as both the method for research and the method for understanding planning practice and planners' role accordingly. This study shows a first scratch in the communicative network of urban projects in Cairo written from the perspective of assemblages and human-non-human actants - using ANT, telling the story of how media co-construct the urban in Egypt. In general, different actants are formed between human and non-human actors (media) in relation to different communicative situations. The planning knowledge that is communicated to the general public in Cairo's streets showed to be mostly consisting of 3d rendered urban images with English or French slogans promising a greener and bluer future. Meanwhile, the contact between planners and the general public doesn't go beyond these images. Planners are constantly met with the images they produce in the streets (which is emancipated by their education and the omnipresence of similar images all over the streets). This makes planners themselves get caught in reproducing what they produce (market).

The study does not show how planners influence the public by their 3d images, but rather how planners are embedded and enrolled and impacted by what they produce. So in a way, planners visualize plans and after that these images recreates planners. In the end, media as an important tool in communicating planning and the city to the general public, urban planners become one of the influenced micro public who does not only create it also but also get affected by it. In a mediatized city like Cairo, planning is media

Case Study / Project

Urban planning agencies

A key support for metropolitan governance

Eric HUYBRECHTS

Abstract

Metropolis and Megapolis are facing huge challenges due to their extreme complexity and their responsibility to drive the economic and social development of countries. Today, more than 50% of urban dwellers are living in metropolitan areas of more than 500,000 inhabitants. The metropolis is the main artifact of the present century. Managing the metropolis is one of the main challenge of today, balancing between citizen representation, efficiency of public service delivery, regulation of land and real estate markets and quality of life. Metropolitan areas are the engine of growth, then high energy consumers. Their responsibility regarding GHS and climate change is huge. The frequent changes in the governance systems to manage territories and public services make difficult to conduct strong and clear policies for development. The necessary intertwin between territories, technical sectors and different levels of administration create high complexity in the management. The power of decision is shared between a lot of actors. Managing metropolitan areas requires collective intelligence support by strong technical bodies to feed the public debates with relevant data, analysis and forecasts.

Metropolitan planning agencies are disseminate on large metropolis due to the necessity to prepare policies and strategies on the metropolitan complexity. They are interdisciplinary teams covering social, spatial, economic and environmental fields. Among the main metropolitan planning agencies there are very different status. For example, we consider Seoul Institute which emerge from the academic field, the Paris regional planning agency that is a semi public body dedicated to Paris region and its numerous territoires, Regional Planning Association of New-York which is supported by sponsor-members or Beijing Planning and Design Institute which is a body inside the Municipality. They play an important role as metropolitan observatories. They play an essential role to prepare policies and strategies in different fields as urban planning, climate, energy, housing, land and real estate, mobility, environment, economic development. The new global network of Metropolitan and territorial planning agencies provide support to strengthen these bodies and help metropolitan areas to create their planning agencies.

Case Study / Project

Developing the regulations for rapid urban growth

The new Centre Plans and TOD of the Doha metropolis, Qatar

Slawomir LEDWON, Fatma AL-BADER, Noora AL-SUWAIDI

Abstract

In less than a few decades Qatar äóñ a country in the middle of the Arabian Peninsula äóñ has grown from a fishing and pearl hunting nation into the most affluent economy with the highest GDP per capita in the world. The population increased from just over a hundred thousand in the 70s to around 2.5 million currently. These major changes had to be reflected in the spatial growth of the country, mainly the metropolitan area of joint Doha and Al Rayyan municipalities.

Such rapid changes needed a parallel evolution of planning regulations and approaches to spatial development, that did not exist before. Planners had to introduce to the country and implement a whole new system to meet the needs of developers, but also to be able to control its development and make sure it follows a coherent vision. Very basic regulations were substituted by complex strategies.

The project of Qatar National Master Plan has developed Qatar National Development Framework 2032 (QNDF), which was approved as a national policy. It introduced many contemporary concepts into the planning and strategies of the country. Together with Qatar National Vision 2030 (QNV2030) and its National Development Strategy it was a foundation for any new initiatives.

Initially the new regulations that were developed were temporary and called Interim Zoning Regulations. Their objective was to provide basic development requirements for the rocketing demand. The simplistic approach was easy to implement, but did not reflect the nation's aspirations to develop a contemporary, efficient and competitive metropolis.

QNDF has put forward a concept of developing centres within the metropolitan area. These were to be aided by the new public transport system, based mainly on new metro lines, which were expected due to winning the FIFA 2022 World Cup hosting rights.

In order to achieve these goals, the QNDF has identified a hierarchical network of centres to allow future growth äóñ from town and city centres to metropolitan and capital city centres. For the whole country a Municipality Spatial Development Plan (MSDP) has been developed. While for the central neighbourhoods, including the new public areas of the stations, there were no special regulations. And the traditional approach to planning did not allow for mixing uses within one lot. Therefore there was a need to develop more complex centre plans and focus on transit oriented development (TOD) around the new metro stations, which are currently under construction by Qatar Rail. TOD sites were also addressed in a new masterplanning process with the developer. Currently a more advanced regulations for the Capital City Centres are prepared, including form based regulation to shape the existing and future form.

The presentation explains the evolution of planning in Qatar, and the rationale behind the latest approved centre plans. It gives examples of and the experience and comments on which were successful and why. Also reflects critically on items that will need to be revised. It discusses the applicability of such approach in both developed and developing settings.

The presented case study can be useful as a reference point on city growth and regulatory measures to steer these changes in rapidly changing environment. It can also show how to shift from land use based simple zoning into more complex regulations also relating to form. Concepts of mixed use development and private sector involvement are also discussed.

Research Paper

Infrastructure Imbalance, Financial Investment and AIIB's Role: Non-state Actor in Regional Governance

Xiangyi MENG, M.S. in Urban Planning, School of Architecture, Tsinghua University; China
Taofang YU, Associate Professor, School of Architecture, Tsinghua University; China

Abstract

The Asian Infrastructure Investment Bank (AIIB), a new multilateral development bank, is an emerging force to solve the problem of infrastructure imbalance in developing countries in Asia. Only a few existing researches focuses on infrastructure investment and spatial governance. Based on the economic geographical framework of density, distance and division, this paper attempts to analyze three traditional governance modes in the context of infrastructure imbalance in developing countries in Asia: low-density sprawl, long distance and limited accessibility to central markets, and spatial division. Infrastructure has obvious positive externalities and will widen the differential rent gaps through land value increment, which will bring higher economic density and agglomeration economies. After analyzing the AIIB's 38 approved investment projects, this paper takes Colombo urban regeneration project in Sri Lanka, Gujarat rural roads project in India and Mandalika tourism infrastructure project in Indonesia as examples, to explore the AIIB's non-state role in spatial governance.

Keywords

Asian Infrastructure Investment Bank (AIIB); Infrastructure-led Development; Density, Distance and Division (3Ds); Under-developed Areas; Differential Rent.

1. Introduction: Infrastructure Imbalance in Asian Developing Countries

According to relevant theories of public economics, infrastructure is a category of "quasi-public goods" with rivalry and non-excludability. Rivalry of infrastructure will generate positive externalities of land value increment and more private capital. However, its non-excludability makes it difficult for the public sector to avoid the "Tragedy of the Commons" caused by free riders. Features of quasi-public goods result in insufficient incentives for private investors as the private benefit is far less than the overall social benefit from the infrastructure construction (World Bank, 1994; Mankiw, 2012). Meanwhile, infrastructure is characterized by large investment amount, long return period, huge "sunk cost" and high initial risk. Only when a completed network forms can infrastructure fully perform its functions (McCann and Shefer, 2004; Ehlers, 2014). These economic attributes make public

investment a major source of infrastructure financing, for which private capital is not easy to access (World Bank, 1994; Asian Development Bank, 2017).

Developing countries in Asia are suffering from severe infrastructure imbalance and infrastructure investment gap. The rapid economic development and urbanization have given rise to much more demands for urban and regional infrastructure (Straub and Terada-Hagiwara, 2010). Public capital alone cannot meet the increasing needs. However, the private sector and international capital markets are far from being tapped (Ehlers, 2014).

The Asian Development Bank (ADB) estimated that Asia and Pacific Region would need an investment of $22.551 trillion from 2016 to 2030. In 2015, the infrastructure investments in 25 developing member countries were $881 billion, but there was still a financing gap of $459 billion. The public sector overwhelmingly dominates the existing infrastructure investment. It accounts for 92%, much more than any other financing sources, including Multilateral Development Banks (MDBs), an emerging force in infrastructure investment, which only accounts for 2.5% (ADB, 2017). The research conducted by McKinsey Global Institute indicated major needs of approximately $20.1 trillion in developing countries in Asia from 2016 to 2030 (McKinsey Global Institute, 2016). Meanwhile, another report released by the World Economic Forum evaluated infrastructure capacity worldwide in terms of transportation, electric power and water supply (Figure 1). The report indicated that the infrastructure gap and imbalance was so evident in developing countries in Asia that an effective solution was of great urgency. (Schwab, 2018).

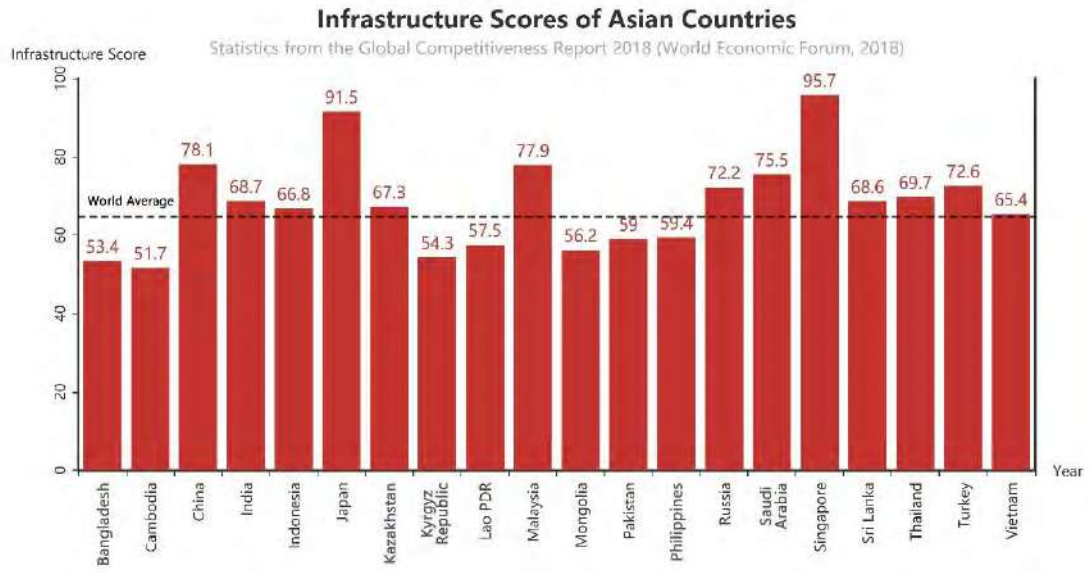


Figure 1 Infrastructure scores of Asian developing countries

Source: Authors' compilation from the Global Competitiveness Report 2018 (Schwab, 2018).

Under such circumstances, the Asian Infrastructure Investment Bank (AIIB), established in January 2016, gradually becomes an emerging force in infrastructure investment. Initiated by China, it aims at bridging the long-existing and huge infrastructure financing gap in developing Asia by further investments, and promoting sustainable economic development. (AIIB, 2015). Unlike the World Bank, the Asian Development Bank and other existing multilateral financial institutions with diversified business domains in multiple countries, the AIIB mainly focuses on Asian developing economies and the investment in sustainable

infrastructure projects, playing a potential critical role in addressing Asian issues. In recent years, researches on the AIIB mainly analyze its development process (Etzioni, 2016) and institutional administration structures (Chin, 2016; Callaghan and Hubbard, 2016), and some are conducted from international political perspective (Hameiri and Jones, 2018; Wilson, 2019). However, there is few researches on the AIIB's infrastructure investment projects and spatial governance. This paper, from the spatial perspective, attempts to provide a theoretical framework to describe the participation of multilateral financial institutions in regional spatial governance.

How to solve the problems of infrastructure imbalance and financing gap in developing countries in Asia? As an emerging force in infrastructure investment, how does the AIIB participate in regional governance as a non-state actor? To answer these questions, the paper, based on the World Bank's framework of "Density, Distance and Division", analyzes the AIIB's approved projects, the traditional governance phenomena in the context of infrastructure imbalance, and the revolution brought by the external capital.

The paper is divided into four parts:

(1) Background: economic attributes of infrastructure and infrastructure imbalance in Asian developing countries;

(2) Research materials: basic information and spatial distribution of the AIIB's 38 approved projects;

(3) Theoretical framework: the economic geographical framework of density, distance and division; traditional spatial governance shaped by the long-standing infrastructure imbalance in developing countries in Asia; and positive externalities of infrastructure through differential rent;

(4) Case studies: three projects located in Sri Lanka, India and Indonesia, and AIIB's spatial governance effects through infrastructure investment.

2. Research Materials: AIIB's Approved Projects

Selected research materials were mainly the published documents on AIIB's official website (https://www.aiib.org), including 112 documents of 38 approved infrastructure investment projects. The research materials cover basic financing information, environmental and social planning frameworks, and the latest implementation progress. Additionally, the research materials also contained the AIIB's establishing agreements, documents concerning banks' management framework, investment policy, business strategies and other basic regulations, relevant news reports and documents of the proposed projects. The basic institutional information, annual reports and project documents of the World bank and Asian Development Bank published on their official websites were also used as extra information during the research. The documents of the AIIB's 38 approved projects were classified according to 10 attributes. They are the project location, types of infrastructure, total project investment amount, investment entities and their investment ratio, co-financing with other multilateral banks, the status of guarantee, attributes of borrowers and implementation agencies, maturity period, project risk levels, and the time of approval and implementation periods.

As for location, the AIIB's 38 approved projects are carried out in 15 developing Asian countries, which embodies AIIB's innovative feature of regional, developing countries dominance. Among them, 9 are in India, 5 in Indonesia and 4 in Bangladesh. The 3 countries have the largest number of approved projects. The remaining 12 countries have one or two respectively. Except for that, two fund projects involving financial intermediaries are not country-specific but serve developing regions in Asia as a whole[1]. The AIIB's focus on developing Asia is also reflected in its membership. It reserves 76.6% total subscriptions of contributions for regional member states (AIIB, 2019a), which is higher than that of the Asian development bank (63.4%), a regional multilateral development bank (ADB, 2019).

The AIIB focuses on infrastructure-related financing projects. The 38 approved projects cover Energy (34.2%), Telecommunications (2.6%), Transport (23.7%), Urban (5.3%), Water (13.2%), Finance (13.2%), and multi-sector (5.3%)[2]. The projects mainly focus on trans-regional energy and transport infrastructure, at the meantime, they have more specific and diversified subsectors (Figure 2).

Risk and return is the core concern of private multilateral financial institutions. Relevant attributes include guarantee status, and the attributes of borrowers and implementation agencies. Such factors have an obvious influence on the risk and profit outlook of the AIIB. The guaranteed projects can be further divided into projects with sovereign-backed financing (SBF) and projects with non-sovereign-backed financing (NSBF). SBF means that loans have sovereign guarantee, and others are identified as NSBF (AIIB, 2017a). According to the attributes of borrowers and implementation agencies, projects are further classified into public-sector-led projects and private-sector-led projects in this paper. The public-sector-led projects refers to those whose borrowers and implementation agencies are governmental institutions, state-owned or state-controlled enterprises, and social institutions and organizations established by governments for special purposes. The private-sector-led projects refers to those whose borrowers and implementation agencies include private entities, such as the institution established by a joint-stock company which is jointly owned by diversified stakeholders for special purposes. As an emerging multilateral development bank, the AIIB has 29 projects guaranteed by sovereign credit, 27 of which were led by the public sector of recipient countries. And among the other 9 projects with NSBF, 2 are led by the recipient countries' public sector.[3] Sovereign guarantee and the leading role of the public sector will help financial institutions reduce investment risks at the early stage of their establishment, accumulate project investment experience step by step, and pursue long-term returns.

Based on the basic information of these projects, this paper analyzes the traditional governance phenomena in the context of infrastructure imbalance in Asian developing countries and, by studying the following 3 projects, analyzes the modes of the AIIB's participation in spatial governance.

[1] Source: Authors' compilation from documents of the AIIB's approved projects.

[2] Source: Authors' calculations from documents of the AIIB's approved projects.

[3] Source: Authors' compilation from documents of the AIIB's approved projects.

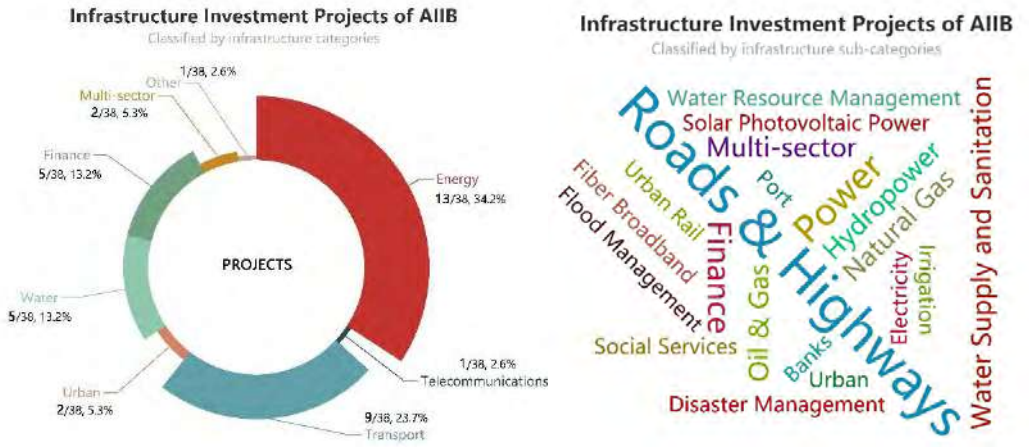


Figure 2 Types of infrastructure in AIIB's approved projects

Source: Authors' compilation and calculations based on documents of the AIIB's approved projects.

3. Theoretical Framework based on Density, Distance and Division

3.1. Literature Review

Review of Literature on 3Ds

Density, Distance and Division (the 3Ds), three elements of economic geography, were regarded as the core of regional economic development in the world development report published by the World Bank in 2009. According to the report, the density of economic, capital and technical elements per unit land can be used for evaluation of local economic outcomes efficiency (World Bank, 2009). Studies have fully proved that high-density agglomeration economies promote continuous economic development and urban economic output efficiency (Wheaton and Shishido, 1981; Ciccone and Hall, 1993; Gallup, Sachs and Mellinger, 1999). The distance from a region to the core market, or the accessibility to the core market, can be used for the evaluation of the region's potential for obtaining spillover effects and integrating into market exchanging system (World Bank, 2009). It is generally acknowledged that the longer the distance from the region to the core market is, the less the spillover effects of capital the region will obtain, and the longer distance is an unfavourable factor for production efficiency, employment opportunities and wages in the region and for agglomeration economies (Rosethal and Strange, 2001; Roberts and Goh, 2011). Division refers to the geographic and social impermeability and barriers because of borders, languages and regulation systems among regions. It can be used to evaluate the regional economic integration. In Asian developing countries, factors for spatial division exist widely. These factors can be divided into institutional factors and social-cultural factors. The former includes national borders, regional administrative boundaries and regulation systems, while the latter refers to languages, cultural customs, religions, races, etc. (World Bank, 2009; Wang *et al*, 2018).

It is generally acknowledged that higher density of economies, shorter distance to the central market and less division will develop agglomeration economies and improve the overall economic efficiency (World Bank, 2009). A few researches have analyzed under-

developed regions and especially Asian developing economies based on the framework of 3Ds. They have proved that the relation between 3Ds and economic development also applies to developing countries and under-developed regions (Guo and He, 2012; Wang *et al.*, 2018). However, only few studies analyze the traditional governance phenomena, and especially land use features, using the framework of 3Ds.

Review of Literature on Infrastructure and Governance

Infrastructure supply is closely related to regional governance. Infrastructure imbalance is a major reason for regional under-development, while diversified external sources of infrastructure investment can improve the governance structure (Mengistu and Adams, 2007; Ogun, 2010; Sorensen, 2018). In Asian, African and Latin American developing countries, inefficient governance of the public sector and limited capacity of public investment have severely influenced the supply of basic infrastructure, which increasingly attracts global attention. Emerging forces such as non-governmental organizations (NGOs), the private sector and international donors are increasingly participating in the developing economies' improvement of infrastructure and governance. Social infrastructure aid such as governance structure improvement is gradually replacing physical infrastructure aid (Nunan and Satterthwaite, 2001). Compared with the internal forces in developing countries, "non-state" governance can bring institutionally and spatially changes to the recipient countries from the outside in a more profound and direct manner (Mengistu and Adams, 2007). For instance, the World Bank, the Asian Development Bank and other existing multilateral financial institutions have assisted the recipient countries through infrastructure investment projects, as well as assisted their social governance through technical assistance, anti-corruption mechanisms and capacity building (Bafoil and Lin, 2010).

Although there are substantial researches on infrastructure, regional governance and diversified external forces, only few researches analyze traditional governance phenomena in the context of infrastructure imbalance and the role of infrastructure in spatial governance. This paper mainly focuses on the two aspects.

3.2 Analyzation of Traditional Governance Phenomena in Asian Developing Countries based on 3Ds

As mentioned before, the infrastructure imbalance and financial investment gap have long plagued developing countries in Asia. The long-term infrastructure imbalance results in limited endowment of density, distance and division, causing problems of low-density sprawl, long distance and limited accessibility to the central market, and severe spatial division. In this paper, we classify the traditional governance phenomena into three categories: (1) the low-density sprawl existing in urban areas and towns; (2) long distance and limited accessibility to the core market in under-developed areas; (3) the spatial division and collage in the most under-developed urban and rural areas, or unpopulated zones (Table 1).

First, the low-density sprawl exists in urban areas and towns in Asian developing countries. It still functions under contemporary governance discourse systems, with public and private sectors jointly providing management, public services and goods. However, the low saving ratio and low investment ratio of cities' public finance lead to low returns rate of land output. The long-existing inefficient development has led to an undifferentiated network in terms of spatial connection, without spatial centers and nodes. Social diversified capital is of low

liquidity and lack of encouragement for converging, so the effect of agglomeration economies is not obvious. As for the land use, low-density, high-homogenized urban sprawl is the core feature in such regions.

Second, under-developed areas have long distance and limited accessibility to central markets. Studies have fully proved that long-distance and cross-regional infrastructure, such as transportation and communications can effectively shorten the spatial distance, reduce transportation costs and promote liquidity of business capital. On the contrary, remote location and limited accessibility brought by the lack of regional infrastructure will hinder the regions' participation in the regional trading network and decrease spillover effects of central market (Limão and Venables, 2001). Other infrastructure, such as electricity and fossil energy, can also improve the economic density of the region. In under-developed regions in Asia, infrastructure imbalance isolates a large number of remote areas which are far from central markets, and the connections between these regions are often vulnerable and uneasy to establish. Due to the lack of capital elements, land use in remote areas also indicates the primitive features of low economic density.

Third, spatial division and collage are common in the most under-developed urban and rural areas, or unpopulated zones in developing countries in Asia. Diversified institutional and social division factors, such as local tribes, clans, special interest groups, warlord separatists and administrative boundaries, have contributed to an autonomy based on localism. The fragmented regions hinder trans-regional and large-scale infrastructure investment, planning and construction, making it difficult to form a unified capital market within the region. Clans and tribes, which are commonly seen in rural areas of developing countries in Asia, maintain the governance of villages and tribes by blood ties. When facing these aforementioned existing circumstances, planning and construction of regional infrastructure often encounter difficulties such as civilization conflicts, land acquisition problems and resettlement reimbursement. These remaining forces make the regional infrastructure far from reaching the living standards of contemporary people. Special interest groups, such as gangs in urban slums and opposition regimes across Asia, generate a "self-organizing" governance which means being independent from the public governance. Such groups are only responsible for the economic and social affairs within their groups, such as collecting taxes, providing protection services, or providing basic public services like sanitation and electricity. There are strong centripetal forces and cohesion inside these groups, but insufficient spatial connections between groups, which embodies the spatial division and collage. Land is usually fragmented and combined with inefficiency.

Table 1 Analyzation of traditional governance in Asian developing countries based on 3Ds

Traditional Governance	Scope	Governance	Spatial connection	Land use features
Low-density sprawl	Under-developed urban areas and towns	Inefficient contemporary governance: low investment rate and low rate of returns	Undifferentiated network: lack of spatial centers or nodes	Undifferentiated land use and low-density sprawl

Long distance and limited accessibility to the core markets	Remote districts with limited accessibility	Isolated autonomy	Vulnerable and uneasily-established connection	Low density and fragmentation
Spatial division and collage	Most under-developed urban/rural areas, or unpopulated zones	Autonomy by local tribes, clans, special interest groups or within administrative boundaries	Centripetal division and localism	Fragmentation, inefficiency and collage

3.3 Differential Rent under Infrastructure-led Development

According to the theories of economic geography, a higher economic density will bring about increasing return and agglomeration economies, which is the foundation for regional divergence and locational selection (Krugman, 1991). The positive externalities of infrastructure play a significant role in increasing economic density, and sound infrastructure is the foundation for agglomeration economies (McCann and Shefer, 2004). As for the under-developed districts, remote location, limited accessibility to urban agglomeration economies and spatial division are often the main causes of poverty (Partridge and Rickman, 2008). Meanwhile, infrastructure, especially roads and highways, will effectively shorten the distance, improve the connectivity among human settlements and the flow of capital, business and labors among regions (Limão and Venables, 2001). However, agglomeration economies are closely related to the process of widening the gaps in differential rent. Only few researches focus on the relationship between 3Ds, infrastructure and differential rent.

Differential rent, including Differential Rent Ⅰ and Differential Rent Ⅱ, refers to differences in land production efficiency because of differences in land capability and location. Differential Rent Ⅰ refers to land output efficiency differences caused by the differences in soil fertility and location, while the latter refers to land output efficiency differences caused by the differences in investment, technology and new equipment (Marx, 1909). After the construction of infrastructure, although natural features of the land don't change, the improvement on location will attract emerging elements like capital, public amenities, modern technology and high-quality labor force, as well as raise both Differential Rent Ⅰ & Ⅱ. In the infrastructure-led urban and rural development, the positive externalities of infrastructure play a significant role in improving economic density, which will lead to spatial spillover and land value increment (McCann and Shefer, 2004). During this process, differences will increase and gaps in differential rent will be widened, which will attract capital with stronger land rent affordability to the central zone of mega-cities, and thus form agglomeration economies.

In developed countries, the function zones in urban and rural areas are clear and development is driven by agglomeration economies (Gottmann, 1957), Unlike them, the typical urban and rural land use in developing countries in Asia is summarized as the

"Desakota" model. Due to high population density, huge demand for production and business activities within limited space, and the international context of integrating into the world market and undertaking industrial transfer from developed economies, economic activities in developing countries in Asia have the characteristics of highly mixed and undifferentiated sprawl from urban center to rural in terms of land use (Ginsburg, Koppel, and McGee, 1991). Infrastructure imbalance in under-developed regions in Asia results in low capital density, long distance to central markets and fragmented area division. The long-standing problem of infrastructure imbalance has such consequences: (1) The lack of infrastructure narrows the gap between actual rent and the absolute rent, which will lead to less encouragement to generate surplus value and widen the gaps in differential rent. (2) It is the natural feature of capital to chase economies of scale so that an undifferentiated land will not be favorable enough to attract gathered capital. Only little capital with weak rent affordability will locate in these areas. (3) Differences in functions and landscapes between city centers and suburban areas, or built-up areas and rural areas are not obvious. And an urban-rural low-density sprawl pattern has formed. (4) In the long term, it is easy for this governance mode to get caught in a "closed vicious circle", that is, lack of investment – imbalance and shortage in infrastructure – undifferentiated differential rent – unattractiveness to capital - lack of investment again.

Infrastructure-led development is relatively more sustainable and can form agglomeration economies. First, infrastructure will become the driving force of improvement in geographical location and land rent value increment. Then, capital with stronger land rent affordability will inflow, which will upgrade the industry, capital density and economic vitality, which is the initial effects of aggregation economies. Third, the capital-intensive districts will expand to surrounding areas, which will optimize overall functional zone division and spatial structure of the city.

4. Case Study: AIIB's role in Regional Governance

Generally, regional governance involving bilateral or multilateral external forces has two modes. The first mode is mainly for the public sector, and often financially backed by sovereign credit. Because of its low risk, such loans generally have a long maturity period and are suitable for large-scale, long-distance infrastructure investment in developing countries. In such projects, the AIIB will not directly participate in the distribution of profits, but only receive a certain proportion of loan interests as the investment revenue after the maturity period. The second mode is mainly for the private sector, often with a non-sovereign back. Because of the limited economic and credit capacity of guarantees, financial institutions tend to pursuit short-term profit. In the second mode, financial institutions usually adopt "direct" governance methods such as participating in land development as shareholders, holding shares of the projects and obtaining operating dividends.

At present, the AIIB's 38 approved projects are mainly sovereign-backed financing. The AIIB's indirect spatial and institutional governance, that is, not participating in regional governance as a political, administrative or implementation entity, reflects the AIIB's role of an "non-state" actor. Based on the aforementioned 3Ds framework, this paper analyzes the AIIB's role in regional spatial governance, with cases of Colombo urban regeneration project (increment of economic density), Gujarat rural roads project (improvement in accessibility)

and Mandalika tourism infrastructure projects (spatial integration). All the three projects are sovereign-backed, with standalone financing (without other multilateral development banks as co-financers) and without the AIIB's direct participation in the distribution of profits. Among them, the urban regeneration project is analyzed as the main case, because in this case, economic density and agglomeration economies have the most direct and profound influence on space.

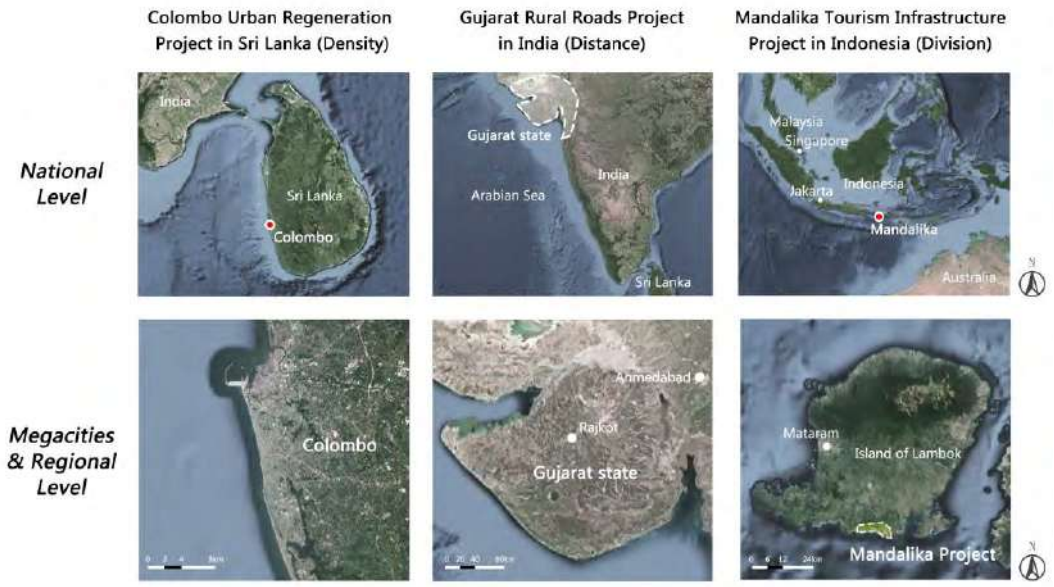


Figure 3 Locations of selected projects

Source: Base maps are from the Google Earth. The projects' locations are from the AIIB's investment documents (AIIB, 2017b; AIIB, 2018; AIIB, 2019b).

4.1. Density: Colombo Urban Regeneration Project in Sri Lanka

Colombo urban regeneration project is a typical example of dealing with low-density sprawl within urban built-up areas through widen of differential rent by infrastructure investment. Colombo is the largest mega-city with the highest economic and population density in Sri Lanka. However, like the most cities in under-developed regions in Asia, the land use of Colombo is characterized with obvious low-density sprawl. In 1960s, the Government of Sri Lanka built one-or-two-stories buildings with low density to handle the housing problems of low-income people (AIIB,2019b). Most of them have suffered long from the severe deficiency in electricity, drainage system, road access, etc. According to a survey of Urban Development Authority, there are still 68,812 households, over 50% of Colombo's population, living in 1499 such underserved communities in Colombo (Urban Development Authority, 2018a). In terms of land use, commercial land is now concentrated in the north-south narrow regions near the west coast. Low-story communities have taken up vast tracts of urban land, resulting in the low-efficient, low-density land use. Limited unused land hinder the expansion of urban commercial district, which seriously affects the accumulation of capital and the promotion of economic density. Additionally, the newly built-up areas have to turn to the suburbs which are farther from the city center (Urban Development Authority, 2018b; AIIB, 2019b). In consequence, the phenomenon of cities and towns encroaching into peripheral villages and woodlands became increasingly severe.

In the background of low-density sprawl, AIIB supports the Government of Sri Lanka through standalone infrastructure investment to carry out urban regeneration, aiming at regenerating the underserved low-income communities by demolition, and land redevelopment in Colombo, Sri Lanka, to provide affordable housings for the bottom class and improve land economic density, utilization efficiency and potential profits by infrastructure construction and commerce redevelopment. According to the financing documents, this AIIB-led project has two major tasks. One is to build 4074 affordable multi-story apartment units, which will be carried out in 6 blocks with 17.4 acres of land in total, to meet the residential needs of low-income groups. The other one is to redevelop the 92 acres of vacated land in 10 blocks (Figure 4). 6 acres of land will be used for basic infrastructure and the rest 86 acres of land for commercial redevelopment. Small pieces of land will be directly auctioned to developers. Medium-sized land will be auctioned after being sub-divided and equipped with infrastructure by implementation agency. Public-Private-Partnership (PPP) will be applied to large-sized land, replacing implementation agencies with elected private partners for land redevelopment (AIIB, 2019b).

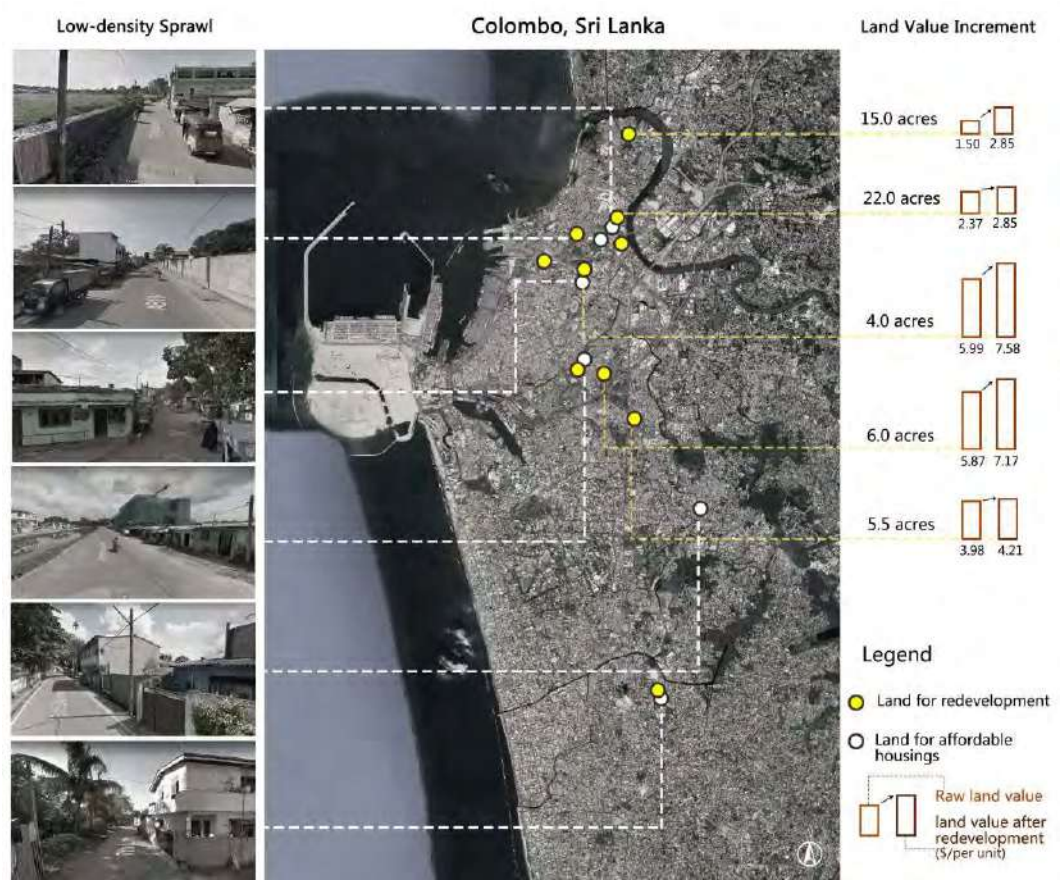


Figure 4 Locations of land for affordable housings and redevelopment in Colombo

Source: Base map and street view pictures are from the Google Map and statistics are from the AIIB's financing document of the project (AIIB, 2019b).

Urban regeneration and land transaction involves multiple stakeholders with diversified demands. Firstly, the public sector represented by states and state-owned institutions, as land owners and implementation agencies of the regeneration, will enjoy the long-term economic benefits brought by land value increment. It is estimated that per unit land price

will increase 6%-166% after land redevelopment (AIIB,2019b; see graphs of land value increment in Figure 4). The infrastructure investment will increase the differential rent of regenerated land, and attract more private capital investment as a financial leverage. After that economic and capital density will increase and agglomeration economies will be formed. Meanwhile, the homogenized urban network will develop new economic centers and nodes during the land redevelopment, and the urban spatial structure will be optimized (Figure 5). Current spatial pattern of high concentration of commercial capital in coastal areas will be gradually replaced by the multiple-center pattern in megacities. Spillover effects of new commercial centers will also promote the upgrading of surrounding areas, and hinder the expansion of built-up areas to rural areas. Additionally, highly-intensive commercial redevelopment will provide funds for future regeneration.

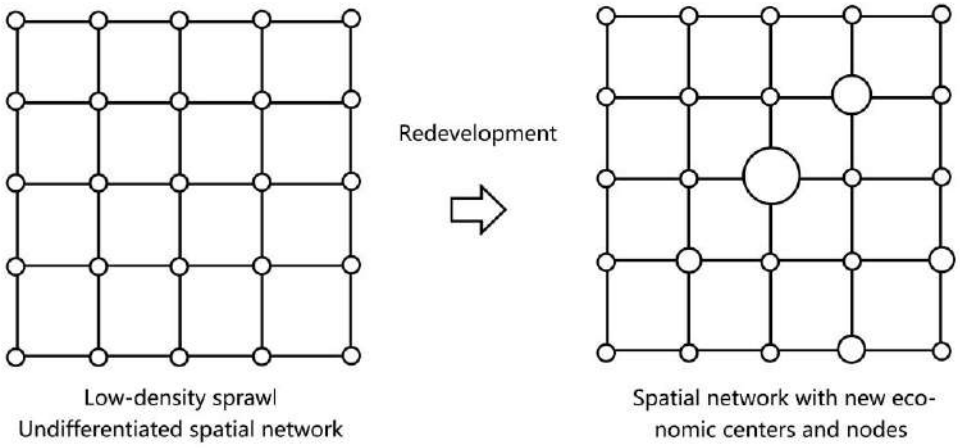


Figure 5 The AIIB's role: from low-density sprawl, and the undifferentiated urban network to the network with new economic centers and nodes

For low-income residents, housing conditions from original "underserved communities" to current affordable housings with adequate infrastructure have substantially improved their living conditions. However, it may also bring about gentrification, with the increase of living costs and "crowding-out" effect for low-income groups. The involuntary relocation may also result in negative, irreversible social impact on individual social networks and cultural memories of low-income residents.

As private partners, developers and contractors will replace governmental agencies to carry out land subdivision, planning and infrastructure construction. The revenue will be distributed between public and private sectors based on the share of contributions (AIIB, 2019b). Maximum profit, which is the core concern of private enterprises, will encourage developers to make a balance between benefits and risks, and fully realize the land's profit potential during commercial redevelopment.

Finally, as the financial provider from outside, the AIIB's financial investment will assist the under-developed regions to jump out of the vicious circle of "low investment, low profit and low efficiency", and move towards an infrastructure-led development path. Meanwhile, the AIIB is subtly pushing the recipients to form a modern governance mode, through mature multilateral project management. The origin intention is to avoid and mitigate risk of investment that widely exists in Asian developing economies, such as inefficient implementation and damage to environmental and social sustainability. The Colombo urban

regeneration project is run by a specially-established department with modern management structure. Monitoring of implementation by the AIIB will run through the process of planning, financial supply, procurement and construction. The AIIB will provide necessary technical assistance. In each project, the AIIB evaluates the transparency of governmental agencies, environmental and social sustainability, and potential revenue. The Colombo project is rated as "Highly Risky", especially in the aspects of governmental credit, and land acquisition and resettlement (AIIB, 2019b). It will urge the local public sector to pay attention to the anti-corruption, and improve the environmental and social inclusion by respecting the interests of low-income groups. By these aforementioned mechanisms, the local governance will get gradually improved.

In conclusion, the AIIB's role in spatial governance is to promote multiple stakeholders to take part in urban regeneration, promote value increment of specific land, gather capital elements, and gradually change the traditional development mode of low-density sprawl. As shown in Figure 6, the graph reflects the traditional mode of low-density sprawl before land redevelopment in Colombo: the central business district of Colombo has strong land rent affordability, while areas outside the central business district are characterized with undifferentiated low-density sprawl. The differential rent is very close to the absolute rent. As shown in the Figure 7, after the infrastructure construction and land redevelopment, the land rent curve moves upward and the differential rent increases. The increased differential rent will be shared as profit among the public sector, local residences, developers and the AIIB. The public sector will get profit from land premium. Local residences will enjoy the improved housing conditions. Developers will get economic returns under interests' incentives. The AIIB will acquire a certain rate of interests after the maturity period, although it will not directly participate in the project implementation and distribution of profits, which indicates AIIB's non-state role in regional governance. Additionally, governance structure in under-developed areas will get improved gradually with the introduction of the AIIB's "outside-in" multilateral governance and the guidance of modern management mechanism.

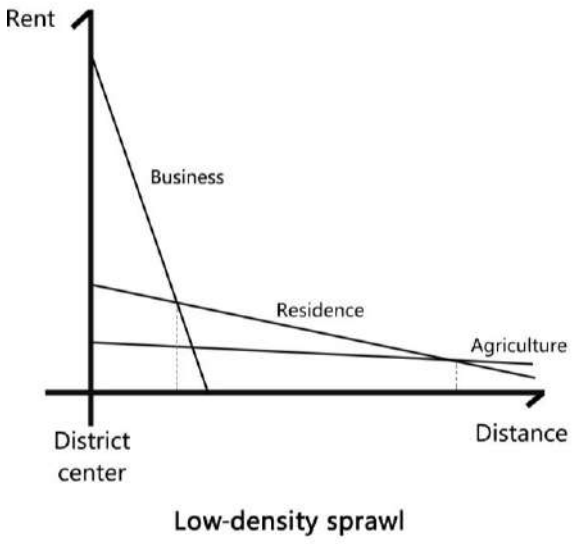


Figure 6 Low-density sprawl before land redevelopment in Colombo

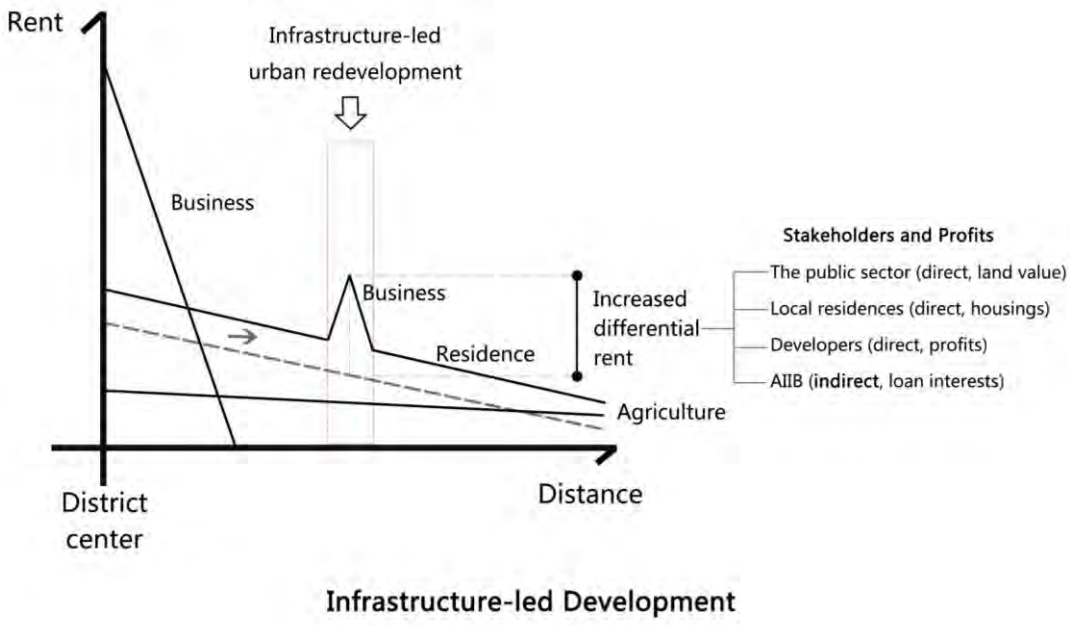


Figure 7 A new infrastructure-led development mode after land redevelopment

4.2. Distance: Gujarat Rural Roads Project in India

It is necessary to construct cross-regional infrastructure because of the demands for regional social-economic connections such as transportation and telecommunications, as well as the uneven distribution of fossil energy, electricity and other resources. In the AIIB's 38 approved projects, regional infrastructure projects aiming at shortening the spatial distances among districts, including construction of inter-city highways, urban rail transits, power transmission, natural gas pipelines, and upgradation of rural roads, account for approximately 45%, which shows that the AIIB mainly focuses on shortening spatial distances, improving the free flow of population, capital and commodities, and promoting the even distribution of energy and resources.

The Gujarat rural roads project is sovereign guaranteed by government of India and invested by the AIIB alone. Gujarat, located on the western coast of India, is a relatively developed region of the country, but 57% of its population still live in rural areas (Government of Gujarat, 2017). The project has two tasks. One is the reconstruction of 5045 km unhardened and non-planned roads, and the upgrading of 2518 km hardened roads that have not been maintained for years. And the other one is to upgrade and maintain those planned roads regularly in the following years (AIIB, 2017b). It is estimated that the project will change 8 million rural people's travelling conditions and way of life (AIIB, 2017b).

India has preliminarily established a road system consisting of "national highway", "state highway", "district road", "village road" and "non-planned road" (AIIB, 2017b). However, there are still many remote villages that are far from main roads and lack road branches, and first and second connectivity rural roads which are linked to the national, provincial and district road networks. There are still long distances from villages to central markets, villages and better service facilities. The remote villages are isolated and autonomous. Land is mainly used for agricultural production and housing (AIIB, 2017b). The gap between differential rent and absolute rent is not obvious. The production activities and the way of life in such villages

are in a primitive, self-sufficient and inefficient manner. Moreover, spatial divisions caused by languages, customs and races are quite common. There are still large proportions of scheduled castes (6.74%) and scheduled tribes (14.74%), and some primitive tribal groups still suffer from pre-agricultural living conditions. These tribes mainly use dialects, with a literacy level of less than 50%. In terms of social customs, they have inherited the worship of deities, arranged marriage within communities, and unique customs and festivals (Government of Gujarat, 2017). Localism forces represented by tribes and clans have the feature of introversion because of the lack of transportation infrastructure and the connection to modern societies.

Distance to central markets is the core element that influences rural economic development. Because of the AIIB's investment in transportation, the spatial distance between rural settlements and central markets will be shortened. Influences on spatial governance brought by the investment can be shown in the following three aspects. First, a closer economic connection with higher-grade service points will take shape. Remote villages will be interconnected with higher-level settlements and regional central markets, and will be influenced by the spillover effects of their economic and capital elements, which will increase rural economic density. Agricultural products and agri-processed products will require less transportation time and economic costs, and have the opportunities to be sold with more profits. The service scope of schools, hospitals and other serving institutions located at higher-grade service points will be expanded, which can improve the medical services, and diversify commodity markets in remote rural areas. Second, the formation of linear corridors will be accelerated and in nearby areas, the land price and economic density will increase. Meanwhile, as the population increases, villages will expand alongside roads. Third, the transportation infrastructure will connect the isolated villages and tribes to modern societies and realize spatial de-division.

4.3. Division: Mandalika Tourism Infrastructure Project in Indonesia

Mandalika tourism infrastructure project in Indonesia is a typical infrastructure-led case in the most under-developed rural areas or unpopulated zones. Mandalika, located in Island of Lambok, is one of the Indonesian most economically backward provinces. The project is mainly located in a less-developed rural area with severe poverty. There are 77 villages scattered in the region, with nearly 10000 agricultural households and more than 30000 rural people. Among them, approximately half of the households are struggling in the "lowest to five welfare categories" living conditions. And the population below the poverty line in the region accounts for about 16%. (AIIB, 2018; ITDC, 2018) Indigenous people in Mandalika are mainly Sasak. Current land use has primitive and pre-industrial features, with vast unoccupied dry land, farm land and forest land. Meanwhile, transport infrastructure in the region is insufficient. 72% roads are unpaved earthen roads, which severely influences the economic connections between villages and external markets, resulting in universal spatial division (ITDC, 2018).

The project aims at providing the most basic infrastructure including roads, water supply, drainage systems and electricity, which are now in an extreme shortage. Public investment in infrastructure will lead to the upgrading of regional environment, attracting private investment in tourism industry such as hotel and retail business. After the improvement of tourist facilities, the region will attract an increasing number of tourists, their average stay and consumption, which will increase public and individual income with a unprecedented

speed. Moreover, the project will bring about more than 30000 direct jobs in hotel business and 60000 indirect jobs in relative industries, which will effectively improve the household living standards (AIIB, 2018).

The AIIB introduces Special Economic Zones (SEZ) like Mandalika to realize its spatial governance in under-developed rural areas and unpopulated areas. By doing so, transportation and telecommunication infrastructure are getting significantly improved, which can effectively reduce spatial division. Governance in these under-developed regions has a distinctive pre-industrial feature. Due to the localism forces like clans and tribes and limited accessibility, settlements are quite scattered and inward, showing the land-use pattern of spatial isolation and division (Figure 8).

Due to the lack of endogenous economic driving forces such as technologies, capital and high quality labors, and the limited public financial capacity, the region has been trapped into a "closed-loop" development with low investment rate, low savings rate and low rate of return. The only way to break this "closed-loop" is to establish "Special Economic Zones" with the help of top-down external forces, which will help form a "central zone" with high agglomeration of capital and economic activities. The central zone's spillover effects will further promote the development of its surrounding areas.

During this process, economic density of per unit land will increase, and the former phenomenon of spatial division and collage will be gradually replaced by the centralization brought by "Special Economic Zones". Governance achievements and the return in the public sector will be realized. Driven by the infrastructure investment, the private companies engaged in business and accommodation will join the tourism market and make profits. The indigenous people will have more job opportunities in tourist industry, and thus will get higher family income, and will gradually get rid of poverty through self-employment or being employed in the private sector. In conclusion, in Asian under-developed rural areas of the pre-industrial level or unpopulated zones, the AIIB's infrastructure investment will promote the development of regional economic centers and reduce the spatial division caused by ethnic, tribal and cultural customs.

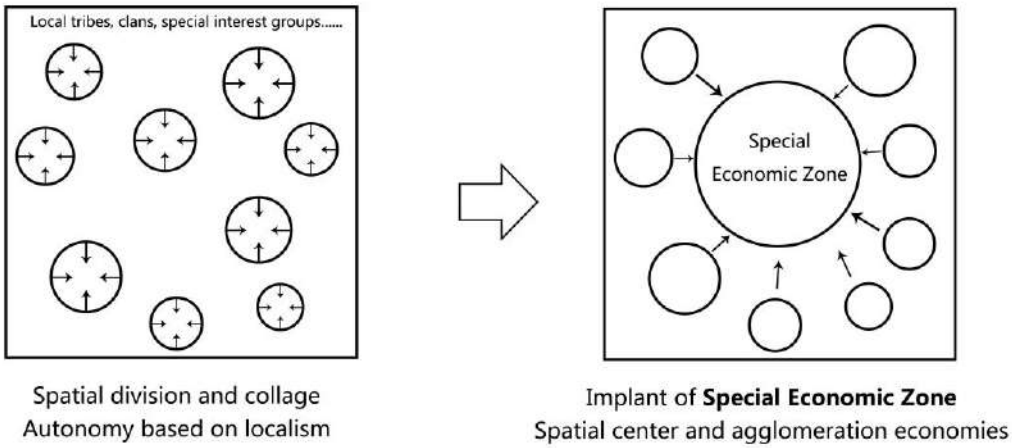


Figure 8 The AIIB's role: from spatial division to agglomeration economics by the SEZ

5. Conclusion

The paper mainly focuses on the framework of density, distance and division of economic geography, traditional governance modes in the context of infrastructure imbalance in developing countries in Asia, and spatial governance brought about by the AIIB's financial investment. The developing countries in Asia have suffered from severe infrastructure imbalance and a severe shortage of investment. This problem has gradually drawn attention from the academia and society. The traditional public-sector-lead mode is not sustainable. The Asian Infrastructure Investment Bank is gradually becoming the emerging force participating in infrastructure investment in developing countries in Asia.

The framework of density, distance and division is appropriate for analyzing the traditional governance modes in developing countries in Asia. Based on the AIIB's 38 infrastructure investment projects, this paper attempts to analyze traditional governance modes and the AIIB's role in non-state governance under this framework. With current infrastructure imbalance, urban and rural development in developing countries in Asia is characterized by low-density sprawl, long distance and limited accessibility to central markets, and spatial division. The AIIB's participation in regional governance is realized through spatial and institutional governance. As for its spatial governance, the AIIB's infrastructure investment will increase land economic density, shorten distance to central markets and achieve spatial de-division. As for its institutional governance, the AIIB will introduce financing supply policies under the supervision of multilateral stakeholders, modern management and behavior constraint mechanism from the outside, which will assist developing countries jump out of the "closed-loop" and gradually optimize their state governance.

In the Colombo urban regeneration project, the differential rent gaps among regions are widened because of land redevelopment, which will lead to an increase in capital density and form agglomeration economies. In the Gujarat rural roads project, distance from remote villages to central markets are evidently shortened, which will decrease the transportation costs and increase the agricultural output. Meanwhile, spatial division because of tribes and remoteness will get mitigated. Indonesia Mandalika tourism infrastructure projects will mitigate the phenomenon of spatial division caused by races, poverty and cultural customs through building a centralized "Special Economic Zone" in the under-developed area.

As aforementioned, the AIIB's role in regional governance could be reflected in spatial and institutional aspects. However, in most approved sovereign-backed projects till now, the AIIB will not directly participate in the distribution of profits. It will only receive a certain proportion of loan interests after the maturity period as an external financial institution. The AIIB's indirect role, that is, not working as a political, administrative or implementation entity which directly participates in spatial governance, institutional governance and distribution of profits, reflects the bank's role as a "non-state" actor in regional governance.

However, there are still several unanswered questions. For example, can such outside governance mode reflect international political and economic games? Can projects in Asian developing countries and the introduction of such governance system reflect the value judgement and ideology of external member states? Does the integration of remote villages into modern governance system potentially threaten the authenticity of cultures? They involve the value judgement and choices of different stakeholders. It takes time to fully

answer these questions. We need to continuously focus on and further study the projects' implementation and the AIIB's future development.

6. Acknowledgements

We would like to express our sincere gratitude to Assistant Professor Amit Chatterjee from Department of Urban and Regional Planning, School of Planning and Architecture, Bhopal, India. Professor Amit Chatterjee provided precious suggestions for the paper's preliminary version, through ISOCARP's "Mentor and Mentee" program. Thanks for his academic advice and encouragement during the mentoring process.

7. References

Asian Development Bank (2017) Meeting Asia's Infrastructure Needs. Mandaluyong City, Philippines: Asian Development Bank.

Asian Development Bank (2019) Asian Development Bank 2018 Annual Report, [online] Available at: https://www.adb.org/sites/default/files/institutional-document/496016/adb-annual-report-2018.pdf.

Asian Infrastructure Investment Bank (2015) Articles of Agreement, [online] Available at: https://www.aiib.org/en/about-aiib/basic-documents/_download/articles-of-agreement/basic_document_english-bank_articles_of_agreement.pdf.

Asian Infrastructure Investment Bank (2017a) Operational Policy on Financing, [online] Available at: https://www.aiib.org/en/policies-strategies/_download/operation-policy/policy_operational_financing_new.pdf.

Asian Infrastructure Investment Bank (2017b) Project Document: Republic of India Gujarat Rural Roads (MMGSY) Project, [online] Available at: https://www.aiib.org/en/projects/approved/2017/_download/India/document/MMGSY_Project_document.pdf.

Asian Infrastructure Investment Bank (2018) Project Document: The Republic of Indonesia Mandalika Urban and Tourism Infrastructure Project, [online] Available at: https://www.aiib.org/en/projects/approved/2018/_download/indonesia-mandalika/mandalika-project.pdf.

Asian Infrastructure Investment Bank (2019a) Members and Prospective Members of the Bank, [online] Available at: https://www.aiib.org/en/about-aiib/governance/members-of-bank/index.html.

Asian Infrastructure Investment Bank (2019b) Project Document: The Democratic Socialist Republic of Sri Lanka Support to Colombo Urban Regeneration Project, [online] Available at: https://www.aiib.org/en/projects/approved/2019/_download/sri_lanka/pd-colombo-urban-regen.pdf.

Bafoil, François; Lin, Ruiwen (2010) "Re-examining the Role of Transport Infrastructure in Trade, Regional Growth and Governance: Comparing the Greater Mekong Subregion

(GMS) and Central Eastern Europe (CEE)", Journal of Current Southeast Asian Affairs, Vol. 29 No. 2 (June).

Callaghan, Mike; Hubbard, Paul (2016) "The Asian Infrastructure Investment Bank: Multilateralism on the Silk Road", China Economic Journal, Vol. 9 No. 2 (April).

Chin, Gregory T (2016) "Asian Infrastructure Investment Bank: governance innovation and prospects", Global Governance, Vol. 22 No. 1 (January).

Ciccone, Antonio; Hall, Pobert E. (1993) "Productivity and the Density of Economic Activity", the National Bureau of Economic Research Working Paper, No. 4313 (April).

Ehlers, Torsten (2014) "Understanding the Challenges for Infrastructure Finance", BIS Working Paper, No. 454 (August).

Etzioni, Amitai (2016) "The Asian Infrastructure Investment Bank: A Case Study of Multifaceted Containment", Asian Perspective, Vol. 40 No. 2 (April).

Gallup, John Luke; Sachs, Jeffrey D.; Mellinger, Andrew D. (1999) "Geography and Economic Development", International Regional Science Review, Vol. 22 No. 2 (August).

Ginsburg, Norton; Koppel, Bruce; McGee, T. G. (1991) The Extended Metropolis: Settlement Transition in Asia, Hawaii, the United States: University of Hawaii Press.

Gottmann, Jean (1957) "Megalopolis or the Urbanization of the Northeastern Seaboard", Economic Geography, Vol. 33 No. 3 (July).

Government of Gujarat (2017) Environmental and Social Impact Assessment (ESIA) for Gujarat Rural Roads (MMGSY) Project, [online] Available at: https://www.aiib.org/en/projects/approved/2017/_download/India/environmental-social-impact-assessment.pdf.

Guo, Qi; He, Can-fei (2012) "Density, Distance, Division, and Urban Labor Productivity: Empircal Study Based on Panel Data of 277 Chinese Cities During 2004 - 2009", Growth and Change, No. 11 (November).

Hameiri, Shahar; Jones, Lee (2018) "China challenges global governance? Chinese international development finance and the AIIB", International Affairs, Vol. 94 No. 3 (May).

Indonesia Tourism Development Corporation (ITDC) (2018) Environmental and Social Impact Assessment (ESIA)/Environmental and Social Management Plan (ESMP) of The Mandalika Urban and Tourism Infrastructure Project, [online] Available at: https://www.aiib.org/en/projects/approved/2018/_download/indonesia-mandalika/Environmental-and-Social-Impact_plan.pdf.

Krugman, Paul (1991) "Increasing Returns and Economic Geography", Journal of Political Economy, Vol. 99 No. 3 (June).

Limão, Nuno; Venables, Anthony J. (2001) "Infrastructure, Geographical Disadvantage, Transport Costs, and Trade", The World Bank Economic Review, Vol. 15 No. 3 (October).

Mankiw, N. Gregory (2012) Principles of Economics, Beijing, China: Peking University Press.

Marx, Karl (1909) Capital Volume 3: The Process of Capitalist Production as a whole, Chicago, the United States: Charles H. Kerr & Company.

McCann, Philip; Shefer, Daniel (2004) "Location, agglomeration and infrastructure", Papers in Regional Science, Vol. 83 No. 1 (January).

McKinsey Global Institute (2016) Bridging Global Infrastructure Gaps, [online] McKinsey Global Institute. Available at: https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/bridging-global-infrastructure-gaps.

Mengistu, Berhanu; Adams, Samuel (2007) "Foreign Direct Investment, Governance and Economic Development in Developing Countries", The Journal of Social, Political, and Economic Studies, Vol. 32, No. 2 (Summer).

Nunan, Fiona; Satterthwaite, David (2001) "The Influence of Governance on the Provision of Urban Environmental Infrastructure and Services for Low-income Groups", International Planning Studies, Vol. 6 No. 4 (November).

Ogun, T.P. (2010) "Infrastructure and Poverty Reduction: Implications for Urban Development in Nigeria", Urban Forum, Vol. 21 No. 3 (August).

Partridge, Mark D.; Rickman, Dan S. (2008) "Distance from Urban Agglomeration Economics and Rural Poverty", Journal of Regional Science, Vol. 48 No. 2 (May).

Roberts, Mark; Goh, Chor-ching (2011) "Density, distance and division: the case of Chongqing municipality, China", Cambridge Journal of Regions, Economy and Society, Vol. 4 No. 2 (July).

Rosenthal, Stuart S.; Strange, William C. (2001) "The Determinants of Agglomeration", Journal of Urban Economics, Vol. 50 No. 2 (September).

Schwab, Klaus (2018) The Global Competitiveness Report 2018, Geneva, Switzerland: World Economic Forum.

Sorensen, André (2018) "Institutions and Urban Space: Land, Infrastructure, and Governance in the Production of Urban Property", Planning Theory & Practice, Vol. 19 No. 1 (January).

Straub, Stéphane; Terada-Hagiwara, Akiko (2010) "Infrastructure and Growth in Developing Asia", ADB Economics Working Paper Series, No. 231 (November).

Urban Development Authority (2018a) Introduction of Urban Regeneration Programme, [online] Available at: https://www.uda.gov.lk/urban-regeneration-programme.html.

Urban Development Authority (2018b) Environmental and Social Management Planning Framework, Urban Regeneration Program, Sri Lanka, [online] Available at: https://www.aiib.org/en/projects/approved/2019/_download/sri_lanka/LKA-URP-ESMF_DRAFT_English.pdf.

Wang, Yongming; Wu, Dianting; Wang, Meixia; Zhou, Li; Ding, Jianjun (2018) "Density, Distance, and Division: Rural Poverty in a Developing‐Country Context", Growth and Change, Vol. 49 No. 3 (September).

Wheaton, William C.; Shishido, Hisanobu (1981) "Urban Concentration, Agglomeration Economies, and the Level of Economic Development", Economic Development and Cultural Change, Vol. 30 No. 1 (October).

Wilson, Jeffrey D (2019) "The evolution of China's Asian Infrastructure Investment Bank: from a revisionist to status-seeking agenda", International Relations of the Asia-Pacific, Vol. 19 No. 1 (January).

World Bank (1994) World Development Report 1994: Infrastructure for Development, New York: Oxford University Press.

World Bank (2009) World Development Report 2009: Reshaping Economic Geography, [online] Available at: https://openknowledge.worldbank.org/handle/10986/5991.

Case Study / Project

Democratic Urbanism

A Method for City-Building

Joel MILLS, Erin SIMMONS

Abstract

In recent years, the field has witnessed a discernable trend toward the retrenchment of autocratic approaches to city-building and more passive approaches to public participation in major planning and design work about the future of the city. Too often today, expensive public processes are failing to result in popularly supported policies and plans. A growing chorus of notable city-building professionals have expressed frustration with the public backlash to their work, decrying the spread of NIMBYism and denigrating the citizenry they are reliant upon for support. Ironically, this trend runs parallel to an ever-increasing public appetite for meaningful involvement in decision-making processes. Many localities are struggling with limited capacity around facilitated public processes, leading to a marked increase in conflict, controversy and distrust as high stakes public conversations are often poorly designed or mismanaged. The resulting decline in the quality of public processes and civil discourse is adversely impacting our collective abilities to make key decisions to meet our core challenges, ranging from urban systems to housing to climate change. Preparing urban professionals for the 21st century requires an education in democratic techniques. Well-designed public processes that involve citizens in city-building pay huge dividends.

The lessons of the past half-century are clear: When urban democracy expands, cities flourish. Democratic Urbanism represents more than a planning or design exercise. It is a method of city-building that integrates democratic ideals into the urban design process and applies broader shared governance models to the implementation of community aspirations, creating places of deep meaning that are broadly 'owned' in the civic mindset. It is a process that carries forward in the implementation of a collective vision, through actions small and large from all sectors of society. Ideally, it involves the intentional alignment of individual and group interests and actions in pursuit of a collective vision for the future city. It is dependent upon a healthy civic infrastructure. This interactive session will include a number of case studies, short films and exercises from the American Institute of Architects' half century of work in its design assistance program. These cases demonstrate the value of democratic approaches to city-building, highlighting communities that have applied democratic urbanism to achieve remarkable transformations across a variety of contexts.

Some of these stories are young, representing nascent efforts, while others show impacts lasting over decades. Collectively, they form a hopeful narrative that demonstrates our civic capacity to overcome the stark challenges of the 21st century and reinvent our communities. They also illustrate the advantages of a democratic method for city-building that is broader than conventional practice, one based in a collaborative approach to governance that offers guidance to local leaders across the world working on the front lines of change today.

Research Paper

MAKING TOD IMPLEMENTABLE IN INDIAN CITIES

From Theory to Practice

Jyoti Vijayan Nair, NIUA; India

Abstract

India's staggering economic growth in the past decade and the unpredecented rate of ubanisation call for solutions that go beyond the paradigm of traditional planning. Transit Oriented Development (TOD) is widely acknowledged as the solution to sprawl, longer commute distances and carbon emissions– problems that are typical of rapidly urbanising economies. However, TOD has largely been a buzzword in Indian policy documents for over a decade, as the country still awaits its first fully implemented TOD project. This paper studies three key TOD proposals in the megacities of Delhi, Mumbai and Ahmedabad and aims to examine their approaches for want of an effective framework to evaluate the feasibility of TODs across the country.

Keywords

TOD, Redevelopment, Implementation, Policy

1. Background

1.1. TOD in India

Much like their European counterparts, traditional Indian cities are characterised by compact, high-density inner cores, which continue to thrive as major activity hubs even today in many cities like Delhi, Ahmedabad, Hyderabad, Madurai, etc. With the advent of the motor vehicle, city planning evolved to pave way for carriageways and planned development, the way we understand it today. Although western town planning principles made their way to create some of the first planned cities in India like Chandigarh, Bhubaneshwar, Gandhinagar, the impact of centuries of colonisation and exploitation did not wear away easily. Consequently, a crippled economy post-independence was unable to cope up with the pace of urbanisation, and issues relating to rural and refugee migration. Seven decades after independence, India is now home to 5 megacities with a population over 10 million (Nations, 2018), and is slated to overtake China as the most populous country in the world by 2027 (United Nations, 2019). As a result of the State's inability to meet housing demands, Indian cities now face a dire space crunch as informal settlements occupy a major chunk of prime city land. Yet, building norms have not evolved to adapt with the challenges of an exploding population, as most cities continue to follow outdated planning regulations that were imported from car-driven western economies in the 60s. Land-based zoning, minimum setback norms, parking minimums and other such regulations exacerbate issues relating to sprawl and longer commute distances. Latest available government data (MoSPI, 2015) shows that Delhi has the highest number of registered private motor vehicles in the country, followed by Bengaluru, Chennai, Ahmedabad and

Mumbai (see Figure 1). Besides increasing dependence on cars, these vehicles occupy a major chunk of city space in the form of on-street and off-street parking, which can otherwise house the urban poor. A study reveals that 'the annual demand for additional parking spaces for cars can be equivalent to as much as 471 football fields in Delhi, 100 in Chennai, 58 in Chandigarh, and 179 in Gurgaon' (Rowchowdhury et al., 2018). Clearly, land utilisation has to be managed in a more efficient and democratic way, if Indian cities aspire to meet future housing demand.

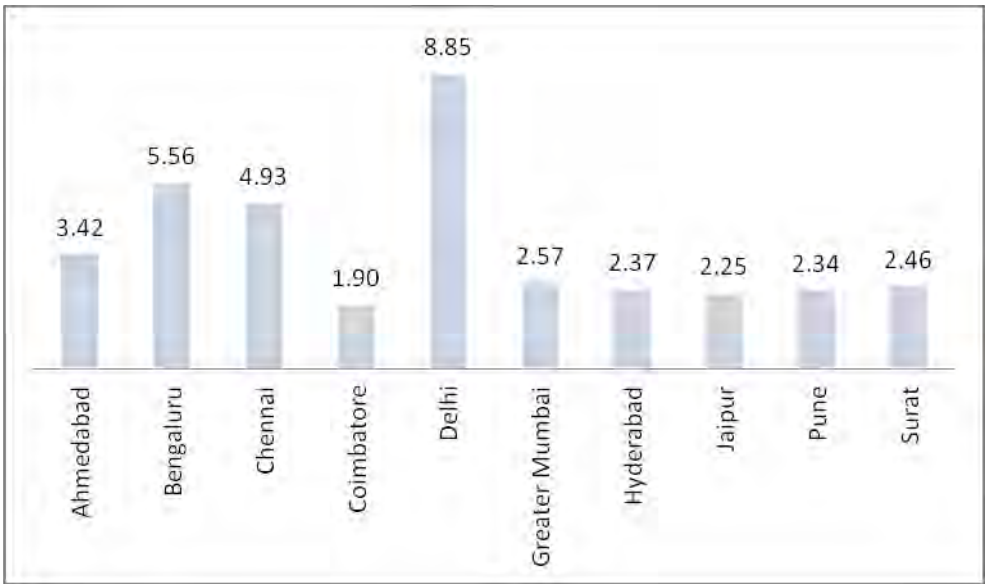


Figure 1. Top 10 Cities with maximum number (in millions) of Registered Motor Vehicles
(Source : Ministry of Statistics and Programme Implementation, 2015)

The need for reducing sprawl and vertical mixing is increasingly being acknowledged in the Indian urban policy context. Learning from their Eastern neighbours like Tokyo, Singapore and Hong Kong, Indian cities are realising the potential of Transit Oriented Development (TOD) as the way forward for rapidly urbanising developing economies. TOD encourages high density, mixed-use living environments that bring live, work and leisure closer to transit, thereby eliminating the need for personal vehicles and thus promoting active travel. Urban practitioners believe that the design principles of TOD coupled with democratic land assembly mechanisms and innovations in project finance could give our cities the much needed makeover and promote sustainable mobility.

1.2. Emerging Policy Climate

The policy climate in the past decade has been in favour of encouraging TOD, as central and state governments are exploring various models to make TODs implementable. The country's first draft TOD Policy for the city of Delhi was released in 2012 (DDA, 2012), as an addendum to the Master Plan Delhi-2021. It was notified with many revisions in 2015 (DDA, 2015), and is being further refined in 2019, as it awaits final notification. The Ministry of Urban Development (MoUD) also released the National TOD Policy (MoUD, 2017) as a guideline for all states to formulate their respective state-specific TOD policies. The states of Jharkhand and Madhya Pradesh now have a policy framework in place, while cities like Ahmedabad, Kochi, and Bangalore have attempted to incorporate TOD in their Master Plans. However, barring the advanced stage of resolution of Delhi's TOD policy with clearly defined institutional setups and plot assemblies for brownfield redevelopment, TOD policies for

most cities just about preach universal principles of urban design as 'special norms' for TOD Influence Zones[1]. Replicating urban design guidelines in the name of state policies without contextualisation or devising of appropriate institutional structures does not help enable TOD as implementable projects.

Numerous TODs are being proposed countrywide, however it's realisation on ground is largely hit-and miss. Delhi's first TOD- the East Delhi Hub at Karkardooma Metro Station was a major proposal by the Unified Traffic and Transportation Infrastructure (Planning and Engineering) Centre (UTTIPEC), that did not fructify amidst much hue and cry, and disagreements between government agencies (Sabikhi, 2016). The website of the Directorate of Urban Land Transport (DULT), Bangalore mentions many proposals including the TOD pilot project for Navnagar, Hubli. However, none of these exist on ground. From a TOD Zone parking management perspective, the World Resources Institute (WRI) studied Ghatpkopar Suburban Rail station area in Mumbai to make recommendations to the Mumbai Development Plan (Rangwala et al., 2014), while a station area accessibility proposal for Indiranagar Metro Station in Bangalore was made as early as 2011 (EMBARQ, 2011). Unfortunately, these too stand as unimplemented academic exercises.

The only promising example of TOD implementation on ground is that of Ahmedabad's proposed Central Business District, wherein the Ahmedabad Urban Development Authority (AUDA) delineated TOD corridors in the last Master Plan and used Gujarat State's progressive land reconstitution mechanism- the Town Planning (TP) Scheme to develop land for brownfield redevelopment. Despite the technical delays in plan preparation (TNN, 2017), if implemented, the CBD will be the first successful example of brownfield TOD in the country.

1.3. Gaps in Implementation

Multiple reasons are attributed to the colossal failure of TOD in India. Firstly, **TOD is largely misunderstood as a tool to increase Floor Area Ratio (FAR) only**, while the aspects of integrated mobility, more public spaces, accessible greens, active street frontages, and minimal parking are sidelined. Ahmedabad's norms relating to Urban Design (setback, building heights, active frontages), permissibility of uses and parking in the TOD notified zone, are the same as across rest of the city (AUDA, 2015). This defeats the purpose of creating a special compact and walkable TOD Zone.

Secondly **normative Masterplans lack the dynamism that can adapt to demand, and often tend to dissociate themselves with on-ground realities** relating to land ownership and size of plots. Delhi's TOD policy (DDA, 2015) attempted to address this issue by devising bottom-up plot assembly mechanisms and appropriate institutional setups. However, putting this enabling framework in place itself took 7-8 years.

Lastly, the biggest issue with TOD policies is that the **norms are uniformly applicable across all TOD station areas, irrespective of context**. A blanket policy across transit stations having significantly different urban conditions is unlikely to fructify without a context-specific action plan. Recognising this gap, Delhi's upcoming revised TOD policy pushes for a phased implementation of TOD on selected nodes instead of the city as a whole (Chitlangia, 2019).

[1] typically delineated as either nodes/circles of 500m radius around metro stations or corridors of 500m on both sides of Bus Rapid Transit Systems

This welcome move is not only an opportunity to identify nodes with high potential but also determine a distinct vision for each node, that will aid in the city's image-making process. TOD policies for other cities are yet to reach this level of streamlining.

1.4. Aim

This paper aims to explore a mechanism for cities to assess feasibility of TOD at a given station *before* a detailed proposal is drafted. It advocates a process of station area selection using a broad set of indicators that can help classify stations into categories of high, medium and low potential for TOD and therefore assist policy-makers in decision making. The methodology will not only provide a framework to predict the success or failure of a potential project, but will also assist in building a case for TOD at a given station.

One of the key conclusions that the paper aims to arrive at is a set of observations on the scope of TOD in densely populated core-city regions versus the sparsely developed peri-urban regions. Broad thumb rules for the development of these may help public and private players understand potential areas for investment and hence work out the economics for such projects.

2. Literature Review

2.1. TOD Zone Delineation

In the case of cities like Tokyo, Hong Kong and Singapore, that are globally acknowledged best practices in TOD, development follows transit and therefore station areas naturally tend to be transit-oriented. Tokyo's strategy of allowing private rail companies to readjust land in greenfields and creating new towns around expanded railway lines, coupled with redevelopment of large parcels of city land around stations, are well-regarded lessons in land assembly and brownfield redevelopment (Suzuki et al., 2013). Hong Kong on the other hand, followed the successful Rail+ Property model (see Fig 2.) wherein the government grants MTR-the privately run railway company, property development rights for station areas at 'before development' market rates. MTR in turn prepares the master plan and co-develops the station area with the developers, while sharing the profit with them on an after-development' market rate (Cervero and Murakami, 2008).

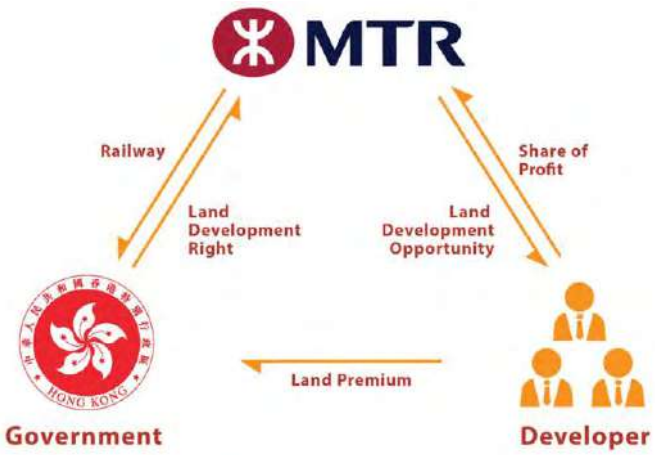


Figure 2. Hong Kong's Rail + Property Development Model *(Source : MTR)*

In the case of Singapore, since 90% of land is owned by the government through acquisition under the Land Acquisition Act of 1967, subsidised public housing by Housing Development Board (HBD) has always been planned around transit stations as shown in Fig 3. As a result, 82% of Singaporeans have access to affordable housing around high capacity transit (Bin and Naidu, 2014).

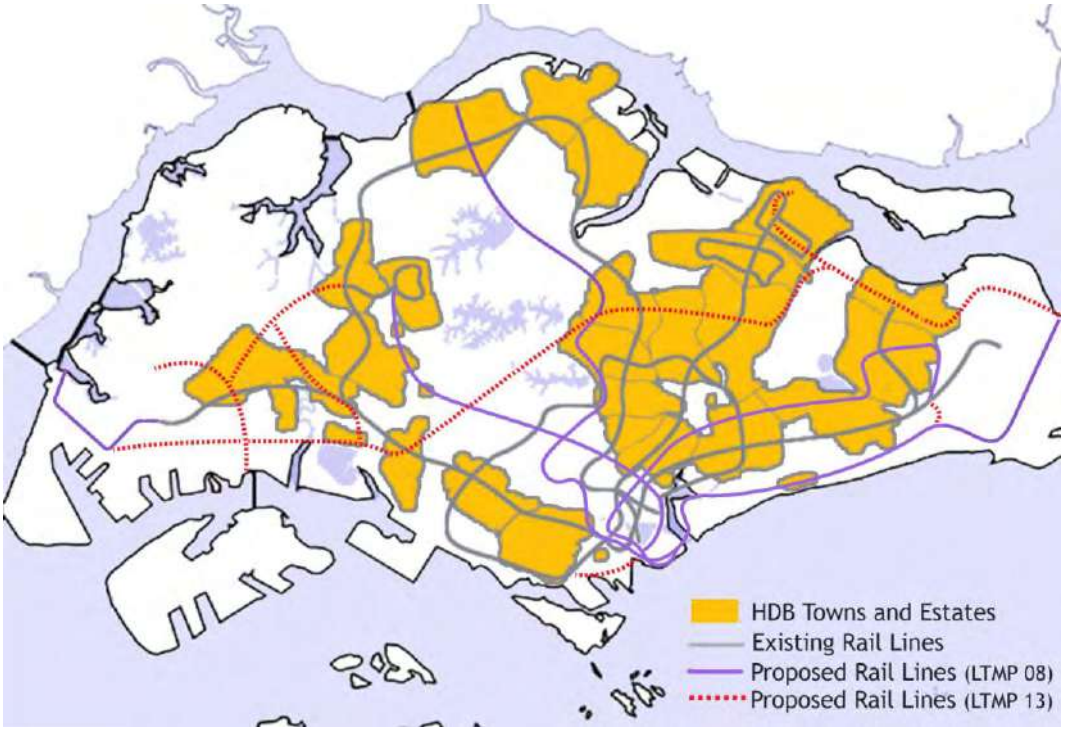


Figure 3. Singapore's Railway Lines vs Public Housing Pockets *(Source : Housing Development Board)*

In most Indian cities except Mumbai and Kolkata, mass transit has only been a recent development[2] unlike in the case of Tokyo, Hong Kong, and Singapore. Therefore TOD in India is mostly imagined as a brownfield redevelopment process, as transit follows development in areas that generate maximum revenue to easily finance the system. The major critique of this however, is a total lack of station area planning, poor accessibility and a lack of integration between different modes of transfer from stations, primarily because land around stations is owned by mutiple entities (Agarwal et al., 2019). As a result, transit is essentially an afterthought instead of being the primary planning strategy. Since its very first Master Plan for 1981, to the last for 2021, Delhi's Master Plan almost never addresses land use and transport integration as a core strategy, even as the Delhi Metro Rail Corporation (DMRC) made its first line operational in 2002.

Acknowledging this issue, the TOD policies therefore, act as an addendum to the process of planning, wherein a certain catchment zone around transit stations/ corridors are delineated and notified as areas of special development, with norms that are different from the rest of

[2] Although Mumbai's Suburban railways and Kolkata's trams have existed since 1853 and 1873 respectively, Mass Rapid Transit as we know it today has existed only since early 2000s. Delhi Metro became operational in 2003, Ahmedabad's Bus Rapid Transit System- Janmarg, began operations in 2009 while Bengaluru's Metro became operational in 2011, followed by Mumbai in 2014, Jaipur and Chennai in 2015, and so on.

the city. In Ahmedabad, this zone is a 400m wide corridor on either sides of the Bus Rapid Transit (BRT) System. In the case of Delhi, the delineation is at a node of 500m radius around Mass Rapid Transit (MRT) Systems or Metro. For National Capital Region (NCR)'s regional rail that connects 5 neighbouring cities to Delhi, TOD Zone is imagined as a node of 1km around stations. The difference in the principles of these delineations depend on the perceived impact of the type of transit system on its surrounding areas. Although the corridor/ nodes are notional boundaries, the actual TOD Zone is determined by local land uses and road layouts (see Fig 4.)

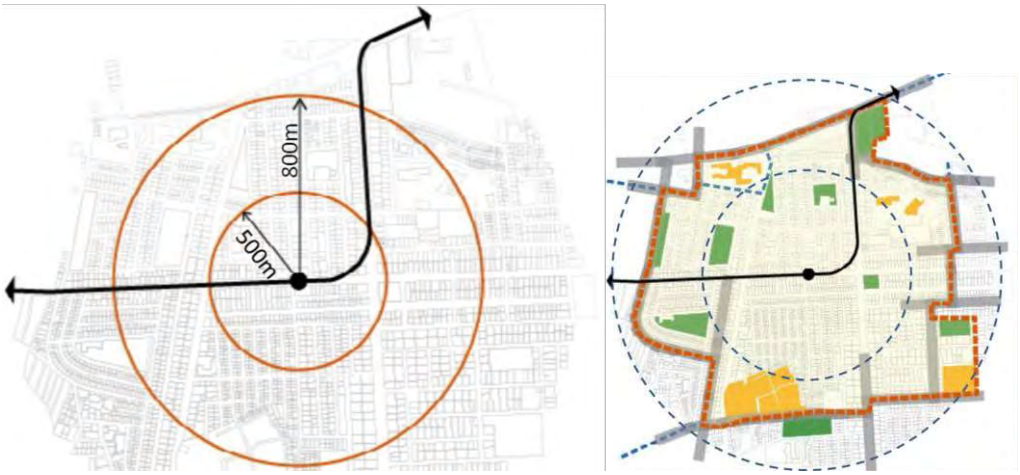


Figure 4. TOD is planned around 500-800m notional circle, the exact boundaries of which are determined by existing road layout and land uses *(Source : National Institute of Urban Affairs)*

Once the zones are delineated, appropriate institutional setups and plot assembly mechanisms need to be put in place to facilitate large scale redevelopments based on the design principles of TOD mandated through special development control norms as outlined in the TOD policy.

2.2. Design Principles of TOD

There are various available definitions and principles of TOD through various national and international policies, literature and standards. According to the Institute for Transportation and Development Policy (ITDP), *"Transit-Oriented Development stands for the rights of all to access the city: to walk and cycle safely, to easily and affordably reach the most distant destination through rapid and frequent transit, and to live a good life, free of dependence on cars. It stands for access to opportunity, education, services, and all the resources available via no- or low-cost mobility options."* (ITDP, 2017). Through mixed-use developments, compact and high density living environments, it emphasises on eliminating the need to make trips and saving commute time and money. Cervero and Kockelman in 1997 identified three "Ds"- *Density, Diversity,* and *Design* as essential components of transit-oriented development (Cervero and Kockelman, 1997), to which Cevero later added *Distance to Transit* and *Destination Accessibility*. The MoUD's National TOD Policy (MoUD, 2017) goes a step further and outlines 'Guiding Principles' that are primarily from a design perspective *(Complete Streets, Multimodal Integration, Last Mile Connectivity, NMT network, Traffic Calming, Mixed Lane Uses, Optimised Densities, Street-Oriented Buildings, Managed Parking, Informal Sector Integration,* and *Housing Diversity)*, and 'Supporting Principles' that are from an implementation perspective (*engage Private Sector, Land Value Capture, Right Size*

Infrastructure, Technology Integration, High Quality Transfer System, Barrier-free Environment and *Preserved Open Spaces*).

ITDP's TOD Standard outlines the following eight core principles of urban design, each supported by specific performance objectives and easily measurable indicators, or metrics. The tool can be used to evaluate projects for their 'TOD-ness' (Joshi et al., 2017) and propose recommendations for their improvement, albeit strictly from a design perspective.

1. ***Walk :*** Through adequate and shaded sidewalks, pedestrian crossings and active frontages.
2. ***Cycle :*** Through a well connected cycling network and access to safe cycle parking.
3. ***Connect :*** Through smaller block sizes, a tight grid of vehicular and pedestrian network.
4. ***Transit :*** Through easy accessibility to Transit stations.
5. ***Mix :*** Through an adequate mix of commercial, residential and recreational uses with a component of affordable housing.
6. ***Densify :*** Through higher FAR and planned density (persons per hectare).
7. ***Compact :*** Through adequate adjacencies and various transit options.
8. ***Shift :*** Through on-street and off-street parking management.

However, there is a growing concern about TOD being misunderstood as merely 'Transit-Adjacent Development (TAD)' than actually being Transit-Oriented (Joshi et al., 2017). The proposals by Indian Railway Station Development Corporation (IRSDC) to develop railway land near select stations as high density commercial and residential hubs, is although being hailed as an example of successful TOD implementation (Das, 2019), the extent of its adherence to TOD principles is something that remains to be evaluated. Besides, most cities still rely on archaic building norms that are contradictory to the very principles of TOD. For example regulations like mandatory provision of front setbacks, parking minimums for each plot, no norms for an integrated street network, active frontages and prohibition of boundary walls, etc. defeat the purpose of creating compact and walkable TOD neighbourhoods that promote Jane Jacob's idea of 'Eyes on the Street' .

2.3. Land Assembly Mechanisms

Unlike in the case of Singapore, majority of land in India is privately owned. Therefore, redevelopment for TOD purpose is conventionally done by public acquisition of land. The National Land Acquisition Act (Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR), 2013), which enables compulsory acquisition of land, is the primary tool to acquire land in India for public purposes[3] (Mathews et al., 2018). However, the costs involved in acquisition are high and the means to finance such projects are still being explored through fiscal and non-fiscal measures. Secondly, delays in procuring land through RFCTLARR has also led state-based agencies to frame alternate land assembly mechanisms (Nair, 2016) like Land Readjustment, Land Pooling, PPP, market price negotiations, land lease policies, etc.

These alternative frameworks are deemed more progressive and bottom-up in their approach, as they provide the land owners with incentives like higher FAR and relaxation on

[3] The Act is a revision to the traditional National Land Acquisition Act of 1894, which was repealed due to issues relating to unfair compensation to land owners and 'severe imbalance of power between the state and the land losers' (Wahi, 2018).

certain norms to make redevelopment a financially viable and profitable option. This categorically means land owners have a choice to form a consortium and amalgamate plots if they want, without mandating land surrender as the only option, as in the case of land acquisition. The government's involvement is limited to infrastructure provision for the new development, in return for a certain percentage of land for public uses such as affordable housing and public green spaces (as in the case of land readjustment). This ensures that even smaller plot are compensated in some way or the other, say through a smaller dwelling unit but with a much higher market value. Needless to say, this is a gradual process and requires a lot of consensus building between land/ property owners.

One of the earliest methods in land readjustment or reconstitution in India was the Town Planning Scheme (TPS) which was introduced through the landmark Gujarat Town Planning and Urban Development Act, 1976 (Ballaney, 2008). The TPS mechanism has been used extensively for the provision of serviced land for development, especially in the peri-urban areas of Ahmedabad. While this mechanism has largely been successful in the peripheries, its success in the urban cores is often contested due to apprehensions regarding carrying capacity of existing infrastructure to support high densities (Dutta, 2015). The entire delineated TOD zone around Ahmedbad's BRT System, as well as the proposed CBD of Ahmedabad rely on the TPS Scheme.

Delhi's TOD Policy (DDA, 2015) uses a similar bottom-up approach wherein individual plot owners within the TOD zone can voluntarily amalgamate plots, partner with developers to form the 'Developer Entity' and redevelop into large scale TOD projects that follow special TOD norms as outlined in the policy. A small percentage of the land is returned to the Development Authority for provision of public greens, as is 50% of the mandatory affordable housing units developed as per the norms. Although the urban design regulations align with the TOD principles, it may take more than just a few years for the idea of redevelopment to percolate into Delhi's real estate market. A way to expedite the process could be through implementing TOD in government-owned lands, as pilot demonstration projects (as was intended through the East Delhi Hub Proposal at Karkardooma Station in Delhi). However, a high quality TOD requires high capital investment and is not possible without the intervention of the private sector. Cities must explore similar strategies to select pilot station areas and devise appropriate financing and institutional setups for land assemblies, in order to put TOD on the fast track.

3. Methodology

3.1. Conceptual Framework

Clearly, the concept of TOD in India is past its nascent stage. It’s design principles and benefits are clearly acknowledged, as is evident from various projects and government policies. Often projects are conceptualised and undergo various design iterations for months/ years, without fructifying on ground due to practical reasons like land ownership and assembly frameworks, project financing, and sometimes, even unforeseen negative impacts on existing urban context. The objective of this paper is :

- to identify criteria or parameters that impede TOD implementation on ground, and

- to develop a framework that can help assess the feasibility of a TOD project at various stages of its inception, i.e. *Pre-Planning, During Planning* and *Post-Planning*.

This will be done through a case study of the following three TOD proposals from different contexts, that have made news in the urban development fraternity.

1. Proposed Central Business District (CBD), Ahmedabad; *(Status : Under Implementation)*
2. Railway Station Development, Habibganj-Bhopal; *(Status : Approved by Implementing Authority)*
3. Karkardooma Metro Station Development, Delhi; *(Status : Not Approved by Implementing Authority)*

For the first two phases (Pre-Planning and During Planning), the paper uses **methods** like **Spatial and Quantitative Analysis** of the three projects using *Master Plans of the proposal, context study on satellite imagery, and a review of development numbers/ area statements from the proposals*. The last phase (Post-Planning) involves a **review of available literature** on *state-specific TOD Policies, Development Model, and Institutional Setup* (See Fig. 5).

3.2. Scoring

The projects are scored on the basis of these criteria- the underlying principle being that each phase carries equal weightage (5 points each). The criteria under each phase carry equal points – 1.66 each in the 'Pre-Planning' Phase, 1 each in the 'During Planning' Phase, and 2.5 each in the 'Post-Planning' Phase. Finally, the project that scores between 1-33% is deemed Low Probability TOD, 33-66% is Medium Probability TOD and 66-100% is High Probability TOD.

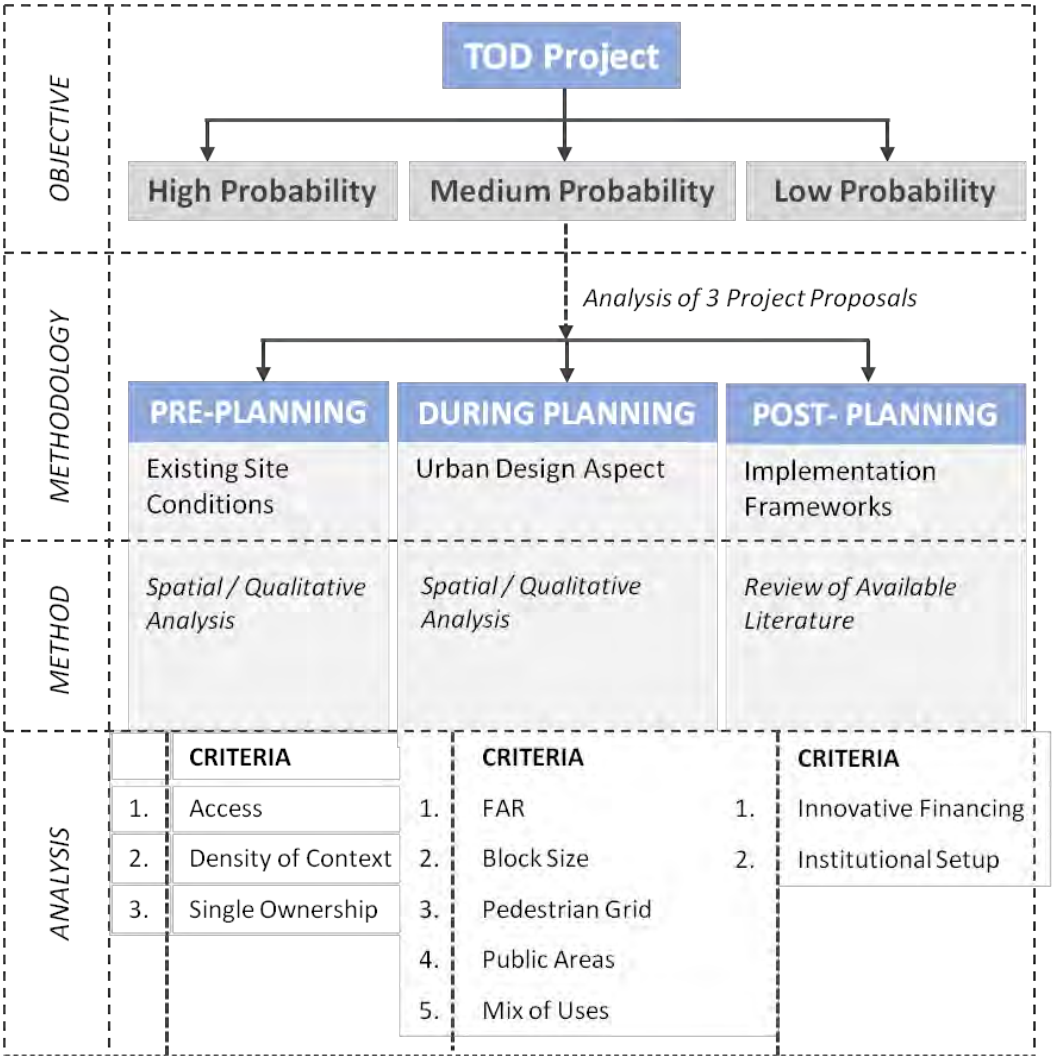


Figure 5 Conceptual Framework

The scoring however, is limited to establishing only a qualitative framework for a quick and initial TOD Project Feasibility Assessment. It does not analyse details such as *Parking Numbers*, detailed *Distribution of Proposed Uses, Affordable Housing Units*, etc. due to data unavailability. The scoring will have to be read in conjunction with policy climate, nuances in land ownership and the political will to implement TODs. Besides, for the 'During Planning' phase, there are already well-established comprehensive set of National (MoUD National TOD Policy) and International indicators (ITDP TOD Standard 3.0) as discussed earlier, which require a bigger and more detailed study, and is beyond the scope of this paper.

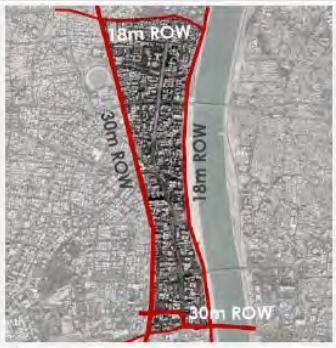
3.3. Analysis of TOD Proposals

The three projects have been analysed on the basis of the conceptual framework in tabular form, as mentioned in Fig. 6.

AHMEDABAD	BHOPAL	DELHI
Central Business District	*Habibganj Railway Station*	*Karkardooma Metro Station*
		
Area : 125 Ha **Type of Transit :** BRT System	**Area :** 29.6 Ha **Type of Transit :** National Railways	**Area :** 28.8 Ha **Type of Transit :** Metro Station

PRE-PLANNING

ACCESS

		
Access from all 4 sides : 30m road from two sides, and 18m road from other two sides.	Access from 2 sides : both 30m road on opposite sides.	Access from 1 Side exists : 28m road and proposed 30m road access from the opposite side

SURROUNDING DENSITY

		
Legend : Medium Density High Density Very High Density Low Density	Legend : Low Density Very Low Density Very High Density Undeveloped Land	Legend : High Density Very High Density Medium Density
Mostly surrounded by medium density	Mostly surrounded by low to very low density	Mostly surrounded by high to very high density

Multiple - PRIVATE ENTITY	Single - PUBLIC ENTITY	Single - PUBLIC ENTITY
DURING PLANNING		
EXISTING AND PROPOSED FAR		
Existing : 1.8 Proposed : 5.4 3X	Existing : 1-1.5 Proposed : 3 2-3X	Existing : 1 Proposed : 2 2X
BLOCK LENGTH		
		
Average : 150-300m Max : 450m	Average : 100-150m Max : 250m	Average : 200-250 Max : 280m
PEDESTRIAN GRID		
		
Approx @20-100m Pedestrian Linkages cut through blocks sometimes, but mostly do not.	**Approx @80-150m** Pedestrian Linkages do not cut through blocks and sometimes end in cul-de-sacs	**Approx @70-100m** Pedestrian Linkages almost always cut through blocks, thereby making pedestrian shortcuts possible
PUBLIC AREAS		
Greens : 30% Roads : 40%	Greens : 8% Roads : 15%	Greens : 20% Roads : 22%
MIX OF USES		
Commercial	Commercial Residential Recreational Uses	Commercial Residential (High End + Social Housing) Recreational Uses
POST-PLANNING		
INNOVATIVE FINANCING AND INSTITUTIONAL SETUP		

Implementing Agency : Govt (AUDA) Development Model : TP Scheme, Gujarat State Investor : Developer Entity (Land Owners + Developers)	Implementing Agency : Govt (IRSDC) Development Model : PPP (land leased to developer for 45 years, ownership with govt.) Investor : IRSDC + Developer	Implementing Agency : Govt. (DDA) Model : NA Investor : (DDA) *Note : Delhi's TOD Policy follows a similar model as the TP Scheme, however this is a recent development and the framework was in place only years after this proposal came out.*

Figure 6 TOD Project Analysis

3.4. Scoring of Projects

AHMEDABAD			
Pre-Planning *(5- Points)*	Access	✓	1.66
	Density of Context	✓	1.66
	Single Ownership	✗	0
During-Planning *(5- Points)*	Higher FAR	✓	1
	Block Size	✓	1
	Pedestrian Grid	✓	1
	Public Spaces	✓	1
	Mix of Uses	✗	0
Post-Planning *(5- Points)*	Innovative Financing	✓	2.5
	Institutional Setup	✓	2.5
			12.33 = **82%**

HABIBGANJ			
Pre-Planning *(5- Points)*	Access	✓	1.66
	Density of Context	✓	1.66
	Single Ownership	✓	1.66
During-Planning *(5- Points)*	Higher FAR	✓	1
	Block Size	✓	1
	Pedestrian Grid	✗	0
	Public Spaces	✗	0
	Mix of Uses	✓	1
Post-Planning *(5- Points)*	Innovative Financing	✓	2.5
	Institutional Setup	✗	0
			10.5 = **70%**

KARKARDOOMA			
Pre-Planning *(5- Points)*	Access	✗	0
	Density of Context	✗	0
	Single Ownership	✓	1.66
During-Planning *(5- Points)*	Higher FAR	✓	1
	Block Size	✓	1
	Pedestrian Grid	✓	1
	Public Spaces	✓	1
	Mix of Uses	✓	1
Post-Planning *(5- Points)*	Innovative Financing	✗	0
	Institutional Setup	✗	0
			6.66 = **44%**

Figure 7 Scoring of Projects

3.5. Observations

- Based on the scoring, **Ahmedabad CBD** qualifies as a **High Probability TOD** and fares very well in all phases, with an overall score of 82%. Although, multiple ownership of land is seen as a limitation here, Ahmedabad's bottom-up land assembly mechanism, i.e. the TP Scheme, outweighs the project delays caused by land pooling and plot reconstitution by AUDA. However, being a CBD proposal, the project cannot be seen as a complete TOD project due to the predominance of commercial over residential and recreational uses.
- **Habibganj Station, Bhopal** also qualifies as a **High Probability TOD**, with a score of 70%, primarily due to its location in a low density area and the PPP Model of Development devised in its financing. However, the design needs serious considerations for it to become TOD-friendly. Ideas of walkability and public spaces are yet to be reflected in the masterplan.
- **Kakardooma Metro Station Delhi,** on the other hand, despite faring extremely well in the design phase, gets classified as **Medium Probability TOD** (51%), primarily due to its location in a busy and congested part of the city and the lack of financing and institutional mechanisms to ensure its implementation. Its exceptional design principles not only focus on high density development and public spaces but also advocate an appropriate mix of uses with housing for the Economically Weaker Section (EWS) category. However, this project has the potential to fare as a very high potential TOD project if Delhi TOD Policy's institutional setup (released a few years after the Karkardooma proposal came out in public domain) can be applied and Private Developers can be incentivised to develop this piece of public land.

4. Conclusions

The paper demonstrates equal significance of all three phases in the planning and execution of TODs. Karkardooma in Delhi is a classic example of how **design alone may not be enough** to implement TOD on ground. Theoretical design aspects of TOD aside, context and finance become the most important factors for decision-makers, who also have a responsibility towards existing populations and may not want to tamper with their day-to-day activities. This also indicates the inadequacy of highly complex TOD Design Scoring exercises to evaluate TOD projects.

Therefore, **TOD may be more easily implementable in** areas with low population, i.e. the **peri-urban regions** (as in the case of Habibganj), compared to dense urban cores. However, this has to be complemented with adequate design. In contexts like Ahmedabad CBD and Karkardooma, special care has to be taken to not disrupt everyday life and therefore may be a slower process, yielding dividends gradually over a span of decades. This time factor will have to be foreseen before dense urban regions are picked for TOD, unlike in the case of Habibganj wherein the land is leased for a small period of 45 years to the developer.

Since India is still struggling with various land assembly mechanisms in both greenfield and brownfield areas, projects like Karkardooma and Habibganj are low-hanging fruits because of **public land ownership,** and therefore must be on government's priority list. Projects like CBD, although follow the right approach in land assembly, still require plenty of public

consultations and workshops with plot owners, apart from various other time and resource-intensive events to garner consensus and attract investment from developers. For Indian cities to reap instant benefits from TOD, strategic selection of potential and the most suitable station areas is the key.

5. References

AGARWAL, O. P., KUMAR, A. & ZIMMERMAN, S. 2019. *Emerging Paradigms in Urban Mobility : Planning Financing and Management,* Cambridge, USA, John Simpson.

AUDA 2015. Comprehensive Development Plan 2021 (Second Revised). *In:* (AUDA), A. U. D. A. (ed.). Ahmedabad.

BALLANEY, S. 2008. Making Urban Planning Work: Town Planning Mechanism in Gujarat, India. *In:* INSTITUTE, W. B. (ed.). Washington DC.

BIN, T. S. & NAIDU, V. L. 2014. Public Housing in Singapore: Examining Fundamental Shifts. *In:* LEE KUAN YEW SCHOOL OF PUBLIC POLICY, N. (ed.). Singapore.

CERVERO, R. & KOCKELMAN, K. 1997. Travel Demand and the 3 D's: Density Diversity and Design. *Transportation Research Part D: Transport and Environment,* 2**,** 199-219.

CERVERO, R. & MURAKAMI, J. 2008. Rail + Property Development: A model of sustainable transit finance and urbanism. *In:* TRANSPORT, U. B. C. F. F. U. (ed.). Berkeley.

CHITLANGIA, R. 2019. Five Delhi Metro stations shortlisted for transit-oriented development. *Hindustan Times*.

DAS, M. 2019. IRSDC to categorise railway stations for redevelopment and modernisation. *Business Line*, March 25, 2019.

DDA 2012. Transit Oriented Development- Policy, Norms and Guidelines. *In:* UTTIPEC (ed.). New Delhi: Delhi Development Authority.

DDA 2015. Proposed Transit Oriented Development (TOD) Regulations as envisaged in Transportation Chapter of MPD notified vide S.O. no. 1914 (E) dated 14.07.2015. *In:* AUTHORITY, D. D. (ed.). New Delhi.

DUTTA, A. 2015. New Urban Utopias of Postcolonial India: 'Entrepreneurial Urbanization' in Dholera Smart City, Gujarat. *Dialogues in Human Geography,* 5**,** 3-22.

EMBARQ 2011. Towards a Walkable and Sustainable Bangalore : An Accessibility Project for Indirangar Metro Station. *In:* INSTITUTTE, W. R. (ed.). Bnagalore.

ITDP 2017. TOD Standard. *3rd Edition.* New York.

JOSHI, R., JOSEPH, Y., PATEL, K. & DARJI, V. 2017. Transit-Oriented Development: Lessons from Indian Experiences. *In:* CENTRE FOR URBAN EQUITY (CUE), C. U. (ed.). Ahmedabad, India.

MATHEWS, R., PAI, M., SEBASTIAN, T. & CHAKRABORTY, S. 2018. State-led alternative mechanisms to acquire, plan and service land for Urbanisation in India. *In:* INSTITUTE, W. R. (ed.). New Delhi.

MOSPI, G. O. I. 2015. Total Registered Motor Vehicles in Million Plus Cities. *In:* 2016, M. V.-S. Y. B. I. (ed.). New Delhi.

MOUD 2017. National Transit Oriented Development (TOD) Policy. *In:* (MOUD), M. O. U. D. (ed.). New Delhi: MoHUA.

NAIR, R. 2016. RFCTLARR Act, 2013 : Overview of Recent Developments. *ASCI Journal of Management*.

NATIONS, U. 2018. World Urbanisation Prospects: The 2018 Revision. *In:* DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, P. D. (ed.).

RANGWALA, L., K., S. K., MULUKUTLA, P. & KULKARNI, S. 2014. Rethinking Off-Street Parking Regulations around Station Areas in Mumbai: Inputs into the Mumbai Development Plan 2014-2031. *In:* INSTITUTE, W. R. (ed.).

ROWCHOWDHURY, A., NASIM, U. & DUBEY, G. 2018. PAMPering Cities: How to manage urban India's parking needs. *In:* (CSE), C. F. S. A. E. (ed.). New Delhi.

SABIKHI, R. 2016. Warped Priorities Dictate Future Development In Delhi. *Business World.*

SUZUKI, H., CERVERO, R. & IUCHI, K. 2013. *Transforming Cities with Transit : Transit and Land Use Integration for Sustainable Urban Development,* Washington D.C., The World Bank.

TNN. 2017. Slow groundwork delays Central business district skyscrapers *The Times of India*.

UNITED NATIONS 2019. World Population Prospects 2019: Highlights. *In:* DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, P. D. (ed.). New York: United Nations.

WAHI, N. 2018. How Central and state governments have diluted the historic land legislation of 2013 *The Economic Times*.

Case Study / Project

Planning and Management Experiences of Global Metropolitan Area

- A Lesson of New York Metropolitan Area, Tokyo Metropolitan Area, Paris Metropolitan Area, and London Metropolitan Area

Huihui NAN

Abstract

This study uncovers the drivers of four major metropolitan areas' success from government management and planning perspective. New York metropolitan area, London metropolitan area, Tokyo metropolitan area, and Paris metropolitan area are internationally recognized as the four major metropolitan areas around the world. They have a large population, a vast territory, a high degree of economic and factor aggregation, and strong international exchange capabilities, bringing together the greatest wealth and most advanced productivity in the world today, playing an increasingly important role in the urban economy and global economic competition. What drives these metropolitan areas to become the engine of the world economy? Can their success be replicated by other regions and countries?

After reviewing the development process of the four metropolitan areas, some factors, including urban functions, regional division of labor, transportation, social equality and environment protection, necessary for the success of urban development were discovered. First, evacuate certain functions of the city, such as education and industry, to surrounding cities or new towns, alleviate the pressure on the city center, avoid excessive urban spread, and help maintain the competitiveness of the metropolitan area. Second, a good regional division of labor is the key to gaining competitive advantage in the metropolitan area. Each city within the metropolitan area should scientifically locate the industrial division of different grades of cities according to its own foundation and characteristics. On the basis of division of labor and cooperation and complementary advantages, we will give full play to the advantages of overall agglomeration and achieve industrial upgrading of core cities. In the end, a äóìsymbiosisäó of the metropolitan area with division of labor, complementary functions and coordinated development will be formed. Third, the transportation network constitutes the skeleton of the metropolitan area. While meeting the needs of commuting, the transportation network strengthens the internal and external links of the metropolitan area, and guides the rational distribution and orderly transfer of industries and populations within the metropolitan area, providing a powerful guarantee for an efficient and orderly industrial division of labor between cities. Fourth, the equalization of public service facilities can promote the rational use of resources within the metropolitan area, and can also promote exchanges and integration of people, and avoid imbalances in supply and demand within the region. Fifth, in dealing with the overall ecological environment quality of the region, it is necessary to break down political barriers, achieve integration of ecological environment protection inside the metropolitan, and achieve regional win-win.

Research Paper

TOWARDS EFFECTIVE PLANNING OF TRANS-BORDER CITY REGIONS

three Australian case studies

Daniel O'HARE

Associate Professor Urban Planning, Bond University, Australia

Abstract

Polycentric city regions are expanding worldwide, often spanning national borders. Using literature review and document research, comparative case studies of regional planning of Australia's emerging internal trans-border city regions are presented. The paper examines fifty years of trans-border planning efforts at three urbanizing borders of the Australian state of New South Wales, demonstrating different levels of commitment and success, partly depending on the proximity (or remoteness) of each trans-border city region to the capital cities in each state or territory. Evidence is provided that effective trans-border planning of city regions depends on overcoming differing levels of commitment to trans-border planning by the state jurisdictions involved.

Keywords

Trans-border, cross-border, city-region, regional planning

1. City regions

1.1. The rise of city regions

With the rise of "global city regions" since the late twentieth century (Simmonds and Hack 2000; Scott et al. 2014), there has been increasing acknowledgment that new models are replacing the twentieth century urban conception of a metropolis. The phenomenon of the polycentric city region has superseded the old idea of suburbs radiating out around a single city centre or 'CBD' (Garreau 1991; Calthorpe and Fulton 2013). Suburbs are becoming urbanized within these new city regions and 'placeless' suburbs are beginning to be transformed through the creation of denser, mixed use suburban centres connected by efficient public transport (Al-Kodmany 2016; Beske and Dixon 2018).

These polycentric city regions are increasingly spreading across state and national borders. Such trans-border city regions have been noted around the world, including in Europe, Asia and the Americas/ North America. Well known examples include:

- the expansion of Shenzen (and other Pearl River Delta cities) and neighbouring separately-administered Hong Kong;
- Aachen-Maastricht-Liege (Germany, Netherlands and France);
- San Diego (US) – Tijuana (Mexico); and

- the 'BonNYWash' crescent embracing Boston, New York and Washington across several north-eastern states in the USA.

In addition to trans-border city regions such as these, there are increasing examples of cross-border collaboration in economic development corridors such as the Dublin-Belfast corridor (linking Ireland and Northern Ireland), the Oresund corridor between Copenhagen (Denmark) and Malmo (Sweden) and the link across the Causeway between Singapore and Johor, Malaysia. Such corridors typically involve a focus on improving transport connections and partnerships to improve the combined international competitiveness and economic well-being of formerly discrete cities and towns.

This paper examines the uneven progress of policy for regional planning of Australia's emerging internal trans-border city regions since the 1970s. Three contrasting case studies are presented, focusing on regional plans in three trans-border city regions. As an exploratory research paper, the case study methods used are a combination of literature review, document research and policy analysis of city-regional plans. Comparisons are made with selected international trans-border city regions.

The Australian case studies illustrate that development of effective trans-border city regions, even within one country, depends on overcoming differing levels of commitment to trans-border planning by the state or territory jurisdictions involved. This commitment may also be shaped by the different balance between resources (eg infrastructure, jobs) and population within a city region that spans across state or national borders. Proximity to a major city, particularly a state capital city, seems to be another factor influencing state government commitment.

2. Three Australian case studies of trans-border city region planning

2.1. The rise and fall and rise of trans-border city region planning 1967-2019

This paper presents the only three case studies of trans-border city region planning that have occurred in Australia to date. As an island continent, Australia has no international trans-border city regions, so the three case studies occur across internal borders of states and territories. All three are at the borders of the most populous state, New South Wales (NSW), with the neighbouring states of Victoria and Queensland, and with the Australian Capital Territory (ACT) around the national capital, Canberra. The differences in approach are at first surprising, however these differences reflect different priorities during different decades, as well as different forms of urbanisation across borders in the three cases.

Despite internal state and territory borders being the sites of expanding trans-border city regions, there has been limited recognition of the need for – or progress towards – more integrated planning of these city regions in Australia (O'Hare 2011). The most impressive progress has been led jointly by the ACT and NSW governments, where the trans-border planning and significance of the national capital, Canberra, has been recognised and increased since the 1990s through effective translation of new spatial planning concepts – the Sydney-Canberra Corridor and the 'Capital Region' – into cross-border plans and strategies with overt support by the two governments and surrounding local governments.

The support of the ACT Planning Authority for a cross-border approach has been motivated by the relatively tight physical boundaries of the Territory within which Canberra is located. Canberra's population of just over 400,000 is contained within a constrained spatial Territory of 2,358 square kilometres, but the city services a large trans-border region by providing jobs, health, education, cultural institutions, higher order retailing and other services. Suburban development now transcends the Capital Territory border into the surrounding rural shires within NSW, and many Canberra workers commute from surrounding large and small towns and rural areas that offer affordable housing within attractive settings.

NSW has arguably been an Australian leader in trans-border city region planning as three of its four state/territory borders are sites of expanding city regions:

- Canberra and the ACT is surrounded by and socioeconomically and physically intertwined with the surrounding region across the Territory border.
- One of the fastest-growing regions in Australia, South-East Queensland (SEQ) is beginning to merge with the expanding NSW Far North Coast region, just over 100 kilometres from Brisbane, the capital city of the adjoining state of Queensland.
- The twin regional border cities of Albury (NSW) and Wodonga (Victoria) have experienced fluctuating levels of collaborative planning efforts since the early 1970s.

While the ACT and NSW have led Australian efforts towards collaborative trans-border planning of city regions, the other two states, Victoria and Queensland have been less consistent in progress towards that aim.

The order in which the three Australian trans-border planning case studies are presented in this paper requires a brief explanation. Albury-Wodonga is presented first to provide a long term perspective – fifty years – on trans-border planning in Australia. It is a case that initially involved the most creative governance arrangements and promised the most, but has not been consistently followed through due to political and other issues. The case study concludes by exploring an encouraging contemporary resurgence in interest that appears to have been led from the local government level over recent years and supported by initiatives from both states and the federal government more recently.

Following the Albury-Wodonga case, the paper explores the development and transformation of Canberra's trans-border regional planning over the past thirty years. The final case study section of the paper investigates uneven moves towards regional planning linking SEQ and Far North Coast NSW as a trans-border city region. The final case study is the most populous and rapidly growing of the three.

2.2. Albury Wodonga: the first trans-border planning experiment, 1960s to the present

"*What began as an ambitious dream* [in 1967] *became a more modest experiment, which was changed into a regional development exercise as it was dismantled slowly* [between 1989 and 2007]" (Pennay 2005:xi).

Albury-Wodonga is a trans-border city region approximately 300 kilometres from Melbourne and 550 kilometres from Sydney. Two towns established here on each side of a major river crossing on the inland route between the two state capitals in the nineteenth century. This crossing point also intersected with the furthest reach of the riverboat traffic that operated along the Murray River during that century. Both were originally agricultural service towns

for the adjoining rich agricultural regions in the Murray valley. Albury's growth and importance were enhanced as the interchange point for passengers on the interstate rail service between Sydney and Melbourne from 1881 until the standard guage rail service was established in 1962. The two towns grew into cities in the twentieth century as significant marketing centres and manufacturing places for rural products such as wool and after World War 2, other manufacturing. Their roles also expanded as major regional centres for State Government departments, major regional hospitals, education and other services.

Integrated trans-border planning for development of Albury-Wodonga was motivated by 1960s concerns by the two state governments to decentralise development and population from Sydney and Melbourne, where long term population drift to the cities was bringing major challenges of population growth, housing shortages, affordability, traffic congestion and pollution which were coming to be seen as unmanageable. The decentralisation push was also aimed at providing Australians in non-metropolitan areas with a more equitable share of national resources and economic and social opportunities. In 1967, the Victorian Government suggested, to both the NSW Government and the Australian Commonwealth (Federal) Government, that Wodonga (in Victoria) and Albury (NSW) be planned and developed "as one complex" for "accelerated development" (Pennay 2005).

In 1972, a new Federal Labor government announced a National Growth Centres program to drive decentralisation of the state capital cities. Of the several regional centres designated as growth centres, Albury-Wodonga was the only trans-border one. The Albury-Wodonga Development Corporation was formed through a 1973 agreement and supported by legislation passed by the federal government and two state governments, formalising a cross-border region spanning two states and seven local councils (Pennay 2005). The Development Corporation was given responsibility for strategic planning of the trans-border city region and was made the planning authority for major urban expansion projects. Its principal function was "to acquire, hold, manage and provide land in those areas designated for development" (NSW State Records, n.d., no page). The national Growth Centres strategy was abruptly abandoned with the dramatic removal of the Whitlam federal government in 1975. The Albury-Wodonga Development Corporation's powers were curtailed and its planning powers removed, but it was not formally wound up until 2007. It continued to develop and sell the remaining land for urban development, and its legacies include urban and regional infrastructure and a regional framework and mechanism for parklands development. Following the dilution and eventual demise of the Development Corporation, collaboration in cross-border collaboration devolved to the two city councils via issues-based organisations and an informal Alliance of Councils and Shires of the Upper Murray (Brown and Bruerton, 2009).

The Albury-Wodonga Development Corporation planned for a trans-border city of 300,000 people by 2000 (Pennay 2005), a population six times that of the area in 1973 (Harris and Dixon 1978). The current combined population of the two cities has only reached about 100,000, while growth of both Sydney and Melbourne has been dramatic over the same period, in a continued trend of centralisation of population, political and economic power in Australia's primary coastal capital cities.

Current efforts towards trans-border planning seem to be more driven by the local governments of Albury and Wodonga, with less involvement of the surrounding rural shires

that were part of the 1970s Growth Centre initiative, and with less immediate connection with the two state governments.

The *Two Cities One Community: Strategic Plan 2017-2021* was adopted jointly by the Mayors of Albury and Wodonga in 2017 with the message: "Our community does not necessarily see a border. They cross a river to share facilities, venues, infrastructure and services. They expect community leaders to adopt a regional perspective and advocate to state and federal governments on issues that impact their day to day lives" (Albury City and Wodonga City 2017: 3). However this plan is a twin cities plan rather than a city region plan, as it does not include surrounding rural shires that interact with these cities, and which were part of the Albury-Wodonga Growth Centre initiative of the early 1970s.

State Government Regional Plans addressing Albury-Wodonga as a trans-border city region

A desktop review of documents and websites suggests that the commitment of the two state governments to coordinated planning of Albury-Wodonga as a trans-border city region is mixed. This paper seeks evidence in the regional planning of the two states for identified regions along the Murray River state border, as well as evidence in the policies and actions of the Cross-Border Commissioners who have been appointed in each of these two states. The Murray River, which divides the twin cities of Albury and Wodonga and the planning jurisdictions of the two states, also divides the northern Victorian region of Hume from the southern NSW region of Riverina Murray.

The three states addressed by this paper (NSW, Victoria and Queensland) all use regional plans to provide their broad frameworks for land use and development, the role of key regional centres, infrastructure provision, economic well-being and environmental management. The approaches vary in each state, with Queensland's regional plans having been restricted to "State Interests" since 2014. The ACT, in contrast to the states, is effectively a city-state. Its planning addresses not only the urban area of Canberra and land within its borders, but also interactions with the region of NSW that surrounds Canberra.

The Riverina Murray Regional Plan is "centred on creating more jobs, strengthening the region's cities, towns and villages, sustainably managing its agricultural, extractive and natural resources and protecting the nationally significant Murray River" (Department of Planning and Environment website https://www.planning.nsw.gov.au/Plans-for-Your-Area/Regional-Plans/Riverina-Murray). Although the regional plan is jurisdictionally restricted to the NSW side of the river border, cross-border issues are prominent and the plan notes that Albury-Wodonga is one of three "regional cities" in the region and that it is the largest of seven cross-border communities. Aboriginal communities from both sides of the river are acknowledged in the Minister's foreword.

Albury and Wodonga are described in the plan as functioning as "a single economic centre, with employment, investment and services accessed across both locations", with Albury alone servicing "an extensive catchment of approximately 200,000 people [and providing] higher-order services, including for business, office and retail uses, and arts, culture, recreation and entertainment, which support the needs of smaller settlements across the region and in cross-border communities" (NSW Government 2017a: 57).

The Riverina Murray Regional Plan prominently demonstrates NSW government awareness that the region is closer to the interstate capital of Melbourne than to its own state capital

of Sydney: it boldly – in very large print – "acknowledge[s] the important role of this region's centres and their relationship to, and export potential with, Melbourne and Victoria…." (NSW Government 2017a: 9).

The vision and goals of the Riverina Murray Regional Plan are supported by 29 "directions" and accompanying actions. Goal 4, Strong, connected and healthy communities is supported by Direction 23, "Create a connected and competitive environment for cross-border communities", which in turn is supported by Action 24.1 "Work with the Victorian Government and cross-border councils to examine: barriers to and enablers of economic, housing and jobs growth; service delivery models; and infrastructure delivery, including transport infrastructure" (NSW Government 2017a: 51).

In contrast, the Hume Regional Growth Plan, from the Victorian side, is much less overt in its recognition of the trans-border city region, focusing more attention on Wodonga as a regional city in its own right, despite acknowledging "the influence of the combined urban area of Albury-Wodonga (recognised as one of Australia's 18 major cities) in the Upper Hume sub-region" (State Government of Victoria 2014: iv). The area covered by Victoria's Hume Regional Growth Plan includes four of the seven cross-border communities included in the NSW Riverina Murray Regional Plan: "Of these settlements, Albury provides a significant economic gateway to New South Wales and creates opportunities for Wodonga to leverage off this broader economic conurbation" (State of Victoria 2014: 58). Potential benefits from a new inland freight rail line (now under construction) and possible future high-speed rail between Sydney-Canberra-Melbourne are identified as providing opportunities for Albury-Wodonga, although this Regional Growth Plan has a tendency to highlight only Wodonga and other settlements within the state of Victoria.

In considering regional transport links, the Hume Regional Growth Plan notes that people from southern NSW travel to Melbourne for healthcare and that Albury-Wodonga benefits from "a reciprocal agreement that provides a single public health service, available to residents of either state. Hospital facilities in … Albury-Wodonga … provide higher order services to the wider region, including southern New South Wales" (State of Victoria 2014: 64).

Notwithstanding acknowledgment of cross-border settlements including Albury-Wodonga, the Hume Regional Growth Plan seems to step back from the innovative approach of the 1960s that led to Australia's boldest experiment in city region planning through cooperation between the federal government, two state governments and seven local governments in the 1970s growth centre project. The current plan does map Albury and Wodonga as comprising a cross-border settlement, and the plan identifies future urban expansion areas south-east of Wodonga that were first identified for development in the 1970s growth centre plan, but no link is made to that earlier thinking.

The Hume Regional Growth Plan identifies the southern sub-region, within commuting distance of Melbourne, as an area that expects more significant growth than the Albury-Wodonga city region. This supports the argument by Harris and Dixon (1978) that Albury-Wodonga was too far from a major city to achieve the population and economic growth envisaged in the 1970s.

Cross-Border Commissioners and joint state agreements

To deal with the many inconsistencies and inefficiencies faced by residents and businesses located in cities and regions on state borders, both NSW and Victoria have appointed Cross-Border Commissioners in recent years. In 2012, the NSW Government established the Office of the NSW Cross-Border Commissioner in order to identify and resolve cross-border issues. The current NSW Cross-Border Commissioner is based in Wagga Wagga, in proximity to NSW borders with both Victoria and ACT. The NSW Cross-Border Commissioner is attached to the Department of Premier and Cabinet, and thus has access to key decision makers in government. In 2018, after pressure from Murray River communities, the Victorian Government also appointed a Cross-Border Commissioner, and the first Commissioner is based in Wodonga and operates under the auspices of the Minister for Regional Development. The Cross-Border Commissioners both have a wide remit to address incompatibilities between legislation and regulations across borders, and urban and regional planning is just one of those many issues. The NSW Cross-Border Commissioner has assisted in the development of agreements between that state and both the ACT (in 2016) and Queensland (in 2017) as discussed in the other case studies below, but there is not yet a similar agreement with Victoria. Given the success of the NSW Cross-Border Commissioner in dealings with the other states, it is anticipated that the existence of Cross-Border Commissioners in both NSW and Victoria will lead to a strengthening of cross-border initiatives in future planning for Albury-Wodonga as an expanding trans-border city region.

Return of the Federal Government to city region planning: a Regional Deal for Albury-Wodonga

Following its withdrawal from the Growth Centre projects in 1975, the Australian Government has generally been prepared to leave urban issues to the two lower levels of government until 2015, when it reintroduced a Cities portfolio. This reflects wider recognition that cities and city regions are critical to the e conomic and social well-being of Australia. One of the new initiatives of the federal government is to fund City Deals, a partnership scheme based on the UK model, whereby the three levels of government and the community work in partnership to align planning, investment and governance to deliver "a shared vision for productive and liveable cities" (Australian Government, nd, https://www.infrastructure.gov.au/cities/city-deals/index.aspx).

The federal government also offers similar place-based Regional Deals, and Albury-Wodonga was announced as a pilot cross-border regional deal recipient in March 2019 (Australian Government 2019). Under the ten-year AUD$3.2 million deal, the federal government, two state governments and two city councils will engage with business, industry and the community to develop and implement a strategy for population growth and economic development to ensure that Albury-Wodonga "remains a nationally-significant, liveable and prosperous region" (ibid.). If implemented well, this regional deal promises to be a major means of achieving better outcomes for Albury-Wodonga by treating the trans-border city region as one.

2.3. Integrating Australia's Capital City and its trans-border region, 1995 to 2019

Australia's capital city Canberra, founded in 1911, has been comprehensively planned since 1959 by the ACT Planning Authority and its predecessor the National Capital Development Commission. The city's strong history of planning initially occurred solely within the spatial constraints of the 2348 square kilometres of the Australian Capital Territory (ACT). By the 1990s there was increasing recognition that Canberra played a valuable role as the major city for the surrounding region of NSW, and Canberra's planners became increasingly involved in NSW planning of the surrounding trans-border region.

An early example of this trans-border approach to city region planning was the adoption of NSW's first Sydney-Canberra Corridor Strategy in 1995 (McKenzie 1997). The emphasis of that strategy was as much on connections with Sydney as with Canberra, as well as the corridor itself which consisted of a string of towns and smaller cities set in a scenic and productive landscape along the 200 kilometre highway and rail corridor linking the two major cities. The ACT planners followed this in 1998 with the production of the ACT and Sub-Region Plan. NSW updated its corridor study in 2007 to become the Sydney-Canberra Corridor Regional Strategy 2007-31. The strategy recognised and sought to plan for the effects of the growth of both Sydney and Canberra on the region between the two capital cities. Although the Corridor Strategy's focus was mainly on the region between Sydney's outskirts and the ACT border, it gave prominent recognition to the fact that Canberra and the immediately adjacent smaller NSW city of Queanbeyan effectively operate as a single metropolitan area.

The Corridor Strategy refers to the 2006 signing of two Memorandums of Understanding (MOUs) entitled the ACT–NSW Cross-Border Region Settlement Agreement and the ACT–NSW Cross-Border Water Supply Agreement. At the same time, both governments signed the ACT-NSW Regional Management Framework Agreement (RMFA) (ACT and NSW Governments 2006). These MOUs were signed by the ACT Chief Administrator and the NSW Premier and have laid the way not only for updated MOUs since then, but more importantly for an expansion of the cooperation between the two jurisdictions in the planning of Canberra as a city region that extends beyond the ACT borders.

The ongoing commitment of both governments to Canberra-region cooperation since the 1990s can be attributed to decades of voluntary cooperation through diverse formal and informal collaborations including the Regional Leaders' Forum (RLF); the Capital Region Development Board (CRDB); and sub-regional planning strategy working groups. The cooperative approach formalised through the Corridor Strategy and MOUs (renewed in 2011 and 2016) has enabled current regional planning to be increasingly collaborative across the border, including at the levels of the surrounding local governments.

An important regional governance mechanism, established in 2015, is the Canberra Region Joint Organisation (CRJO), which "provides a forum for councils, State agencies and other stakeholders to work together at a regional level to identify shared priorities [and deliver] better outcomes for communities" (CRJO website, 2019). The three core functions of CRJO are: (1) regional strategic planning and priority setting; (2) intergovernmental collaboration; and (3) regional leadership and advocacy (ibid.) The 10 NSW local governments in the region

surrounding the ACT are CRJO members and the ACT Government is an associate member of the organisation.

The region surrounding the ACT border is now addressed by the South East and Tablelands Regional Plan 2036 (NSW Government 2017b). "The combined population of the local government areas within an hour's commute of the ACT, and the Territory's population itself, will increase to more than 660,000 by 2033 – a larger population than the Gold Coast today." (ibid., p4). Of the planning instruments reviewed in this paper, this regional plan is the most overt in its recognition of the significance of the cross-border relationship. The vision of the plan is for "a *borderless region* in Australia's most geographically diverse natural environment with the nation's capital at its heart" (ibid., p8, emphasis added). The regional plan is framed within this strong conception of the region as "a connected and borderless Canberra region." There are no inter-regional rivalries here, just a community-supported conviction that the prosperity of the region is dependent on Canberra and vice-versa. Canberra's airport, its jobs market, high order services, cultural institutions and lifestyle qualities are seen as assets for the region. Conversely, the region is recognised for providing additional housing opportunities (both affordable and prestige), recreational opportunities (ranging from bushwalking and camping to snow skiing and beach surfing), fine produce and scenic landscapes.

The NSW regional plan refers to its evolution from consultation with the ACT Planning Authority and the local governments of the region. In particular, it acknowledges the complementary approach taken by the ACT Planning Strategy 2012, which "acknowledges that Canberra's success depends on its relationship to surrounding areas. It acknowledges the importance of regional collaboration on biodiversity, transport and economic development" (NSW Government 2017b: 13). Those sentiments are reinforced in the 2018 "refresh" of the ACT Planning Strategy (Direction 1.4, p46), which is perhaps otherwise more focused on Canberra itself within the ACT border (ACT Government 2018). The ACT Plan reciprocates by emphasising that the NSW South East and Tablelands Regional Plan 2036 contains several joint initiatives and actions in parallel with the matching ACT plan and policies (p48). Mutual calls for collaboration are acknowledged, most notably by Canberra Region Joint Organisation (CRJO), as is the ACT-NSW Memorandum of Understanding for Regional Collaboration, as well as collaboration arrangements with a key adjoining council (p49).

The South East and Tablelands Regional Plan 2036 has provisions to protect the flight path for Canberra Airport, which is seen as vital to the economy of the surrounding region (Action 1.1, p15). Direction 19, "strengthen cross-border connectivity", addresses the importance of achieving legal and contractual reforms to allow seamless cross-border public transport services for towns and housing developments within commuting distance of Canberra (p44).

As Canberra's ACT Planning Strategy 2012 and 2018 seek to transform low density Canberra into a more compact urban form, the NSW South East and Tablelands Regional Plan acknowledges and attempts to limit the corresponding increase in development of low density development across the border (Direction 25, p53). This is an attempt to guard against the experience of Vancouver, Washington in the US, where significant car-dependent low density development has provided an unofficial alternative to the compact settlement pattern pursued across its border with Portland, Oregon (Bae 2000, in O'Hare 2011). Under Direction 26, proposals are advanced for cross-border infrastructure and monitoring systems

for land, housing and water requirements. In the final section of the Plan, key planning priorities are identified for those NSW local government areas that adjoin the ACT border.

CRJO and the ACT Government are currently lobbying the federal government to back a "Canberra Region Deal" to boost the city and its region by a coordinated investment in infrastructure and enhanced 'borderlessness' in delivery of higher order services such as tertiary education and health care (CRJO and ACT Government 2019).

2.4. SEQ and North Coast NSW: uneven approaches to cross-border planning 2005-2019

The third Australian case study city region that spans state borders is South East Queensland (SEQ) and north coast NSW (NCNSW). SEQ is a large and fast-growing city region which encompasses the Queensland capital, Brisbane and several smaller cities with a total region population of 3.5 million, projected to be home to 5.3 million by 2041 (Queensland Government 2017). SEQ's urban interface with the state border, with a combined population of approximately 700,000, consists of the City of Gold Coast (Queensland) and the contiguous urban area of Tweed Shire in NSW (ABS 2019). Gold Coast-Tweed is Australia's sixth largest city and one of its most rapidly growing city regions. Gold Coast Airport, straddling the border, serves as international gateway to both regions.

Cross-border planning in this large trans-border city region is significantly under-developed, particularly from the Queensland side. Regional plans have been in place in these two adjoining regions since 2005 and 2006 respectively (Queensland Government 2005; NSW Government 2006). From and including that time, there has been a steady building of attention to trans-border issues from the NSW side and a fluctuating level of interest from Queensland. There has not been a true bilateral commitment to the promise offered by the statement that "the NSW and Queensland governments have formed a partnership to share information and promote consistent sustainable planning strategies" (NSW Government, 2006: 44).

The SEQ Council of Mayors, a powerful regional local government advocacy organisation, was established in 2005 to represent the interests of the fast growing SEQ regions. It recognises that SEQ has grown into a city region that is "no longer just a series of disparate geographic areas but a region that, in practical terms, functions as a single metropolitan area" (Council of Mayors website, accessed 21 July 2019). Given that the SEQ region extends to – and, de facto, across – the state border, it is astounding that neither of the two councils abutting the urbanised section of the border – Gold Coast City (in Queensland) and Tweed Shire (in NSW) – are currently members of this influential and highly effective group of ten SEQ councils. Consequently in the otherwise sophisticated current proposal for a SEQ City Deal partnership between the federal, Queensland and local governments for transforming SEQ into a high-performing polycentric city region, there is only one mention of the state border, and that is as the southern boundary of the region (SEQ Council of Mayors and Queensland Government 2019: 8) rather than a transition line in the contiguous settlement pattern. It is therefore not surprising that the document does not advance the case for improved cross-border coordination in planning and development.

Despite their non-participation in the Council of Mayors, the border local governments of Tweed Shire and Gold Coast City have a strong relationship. An agreement exists between the two border councils, providing for bi-monthly consultations between their strategic regional planning teams "to coordinate planning, infrastructure and response to traffic

issues (Brown and Bruerton, 2009, p.57). In practice, this level of cross-border council communication and collaboration happens less frequently, but is invoked to deal with major issues including planning updates (senior planners, pers.comm.).

The current state-level regional plans for the two adjoining regions are *ShapingSEQ: South East Queensland Regional Plan 2017*, and the NSW *North Coast Regional Plan 2036*. Both were released in 2017, soon after the two states renewed their partnership MOU – similar to that noted for the ACT and NSW, above – aimed at information sharing, resolution of cross-border anomalies, and promotion of consistent sustainable planning strategies. The two regional plans show starkly contrasting levels of commitment to the updated *Queensland and New South Wales Statement of Principles and Priorities for Cross-border Collaboration 2016-2019* identifies four key focus areas for cross-border collaboration: i) regional economic development, ii) aligning services and sharing information, iii) local transport, iv) issues of national significance (Queensland and NSW Governments, 2017). As with the ACT-NSW MOU, the document is accompanied by an annual Worklist detailing planning projects. The worklist is reviewed through an Annual Report.

ShapingSEQ's ambitious 50-year Vision and specific 25-year goals for plan delivery do not carry the collaborative cross-border aspirations of the MOU very far forward. The border is largely ignored, other than in acknowledgment of opportunities for North Coast NSW to benefit from SEQ's significant population growth and employment market and the tourism potential of the World Heritage landscapes that span the border. It recognises that upgrading infrastructure will connect the regions and support access to employment and recreation, while also enhancing the flow of goods, services and skills (Queensland Government, 2017). Commitment to the MOU is not prominent in *ShapingSEQ.* While not completely ignored in mapping within *ShapingSEQ*, the border and interactions beyond it receive little attention. The border is termed the Southern Gateway (Queensland Government 2017: 142). This gateway comprises an emerging "Regional Economic Cluster" (REC) hosting priority sectors that offer cross-border services including an international and domestic airport, major regional hospitals health, manufacturing (focused on aviation industries) and tourism infrastructure.

In contrast, *North Coast Regional Plan 2036* brings cross-border planning much more to the fore, including in its Vision statement: "Northern communities have established important links and are integrated with a burgeoning [SEQ.] …. Southern and coastal communities are building relationships and leveraging opportunities from the Pacific Highway upgrade" (NSW Government, 2017). The NSW Department of Planning and Environment stresses the importance of collaboration with the Queensland Government by strengthening communities of interest and cross-regional relationships (NSW Government, 2017). The contrasting regional planning visions reveal the different significance the two states place on cross-border collaboration: NSW acknowledges its importance, Queensland downplays it. *North Coast Regional Plan 2036* dedicates an entire strategy to cross-regional collaboration, The fifth of 25 "Directions" of the Plan is to strengthen cross-regional relationships, with cross-border connections prominent in the rationale and actions under this direction (NSW Government 2017: 25-26). Cross-border relationships are prominent in the text and maps conveying the *North Coast Regional Plan 2036,* and almost absent in *ShapingSEQ.*

The NSW Cross-Border Commissioner has noted key issues affecting many community and business sectors: summer time zones, trade registrations/licences, fees and costs, education,

transport, health, community services, policing and legal differences, emergency management, agriculture, environment, and tourism. (NSW Government, 2012). Those trans-border concerns that could be addressed in city region planning are taken up in the Plan, and the Cross-Border Commissioner is declared a key agent in achieving the Plan's cross-border outcomes: "The NSW Cross-Border Commissioner, the Queensland Government and councils will work together to better integrate cross-border servicing and land use planning to remove any barriers to economic, housing and jobs growth" (NSW Government 2017: 12).

The hard work ahead of the NSW Cross-Border Commissioner is demonstrated most starkly by the lack of cross-border commitment from the Queensland side that is evident in the current City Deal proposal, as discussed earlier in this section.

3. Conclusions

This paper has reviewed three Australian case studies of the planning of city regions that transcend internal state or territory borders. Despite such efforts commencing up to 50 years ago, the three case studies do not combine to tell a story of a uniformly successful model of trans-border city region planning at these three borders of the state of NSW.

The limited success of Albury-Wodonga in attracting sustained growth in population, employment and facilities may be because these twin border cities are so far from the nation's capital cities which attract the greatest population and investment: Melbourne is 300 kilometres away (Harris and Dixon 1978). It is yet to be seen whether cross-border collaboration will be renewed by the "Regional Deal" securing the involvement of three levels of government including both states with their respective Cross-Border Commissioners.

The Canberra region has the advantage of being centred on itself as a capital city of critical population mass and national political and cultural importance. In addition, it is part of a connected corridor of urban centres extending 200 kilometres from the outer suburbs of the NSW capital, Sydney. The ACT and NSW Governments, together with surrounding local governments, provide the most exemplary approaches to collaboration in trans-border planning. The critical success factors demonstrated here over the past 25+ years arguably include:

- willing cooperation between the state and territory governments and their planners;
- clear conceptualisation and political and public uptake of narratives of a Sydney-Canberra Corridor and a Capital Region;
- The signing of a MOU between the ACT Chief Administrator and the NSW Premier in 2006 and its continued support and implementation by the two governments;
- the desire of surrounding rural shires to benefit economically, socially and culturally from their proximity to the national capital;
- a consistent record of actively addressing cross-border issues in plans made by the ACT government, NSW government and local governments over a sustained period;
- the involvement of the NSW Cross-Border Commissioner where necessary to broker expansion of Canberra across the territory border into NSW.

Lessons from ACT-NSW border need to be drawn on to address cross-border regional planning as the third case study city region, Queensland's SEQ, continues to grow across the border into the North Coast of NSW. This trans-border city region is the most populous and fastest growing of the three case studies, manifesting the continued growth of the 200 kilometre coastal city extending from Brisbane, the Queensland state capital which is only 100 kilometres from this border. Plans by the NSW Government, eg the 2006 Far North Coast Regional Strategy and its successor the 2016 North Coast Regional Growth Plan, have addressed the border and key cross-border centres for some years now, while the most recent SEQ Regional Plan, Shaping SEQ 2017, pays scant attention to cross-border planning issues, and these issues are not prominent in the plans of the two local councils that address development of the contiguous urban development that crosses the border. The unevenness of the response is surprising, given that a MOU and cooperation agreement have existed between the State Premiers of Queensland and NSW since 2006. On the other hand, it is not so surprising that NSW is further advanced in trans-border planning as it has fifty years of experience dealing with these issues on three of its four land borders, while Queensland only faces these issues at one of its borders, and this occurs at the periphery of the state's main city region, SEQ, which is centred around the state capital of Brisbane.

Further research will include key informant interviews with senior planners and community leaders in the three trans-border regions studied here, as well as international comparisons with city regions that transcend international borders.

4. References

ACT and NSW Governments 2006 ACT-NSW Regional Management Framework Agreement (RMFA).

Al-Khodmany, K 2016 New Suburbanism: sustainable tall building development. London and New York: Routledge.

Albury City Council and Wodonga City Council 2017 Two Cities One Community: Strategic Plan 2017-2021. Accessed 21 July 2019 at https://alburywodonga.gov.au/plan

Australian Bureau of Statistics (ABS) 2019 Data by region, accessed 21 July 2019 at https://itt.abs.gov.au/itt/r.jsp?databyregion

Australian Capital Territory Government 2018 ACT Planning Strategy 2018. Canberra: ACT Planning and Land Authority.

Australian Government (no date) City Deals. Accessed 21 July 2019 at https://www.infrastructure.gov.au/cities/city-deals/index.aspx

Australian Government (no date) Regional Deals. Accessed 21 July 2019 at https://www.regional.gov.au/regional/deals/index.aspx

Australian Government 2019 Albury Wodonga Regional Deal. Accessed 21 July 2019 at https://www.regional.gov.au/regional/deals/Albury-Wodonga.aspx

Beske, J and D Dixon (eds) 2018, Suburban Remix: creating the next generation of urban places. Washington DC: Island Press.

Brown, A.J. and M. Bruerton (2009) "Overcoming state borders in Australian cross-border communities: select examples", in B. de Villiers (Ed.) (2009) Crossing the Line: dealing with cross-border communities, pp.47-67, Johannesburg: Konrad-Adenauer-Stiftung.

Calthorpe, P and W Fulton 2013 The Regional City: new urbanism and the end of sprawl. Washington DC: Island Press.

Canberra Region Joint Organisation (CRJO), accessed 22 July 2019 at https://crjo.nsw.gov.au/about/

Council of Mayors, South East Queensland, website accessed 21 July 2019 at https://www.seqmayors.qld.gov.au/

CRJO and ACT Government 2019 Canberra region calls for new deal. Media release, accessed 22 July 2019 at https://crjo.nsw.gov.au/

Garreau, J 1991 Edge City: life on the new frontier. New York: Doubleday.

Harris, CP and K Dixon 1978 Regional Planning In New South Wales and Victoria since 1944 with Special reference to the Albury-Wodonga Growth Centre. Canberra: ANU Press.

McKenzie, Fiona 1997 Growth Management or Encouragement? A critical review of land use policies affecting australia's major exurban regions, Urban Policy and Research 15(2) pp83-99.

NSW Government 2006 Far North Coast Regional Strategy 2006-2031. Sydney: Planning NSW.

NSW Government 2012 Cross-Border Commissioner listening tour report. Sydney: NSW Government Trade and Investment.

NSW Government 2017a Riverina Murray Regional Plan 2036. Sydney: Department of Planning and Environment.

NSW Government 2017b South East and Tablelands Regional Plan 2036. Sydney: Department of Planning and Environment.

NSW State Records (n.d.) "Albury-Wodonga Development Corporation", State Records Investigator: Agency number 2695.

O'Hare, D 2011 Confusion between centrality and remoteness in cross-border regional planning, refereed proceedings, *World Planning Schools Congress*, Perth, July 2011.

Pennay, Bruce 2005 Making a City in the Country: the Albury-Wodonga National Growth Centre project 1973-2003. Sydney: UNSW Press.

Queensland Government 2005 South East Queensland Regional Plan 2005-2026. Brisbane: Queensland Government.

Queensland Government 2017 Shaping SEQ: South East Queensland Regional Plan. Brisbane: Queensland Government.

Queensland and NSW Governments 2017 Queensland and New South Wales Statement of Principles and Priorities for Cross-border Collaboration 2016-2019.

Scott, A, J Agnew, E Soja, and M Storper 2014 Global city-regions: an overview. Accessed 4 April 2019 at https://www.researchgate.net/publication/265192243_GLOBAL_CITY-REGIONS_AN_OVERVIEW

SEQ Council of Mayors and Queensland Government 2019 Transforming SEQ: the SEQ City Deal proposition: Brisbane: State of Queensland (Queensland Treasury).

Simmonds, R and G Hack 2000 *Global City Regions: their emerging forms.* Abingdon and New York: Spon.

State Government of Victoria 2014 Hume Regional Growth Plan. Melbourne: Department of Environment, Land and Water.

Research Paper

Informal planning: a tool towards adaptive urban governance

Theodora PAPAMICHAIL, ETH Zurich, Institute of Spatial and Landscape Development; Switzerland

Ana PERIĆ, ETH Zurich, Institute for Spatial and Landscape Development; Switzerland; University of Belgrade, Faculty of Architecture; Serbia

Abstract

Formal planning instruments and procedures have often been unpopular and ineffective for solving complex spatial issues, such as urban sprawl or transport congestion. As a result, such conflicts turn into complex planning tasks that usually exceed the provisioned time and funding, especially when faced with adversarial interests of actors from different organisations, sectors or social groups. Hence, informal planning, as a non-binding supplement to official planning instruments, is often considered highly effective. In its broadest sense, informal planning includes the principles of collaborative dialogue, diverse networks, trustful relationships and tailor-made processes among interested parties. Consequently, informal planning processes foster sound decision-making delivering a spectrum of problem-oriented solutions and increasing public consensus, while enacting experimentation, learning, change, and the creation of shared meanings among stakeholders. However, informal planning cannot be taken for granted – it is strongly interwoven with the planning culture influenced by the historical and political background, and the current socio-economic conditions.

This paper revolves around several pillars. After an introductory section, a brief historical overview firstly identifies the place of informal planning in various planning models that have appeared since the 1960s. More specifically, informal planning is analysed against the theoretical concept of collaborative rationality. Finally, the paper focuses on a specific informal planning procedure called the 'test planning method', being analysed against the previously elaborated theoretical background. As this instrument links both formal and informal planning, its comparison and interrelation with the theoretical background of collaborative rationality contributes to elucidating the following attributes of adaptive (collaborative) urban governance: 1) flexible and agile institutional arrangements supportive to various kinds of urban planning mechanisms (not only official tools), 2) proactive and imaginative planners ready to accept solutions created outside the technical domain of instrumental rationality, and 3) inclusion of numerous stakeholders to exchange various information and different types of knowledge, i.e. expert and experiential knowledge. Observed through the example of the test planning method, the article finally highlights the successful aspects of informal planning, however, pointing also to its shortcomings, which could be expected in the societies with a lack of key democratic elements.

Keywords

Informal planning, adaptive urban governance, collaborative rationality, test planning method.

1. Introduction: challenges of formal planning

In recent years, global socio-economic transformations have strongly challenged the spatial planning practice. An indicative example refers to the countries of Eastern and Southern Europe, which in particular have experienced a prolonged economic crisis with tremendous impact on numerous facilities, services, and infrastructures. Increasing demand for housing, the provision of low-interest mortgages, and the significant, but not sustainable investments in major urban projects manifest the crisis unevenly across space (Papaioannou and Nikolakopoulou, 2016). In late 2009, international financial markets collapsed stranding millions of new owners with speculative debt few could sustain. The results were catastrophic, especially for southern economies, generating a prolonged recession. Massive state-financed rescue and recapitalisation of the financial system staved off complete collapse. Concerning, for instance, infrastructure management, national (and regional/local) governments have borrowed to fund infrastructure that encouraged such inefficient development – i.e. building roads for unsustainable sprawling development rather than trains for compact sustainable development (Zifou, 2015).

Taking into consideration the discussed socio-economic challenges, current spatial problems in such environments flow from the complexity of decision-making among hierarchical levels of political and economic competition among private firms (developers, lenders, investors, land owners), households (owners, renters), political organizations (political parties, advocacy groups, non-profits) and public officials (elected, administrators, professionals) (Papamichail and Perić, 2018). All these agents make plans, but the ensuing decisions are neither transparent nor coordinated. Legal and regulatory arrangements of spatial planning context usually fail to bring at the same table all the actors who are respectively responsible in decision-making, or provide effective feedback and controlling mechanisms against fast-track investments or uncontrolled privatization of public land and infrastructure. This results in, not only in exclusive benefits, but it also reflects to uneven spatial development across Europe, strengthening the dipole of the North-South. Despite the cohesion policies and tools of EU, countries with partially developed culture in collaboration have a different rhythm of adoption of such cohesion instruments than countries with an integral approach in spatial planning. Therefore, the question comes which informal supplements are appropriate to boost joint responsibility and support weak formal planning systems.

Briefly put, informal planning activities sacrifice authority for joint responsibility. Instead of focusing on actions of control, informal planning focuses on those whose actions shape the future consequences of spatial development (e.g., the flooding, the traffic, etc.), as well as those who will bear most of these consequences (Papamichail and Perić, 2018). Current formal planning structures usually limit people in these respective social positions and locations apart. On the contrary, informal action brings some of these people together and creates alliances in order collaborate towards making plans and setting directions of spatial development. Formal planning processes are usually trapped between political elections and the competition of economic investment. The informal approach invites politicians and investors to join in temporary collaboration beyond the restriction of formal roles. The collaboration is democratic and focused on deliberation among these participants. The

payoff is not increased power, but purposeful criticism on reciprocal learning processes to conceive and compare problems and solutions for a place that combines causal assessment and political judgment (Briassoulis, 1997; Scholl, 2017; Papamichail and Perić, 2018).

The paper starts with focusing on the notion of informal planning and its supplementary role to the formal system, as well as its cognitive and practical contributions. This is followed by a brief overview of the main planning models in order to determine which of these contain the elements immanent to informal planning. The principles of collaborative rationality are particularly highlighted as they serve as a sound conceptual background for the informal planning practice. To be more specific, the next section describes the test planning method as a link between formal and informal planning and how it put those principles in practice. The concluding sections outline the main principles of informal planning and how they support adaptive urban governance, while they interpret the effectiveness of the informal approach arguing that informality works best for complex problems that formal systems fail to face.

2. Informal planning

2.1 The notion of informal planning

Informal processes are also referred to in the literature as: "nonstandard, underground, illegal, hidden, shadow, unobserved, submerged, irregular, invisible, unofficial, parallel, silent, alternative, paraplanning, opaque planning, shadow state" (Briassoulis 1997). Some of these terms indicate that, in the beginning, informality was connected to poverty and marginality. The informal sector was firstly introduced into international literature by the report of the International Labour Office Employment Mission in 1972, Kenya (Lubell 1991; Briassoulis 1997). The physical implications of informal activities have been analysed extensively and prove how informal systems provide everyday practices, illustrating cases such as squatter settlements in developing countries (Briassoulis 1997).

In a broader context nowadays, the term informal mainly relates to the non-institutionalised planning activities carried out either as a preliminary phase that supplements the formal planning process (Scholl, Staub and Vinzens 2013; Hoch, Scholl 2018) or as collaboration completely overlapping with formal planning (Briassoulis 1997). Therefore, it is of utmost importance to arrive at a better explanation of the concept of informal planning through its relation to formal planning. Briassoulis (1997) defines the three main criteria on the basis of the causes of informal planning: 1) degree of state regulation, 2) demand for planning, and 3) cost of planning. When mutually combined, these shows that informal planning appears whenever there is low state regulation but high demand for planning (e.g. in transitional societies driven by market demands). In cases where, on the one hand, there is weak state planning and low planning costs but also where state regulation is fully enforced but costs of planning are high (e.g. great infrastructural projects demanding additional resources to the available public ones), informal planning comes to the fore. Similar to the latter, high demand accompanied by high costs of planning provides room for informal planning activities (Papamichail, 2019).

It is hard to argue over a precise definition since 'informality' meets a broader spectrum of criteria, as mentioned before, and according to Schönwadt (2008) there is no planning "per se"; he notes that: "Planning is always carried out by people who possess specific biological and psychological idiosyncrasies, who nearly always interact with organizations or cooperative projects, who live and work in their own social and cultural milieu, and who have certain aptitudes, skills, and shortcomings, which is to say restrictions", while, based on the view of Tewdwr-Jones and Allmendinger (2002, 214f), he goes on to argue that "there is not one dominant paradigm in planning today..." dismissing the idea that the collaborative/communicative approach is the only approach to planning alive today. Hence, taking into consideration the shift in planning models explained previously, the degree of state regulation places the emphasis on the role of planners as public officials and their relationship to the activities of other stakeholders. More precisely, defining, on the one hand, the position of planners in the decision-making arena and, on the other, their link to non-public sector actors (civic society, individuals, interest groups) elucidates the roots of informal planning in a number of models, which appeared as a reaction to the rational planning.

Briefly, informal planning concerns non-institutionalised processes that supplement the formal institutional practice, increasing joint responsibility between actors. Informal planning through temporary and provisional processes deals with spatial conflicts that formal planning processes fail to fulfil. This does not mean that informal planning processes overlap or disregard formal planning frameworks, but that they supplement them in order to enable actors to communicate, cooperate and coordinate planning tasks between different institutional levels and sectors (Hoch and Scholl 2018), thus dealing with complexity and uncertainty in practice.

2.2 The evolution of informal planning

The rise of informality and the causal complexity of structural problems is related to the shift between first and second generation planning models. Instrumental rationality in planning emerged through the movement of Positivism in the 19th century, which aimed at applying the achievements of science and technology — however crude — to policy-making (Faludi, 1973). Therefore, on the basis of the following steps towards planning tasks, the rational model has been claimed as being too positivistic, ahistorical, and most of all, apolitical: (a) Analysis of the situation, (b) setting of goals, (c) formulation of possible courses of action to achieve those goals, and (d) a comparison of the consequences of each course of action (Meyerson and Banfield, 1964; Muller, 1993; Schönwandt, 2008). This planning model has also been characterised by its top-down approach, supporting the implementation of policies ignoring the public interest and social differences.

By the early 1970s, many analysts had begun to question not only the efficacy of the rational model in planning, but the possibility of the rational planning model in total, turning from technical to collaborative rationality and accepting uncertainty in planning (Hoch 1994). This

critical perspective for the first-generation model was introduced by various scholars such as Lindblom, Forester, Rittel, Heally, Innes, etc. Later it was Rittel who contrasted the "first generation" model in planning with that of the "second generation". In particular, Rittel and Weber (1973) highlighted the importance of societal problems and dilemmas in planning in a different perspective from that of planning as an applied science:

"A great many barriers keep us from perfecting such a planning/governing system: theory is inadequate for decent forecasting; our intelligence is insufficient to our tasks; plurality of objectives held by pluralities of politics makes it impossible to pursue unitary aims; and so on. […]

The kinds of problems that planners deal with - societal problems - are inherently different from the problems that scientists and perhaps some classes of engineers deal with. Planning problems are inherently wicked." (p.160)

The theoretical approach of the so-called "wicked" problems brought various changes in planning theory. The questioning towards the rational model of planning resulted in six planning models that followed: the advocacy model, the (neo) Marxist model, the model of equity planning, the radical model, the liberalistic model of planning, and the collaborative/communicative model (also referred as the model of social learning and communicative action). Figure 1 illustrates the main representatives and objectives of each planning model. The theory of 'communicative action' of Habermas has been criticised as to the basic conditions framing this conversational context as "ideal speech", which in turn set some constraints for planning in practice since there is no space free of power (Flyvbjerg, 1998, Schönwandt, 2008). Based on the Habermas' (1984) theory of communicative action, the work by collaborative planning scholars provides an empirically tested assessment of collaborative rationality: cooperation among numerous stakeholders, obtaining valid information, and exchange of information and different types of knowledge – expert and experiential (Booher and Innes, 2002; Forester, 1989, 1999; Healey, 1992, 1995; Innes, 1995; Sandercock, 1998).

RATIONAL MODEL OF PLANNING	ADVOCACY MODEL OF PLANNING	NEO-MARXIST MODEL OF PLANNING	THE EQUITY MODEL OF PLANNING	RADICAL MODEL OF PLANNING	LIBERALISTIC MODEL OF PLANNING	COLLABORATIVE/ COMMUNICATIVE MODEL OF PLANNING
Before 1960s	*Mid 1960s*	*End of 1960s-mid 1970s*	*1960s*	*1980s*	*1980s*	*1970s-1980s*
Meyerson *Banfield* *Faludi*	*Davidoff* *Reiner*	*Lefebvre* *Castells*	*Krumholz* *Mier*	*Grabow* *Heskin*	*Sorensen* *Day*	*Habermas* *Forester* *Friedmann* *Healey* *Innes* *Hillier*

Positivistic, ahistorical, apolitical model of planning. "Top-down" approach supporting the implementation of policies ignoring the public interest and social differences.	The "Public" is not taken for granted in contrast with the politically "top-down" approach of rational planning.	Planning becomes an instrument of: -Rationalisation and legitimatization - Negotiation and mediation between the differing demands of various groups. -Regulator or valve for the pressure and protest of the governed classes.	The city administration is an arena in which a political agenda is debated, and planners act in favor of the interests of the disadvantaged *within* this arena.	Planners become the free-lancers, acting outside the system and identify themselves with the unprivileged social groups, usually living and working with them in the deprived areas.	The market as the main regulator of spatially relevant activities, therefore the market-oriented instruments can be seen as a means of informal planning conducted by the private sector actors.	The power of knowledge and learning was favored. Planners involve the "public" (stakeholders and inhabitants) by incorporating their knowledge and abilities diminishing the power of official authorities and providing equity between responsible 'players'.

Figure 1 - Seven models of planning (Source: T. Papamichail 2019, based on Schönwandt 2008).

Briefly put, the preliminary outlines of informal planning can be found in four planning models: advocacy, radical, liberal, and collaborative planning. In the advocacy planning model, the planners step out of the main planning boards, councils and committees in order to objectively represent the disadvantaged social groups and their interest. The public interest is not taken for granted; on the contrary, it must be defined through assessing the needs of the weaker parties (Davidoff & Reiner 1962). The radical model follows this line of thought; however, it goes a step further. Planners become the freelancers, acting outside the system and identifying themselves with the underprivileged social groups, usually living and working with them in the deprived areas (Heskin 1980). The liberal planning model emphasises the role of the market as the main regulator of spatially relevant activities; therefore, the market-oriented instruments can be seen as a means of informal planning conducted by the private sector actors (Sorensen 1983). Finally, the collaborative planning[1], ideologically based on the power of knowledge (be this expert and/or experiential) and good argument, diminishes the official authorities and makes all the stakeholders relevant and equal players in the game. A collaborative approach combining professional knowledge about spatial causes and consequences with the diverse interests and ideas of various stakeholders can be understood as informal planning, particularly within the emerging and transitional democracies.

[1] Many different terms revolving around the same idea of unhampered collaboration have appeared in recent decades: 'communicative-argumentative turn in planning' (Forester, 1989), 'planning through discussion and cooperation' (Healey, 1992), 'communicative planning' (Sager, 1994), 'pragmatic approach' (Hoch 1994), 'inclusive discourse' (Healey, 1995), 'communicative action and interactive practice' (Innes 1995), 'planning through consensus building' (Innes, 1996), 'collaborative planning' (Healey 1997), 'discursive practice' (Sandercock, 1998), 'deliberative planning' (Forester, 1999), etc. (Perić and Soltaniehha, 2015).

2.3. Collaborative rationality

Innes and Booher (2010) further argue for the relevance of informal planning based on collaborative rationality in the context of complex spatial problems. They elaborate five principles to use to judge if and when to collaborate.

- Diversity and interdependence. Interdependence among diverse actors motivates participation and spreads risk and reward as each contributes to joint conceptions of problem and solution. Learning about mutual gains and risks encourages commitment to joint action now within an encompassing framework as future commitments remain provisional – open to changing circumstances and shifting participants.
- Collaborative dialogue, trust and knowledge. Collaborative dialogue among participants in small groups requires that each listen and learn from each other. Focusing on interests and intentions fosters trust as it informs judgments about causality and possibility. Future consequences replace attachment to rules and positions.
- Networks. Networks among the stakeholders include a wide variety of possible interrelationships. This may include interdisciplinary cooperation, i.e. cooperation among various sectors within administrative structure, but also intersectoral cooperation, which includes mutual activities across public, private and civil sectors.
- Monitoring and feedback. Accountability and responsibility animates the entire plan from the outset. Evaluation accompanies every phase because the plan provides an ongoing guide for relationships and not a blueprint.
- Small, diverse working groups. Convening small temporary groups of people with a stake in a pressing complex spatial problem makes it possible to build relationships tied to resolving the problem. People are more willing to trust others and reconsider old habits in the context of relationships tied to shared purpose yet provisional and sensitive to impacts for others.

Based on the Habermas' (1984) theory of communicative action, the work by collaborative planning scholars provides an empirically tested assessment of collaborative rationality: cooperation among numerous stakeholders, obtaining valid information, and exchange of information and different types of knowledge – expert and experiential (Booher & Innes, 2002; Forester, 1989, 1999; Healey, 1992, 1995; Innes, 1995; Sandercock, 1998). Hence, how the principles of collaborative rationality relate with the deliverables of informal planning? The informal system taps the insight of diverse social experience to improve practical judgments about complex problems. Planning in such settings embraces the conventions of deliberative democracy linking small group discourse with scientifically informed causal and interpretive analysis of problems and solutions (Papamichail and Perić, 2018).

3. Test planning method: between formal and informal planning

Numerous informal – or, as often called, 'collaborative' - planning processes have been developed; however, the one described below, the Test Planning Process, is based on the Action-Oriented Planning approach (Scholl, 1995) and it links formal and informal responsibility. More specifically, the Test Planning Process (TPP) is the informal planning method for creating concrete and feasible proposals and solving challenging tasks in spatial planning. It stimulates a critical discourse about implementing the solutions for complex and long-term spatial problems (Scholl et al., 2013, Scholl 2017). Instead of traditional/formal spatial planning methods, the TPP implies a collaborative process among numerous stakeholders with different interests, which combines top-down with bottom-up approaches. More than a common competition, the TPP gathers competitive ideas from various planning teams coordinated by an interdisciplinary steering committee. The resulting contributions are introduced, discussed and, after close evaluation, presented to an executive committee for further elaboration and implementation (Scholl et al., 2015; Papamichail, 2015).

According to Scholl et al. (2013), there are seven key theoretical principles underpinning test planning as a method:

- Concurrence of ideas. The core of test planning is the competition between various ideas. As a result, the most efficient solution is given to the contractor within the framework of the given conditions.
- Rhythm. Ideas and solutions mature due to repeated discussions and continuous testing throughout regularly scheduled meetings.
- No 'winner'. Unlike a traditional competition, there are no unique winning proposals. Since complex tasks often do not have ideal solutions, this method examines the different ideas of the teams and selects those that are most appropriate.
- Ad hoc organization. Test planning is an independent process and even the contributions of local and regional officials are considered according to the TPP rules. As a result, alternative, impartial solutions can emerge.
- Communication. Test planning cases are usually about areas whose future has a strong public interest. To gain public support for the results and attract various actors, communication and marketing of the various steps and solutions is important from the beginning.
- Finding problems and solutions. Apart from the final solutions, a redefinition or identification of new problems in addition to the given ones often takes place. This turns test planning into a dynamic process.
- 'Protected' process. Ideas and solutions are first discussed and tested in closed meetings between the teams and the steering committee before any public announcements in order to develop strong argumentation for the solution, and which paves the way for fruitful dialogue with various actors and the public to follow.

A typical organisation and structure of the Test Planning Process is indicated in Figures 2 and 3.

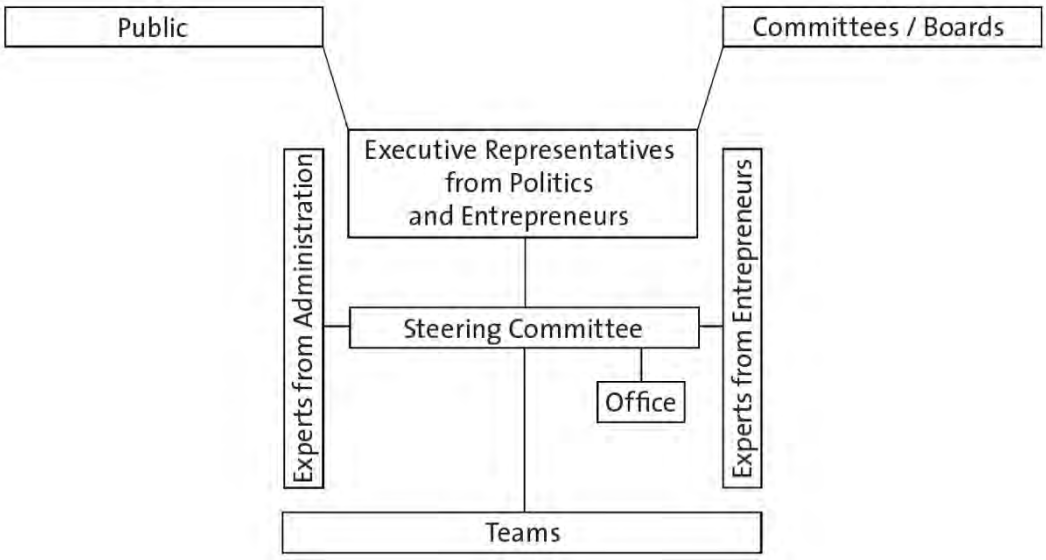


Figure 2 - Typical structure of a test planning process (Source: ARL 2011 in Scholl 2017).

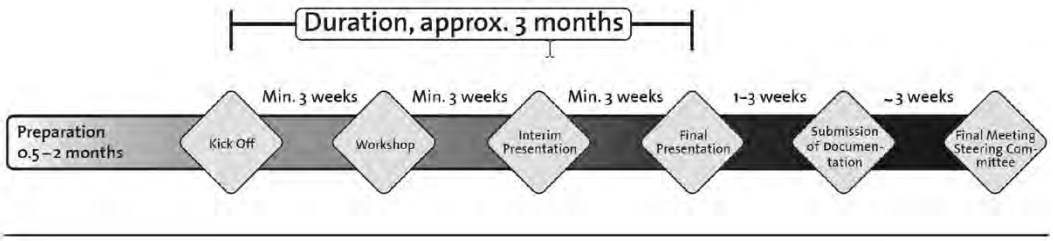


Figure 3 - Typical organisation of a test planning process (Source: ARL 2011 in Scholl 2017).

As to the structure of the process (Fig. 2), the role of each group is, in brief, as follows (Scholl 1995, 2017):

Executive Representatives from politics and entrepreneurs: The Executive Committee consist of two to five representatives (all with voting rights) of the commissioning political authorities and organizations. It distributes the formal mission for conducting a test planning process, is regularly informed about the working progress of the Steering Committee, and approves the definitive recommendations resulting from the test planning process. The Executive Committee also selects the coordinating chairman from within its members.

Steering Committee: The Steering Committee comprises usually seven to twelve persons (all with voting rights), who are experts from the commissioning body as well as independent experts. Additional experts, without voting rights, can be also invited. The Steering Committee leads the test planning process content-wise, is in direct discussion with the

planning teams, and formulates the recommendations from the team proposals to submit them later to the Executive Committee, while it selects the coordinating chairman from its members, usually based on the suggestion of the Executive Committee.

Planning Teams: A minimum of three, maximum four, interdisciplinary teams work on problem-solving proposals to address the problems presented in the task description (Task Mission), which is the same for all teams. The selection of the teams should provide a diversity of qualified teams from the region, and elsewhere, national or international. A pre-qualification phase can support the selection.

Steering Committee's Office and the Preparation Group: The Steering Committee has an office assigned to it, responsible for writing up the protocols, performing other tasks, and organising the meetings, as well as the preliminary assessments and synopses of the team proposals for the final meeting. In addition to the Office, during the preparation phase of a test planning process, a Preparation Group is required. This group is responsible for the compilation and preparation of the basic information on the test planning task description, the preliminary assessment of the projects and the operative leadership of the process.

The Test Planning Process is rooted in the case of the Vienna Model (1975), Vienna's need of flood protection for the Danube River, while it has been implemented in several other cases such as Frankfurt's regeneration of the urban area along the Main River waterfront (Stadtraum Main), the Swiss cases of Solothurn's revitalization of one of the largest brownfields, the transformation of the abandoned military airport at Dübendor, the case of Brig Railway Station, or the brownfield regeneration of Bovisa Gasometri in Milan (Scholl 2017). In those cases, besides the previously described steps and role models, two more elements contributed significantly in the impact if informal planning; the formulation of the conciliums, e.g. in the case of Vienna and Frankfurt, or the formulation of platform associations, e.g. in the cases of the Limmat Valley and Brig. The role of the concilium concentrated on preparing the ground for a common discussion before, during and after the implementation of an informal planning process. Likewise, the composition of platform associations, consisted of representatives of the stakeholders, was a result of informal planning and it supported the following formal planning processes, creating common ground for exchange knowledge and information among the actors and the public.

How well do the elements of the TPP incorporate the principles of collaborative rationality? Figure 4 offers a graphic image detailing important overlaps.

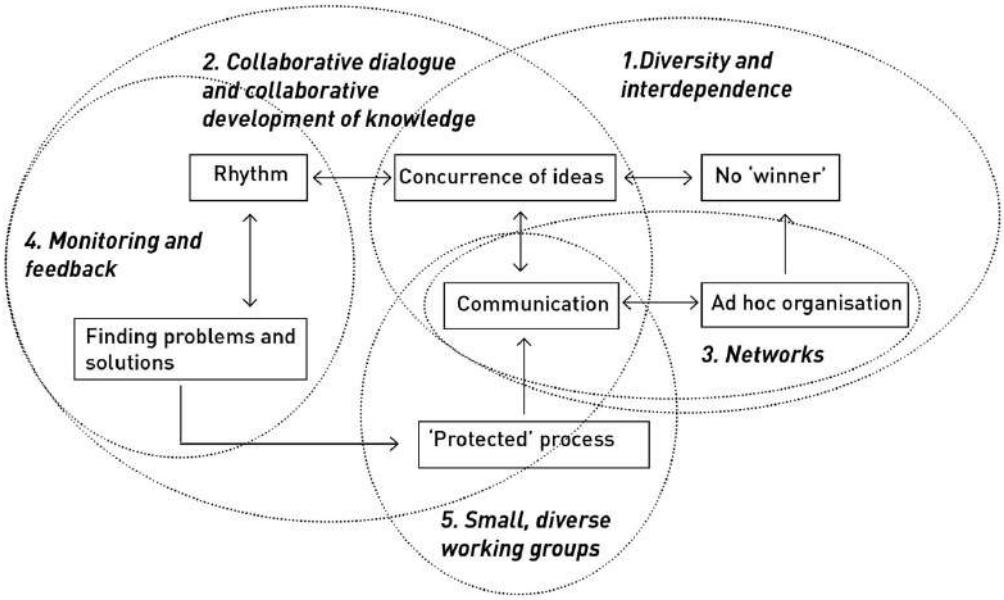


Figure 4 - The interrelation between five principles of collaborative rationality and seven principles of the test planning process (Source: Papamichail and Perić 2018).

4. Towards adaptive urban governance through informal planning?

Based on the interrelation of informal planning and collaborative rationality, the five principles are following (Papamichail, 2019):

- *Inclusive, flexible & transparent processes towards joint responsibility.* They increasing security for the process based on trust building, eliminating misconceptions, and managerial relations or 'behind the scenes' actions. Furthermore, it includes all responsible actors and overcomes administrative and institutional borders as well as adapts to tasks of different spatial (national, regional, local) and power (national, regional, local) scales and projects (brownfield regeneration, transport development etc.), creating new spaces for action.
- *Non-linear, but simultaneous processes based on the three-cycle design.* They provide knowledge as to how to act simultaneously at the right moment, dealing with various aspects of sustainable development, accelerating decision-making saving time and funding resources. Such processes stimulate a spectrum of problem-oriented solutions that are not often visible or commonly accepted in the beginning, and offer both purposeful criticism and the time to come up with robust ideas and solutions.
- *Focus on public consensus building*. Based on collaborative dialogue, informal planning not only produces agreements and plans, but it also enacts experimentation, learning, change, and building shared meaning among all affected parties. This counterbalances hierarchical and political mandates, as well as administrative procedures, which preclude the kind of conversation needed to avoid

the pitfalls of adversarial positions and posturing. Moreover, it weakens ideological and personal commitments that usually blind officials and clients to problem complexity and adaptive solutions.

- *Potential and problem-oriented scenarios and solutions.* Informal planning complements with problem or potential-oriented planning scenarios and solutions based on concurrence of ideas. Unlike the usual concept of a competition, the concept of the concurrence of ideas delivers multi-functional concepts based on diverse aspects and ideas. As a result, this provides holistic plans based on commonly accepted frameworks and conditions.
- Actor networks based on role differentiation. offer diversity and interdependency between the participants based on an ad hoc and clarified structure. This structure includes a commission (representatives of executive authorities), a guiding group (which binds representatives from both public authorities and private sector) and working groups (planning teams). Not less than three different working groups ensure plurality of ideas and solutions, testing even those that have been disregarded.

Hence, the principles of informal planning contribute the following, concerning the promotion of adaptive urban governance in environments of crisis: 1) flexible and agile institutional arrangements supportive to various kinds of urban planning mechanisms (not only official tools), 2) proactive and imaginative planners ready to accept solutions created outside the technical domain of instrumental rationality, and 3) inclusion of numerous stakeholders to exchange various information and different types of knowledge, i.e. expert and experiential knowledge, 4) problem-oriented scenarios and solutions of spatial and urban development, based on the concurrence of ideas.

5. Conclusion

Informal planning shows how it can supplement formal planning structures and serve as a tool for adaptive urban governance. Even though, in several cases, informal planning is not accepted fully by different planning cultures, it presents a potential and long-term impact. Namely, informal planning processes:

- Point out a step-wise development concerning complex tasks in spatial planning based on concrete arguments, which emerge through clarification processes.
- Provide shared experience to inform simultaneously formal national institutions or transnational institutions, i.e. EU institutions, policies and instruments, providing information channels among international, national, regional and local level of spatial planning.
- Include numerous stakeholders and smooth the paradoxical role of planners, who act between formal and informal responsibility.
- Provide a spectrum of action, especially in countries challenging socioeconomic environments, and it might happen opening the door for further research.

Reinforcing strategic decision-making and a step-wise development are the tools for paving the way towards a new planning culture. Nevertheless, changing planning culture is a long-term process, which may or may not be successful. This does not depend only on planners and their readiness to understand, accept new skills and adapt these to the local settings, but it depends more on the general socioeconomic conditions, which provide a secure and stable context for innovative planning to happen. For instance, the adoption and interpretation of informal planning in countries with immature society in collaborative planning processes, e.g. in Greece, or no background in deliberative democracy, e.g. China, Iran, can still provide challenges regarding the misinterpretation of the role of informal planning towards favouring again fast-track investments and focusing on the benefits for a few. For creating a mature background, the systemic support is needed as a backbone, i.e. though education – only in this case planning finds a fruitful ground for interpreting and implementing informal procedures. This opens further questions for future research steps concerning the transfer of tacit knowledge in countries with partially developed culture in collaboration and deliberative democracy.

6. References

Allmendinger, Philip; Tewdwr-Jones, Mark (2002) Planning futures: New directions for planning theory, London: Routledge.

Briassoulis, Helen (1997) "How the others plan: Exploring the shape and forms of informal planning", Journal of Planning Education and Research, 17, 105–117.

Davidoff, Paul; Reiner, Thomas. A. (1962) "A Choice Theory of Planning", Journal of the American Institute of Planners, 28:2, 103-115.

Faludi, Andreas (1973) Planning theory (Vol. 7, Urban and regional planning series). Oxford etc.: Pergamon.

Flyvbjerg, Bent (1998) Rationality and power: Democracy in practice (Morality and society). Chicago: University of Chicago Press.

Forester, John (1999) The deliberative practitioner, encouraging participatory planning processes. Cambridge, MA: MIT Press.

Habermas, Jürgen (1984) The theory of communicative action. Vol 1. Reason and the rationalizations of the society, London: Heineman.

Healey, Patsy (1992) Planning through Debate: The Communicative Turn in Planning Theory. Town Planning Review, 63, 143-162.

Healey, Patsy (1997) Collaborative planning - Shaping places in fragmented societies. London: MacMillan Press.

Heskin, Allan, David (1980) "Crisis and Response: A Historical Perspective on Advocacy Planning", Journal of the American Planning Association, 46:1, 50-63.

Hoch, C.1994. What Planners Do: Power, Politics, and Persuasion. Chicago, Illinois etc.: Planners Press.

Hoch, Charles; Scholl, Bernd (2018) Linking Informal and Formal Responsibility. In: Peric, A., Signer, R. (eds), "Spatial Planning Matters! Inspiring topics and fundamental topics." Zurich: vdf Hochschulverlag AG.

Innes, Judith (1995) "Planning theory's emerging paradigm: Communicative action and interactive practice", Journal of Planning Education and Research, 14:138-196.

Innes, Judith (1996) "Planning through Consensus building. A new view of the comprehensive planning". Journal of American Planning Association, vol. 62, issue 4.

Innes, Judith; Booher, David (2010) Planning with complexity: An introduction to collaborative rationality for public policy, New York: Routledge.

Lubell, Harrold (1991) The Informal Sector on the 1980s and 1990s. Paris, France: Development Centre of the Organisation for Economic Cooperation and Development.

Meyerson, M.; Banfield E.C. 1964. Politics, Planning, and the Public Interest: The Case of Public Housing in Chicago. A Free Press Paperback. London: Free Press of Glencoe.

Muller, Jerry Z. (1993) Adam Smith in his time and ours: Designing the decent society, New York: Free Press.

Papaioannou, Athanasios; Nikolakopoulou, Christina (2016) Greek cities in crisis: Context, evidence, response. In Jörg Knieling and Frank Othengrafen (Eds.), "Cities in crisis: Socio-spatial impacts of the economic crisis in Southern European cities" (pp. 172–189), New York: Routledge.

Papamichail, Theodora (2015) "Railway and urban development in Patras: Towards the improved participation of local governance in complex planning problems". Serbian Architectural Journal, 7(3), 365–380.

Papamichail, Theodora; Perić, Ana (2018) "Informal Democracy in Patras, Greece: A Mechanism for Improved Planning?", Cities, 74: 334–42.

Papamichail, Theodora (2019) Spatial Synergies. Synergies between formal and informal planning as a key concept towards spatial conflicts - the case of tourism-oriented railway development in the Peloponnese, Dissertation (accepted by the examiners, 4.7.2019), ETH Zurich Research Collection (forthcoming).

Perić, Ana; Soltaniehha, Mahdokht (2015) Expert Advisory Platforms: A Critical Analysis of Collaborative Planning Procedures. In Scholl, Bernd; Dubbeling, Martin; Perić, Ana (eds)" "Ten Years of UPATs. Reflections and results", Zurich: vdf Hochschulverlag AG.

Rittel, Horst; Webber, Melvin (1973) "Dilemmas in a General Theory of Planning." Policy Sciences 4: 155–69.

Sager, Tore (1994) Communicative Planning Theory, Aldershot: Avebury.

Sandercock, Leonie (1998) Towards cosmopolis: Planning for multicultural cities. Chichester: Wiley.

Scholl, Bernd (1995) Aktionsplanung. zur Behandlung komplexer Schwerpunktaufgaben in der Raumplanung, Zürich. vdf-Hochschulverl. an der ETH.

Scholl, Bernd; Staub, Bernard; Vinzens, Martin (Eds.) (2013) Test planning – A method with a future, Zurich: vdf Verlag.

Scholl, Bernd, et al. (2015) Code Patras - Rail & city - A test planning process for Patras. Zurich: ETH Zurich, Institute for Spatial and Landscape Development.

Scholl, Bernd (2017) "Building Actor Relationships and Alliances for Complex Problem Solving in Spatial Planning: The Test Planning Method", disP - The Planning Review, 53:1, 46-56.

Scholl, Bernd; Staub, Bernard; Vinzens, Martin (Eds.) (2013) Test planning – A method with a future, Zurich: vdf Verlag.

Schönwandt, Walter (2008) Planning in crisis? Theoretical orientations for architecture and plannin, Ashgate: Aldershot.

Sorensen, A. D. (1983) "Towards a Market Theory of Planning", The Planner, 69, 3: 78-80.

Zifou, Maria (2015) Greek spatial planning and the crisis. In Frank Eckardt, & Javier Ruiz Sanchez (Eds.) "City of crisis: The multiple contestation of Southern European cities" (pp. 155–178), Bielefeld: Transcript Verlag.

Case Study / Project

Organizing Urban Governance in Vietnam:
an Investigation on Housing Development in Ho Chi Minh City

Thai Son PHAM

Abstract

This paper aims to identify and discuss urban governance related issues in Vietnam through an in-depth investigation on housing development in Ho Chi Minh City (HCMC). In the literature review on urban governance regarding housing policy, the paper highlights five dimensions of urban governance that Richard Stren (2007) proposed: capacity, finance, diversity, security and authority. After that, the paper examines major challenges in capacity and authority dimensions of urban governance in HCMC based on extensive working experience with the city's technical departments and empirical analysis on various secondary documents on housing development,. The findings show that HCMC has a huge responsibility of providing housing for its growing population but receives inadequate decentralization from central government, causing a lack of financial resources, an institutional fragmentation and a weak coordination framework with poor community engagement. The paper concludes that current configuration of urban governance in HCMC is not sufficient to address housing as cross-cutting and multi-faceted issue and proposes integrated approaches towards a good governance system with broader implications that go beyond the single case of Ho Chi Minh City.

Research Paper

Decentralisation and devolution in growing megacities

Case of Bangalore, India

Ananya RAMESH, India
Nirupama M VIDYARTHI, India

Abstract

Through the 73rd and 74th Amendment Act of 1992, India sought to empower urban and rural local bodies. On the contrary, parallel modes of governance have undermined them. In the case of megacity Bangalore, two such modes i.e Electronic City and Smart City are studied to unpack the status of decentralisation. Key person interviews serve as primary data. Following the enquiry of decentralisation and devolution, elements of disconnectedness emerge. Disconnectedness can be seen between parts-affecting the whole, embodied as intents as well as outcomes through tools of planning, administrative, legal, political and economic choices. This leads us to enquire how we can retain decision-making power within the democratic realm and strengthen the role of local bodies in megacities. Unpacking the dynamics of decentralized governance is critical across megacities globally, as cities continue to seek autonomy not just in functioning but identity and influence, in the network of global flows.

Key words

Democratic decentralization, Electronic City, Smart City, Disconnect

Introduction

The United Nations (UN) define megacities as those with a population mark of over 10 million, where Bangalore features in the top five megacities in India with a population of 10.5million (United Nations, 2018). The Census of India, 2011 refers to Bangalore as an Urban Agglomeration under the million plus category, governed by a Municipal Corporation. In India, megacities are categorised based on their contribution to the Gross Domestic Product (GDP) and their role as central to the 'economic future' of the country (McKinsey Global Institute, 2010). Cities in this framework are viewed as concentrations of investment, labour and infrastructural provisions. This makes them vital tools in the 'growth' narrative calling on governments to 'remove barriers in product, land and labour markets' (McKinsey Global Institute, 2001).

Megacities as a process

Harvey deconstructs these 'utopian' (Harvey, 1996) ideas of growth in cities and argues that they are not entities, but processes of 'accumulation of capital across time and space' (Harvey, 1996) especially the big agglomerations which act as the primary centres of 'capitalist creative destruction' (Brenner, 2013, p. 108). In cities like Bangalore this is especially marked in the processes of creating a 'world class city' (Ong, 2011) more pronounced since the mid-1990s (Goldman, 2011a). Michael Goldman discerns the flow of capital and its effect on the transformation of Bangalore from a quiet pensioners town to a

'third world Megacity' (Goldman, 2011a) catalysed by the growth of the IT industry. This makes Bangalore a frontier of "speculative urbanism" (Goldman, 2011b) with the transnational agencies aiming it to connect to a global network of flows while undermining the local bodies. Urban as a 'process of transformation unfolding in diverse sites, territories and landscapes' as proposed by Brenner helps visualise the case of Bangalore with urbanisation bleeding into the "non-urban" and helps ascertain the capture (Brenner, 2013) and its facilitation, at the expense of the local government. When regional competitiveness (Kennedy, 2017) is at odds with local political competence, capital finds non-capitalist spaces and strata ((Luxemburg, 1951) as cited in (Idiculla, 2015, p. 5)) to engage with; to ease the process. Yet for the very same reason, states invite capital in the very same flagship cities, willing to give up some level of control. This can be viewed as a reason for regional imbalances and certain cities growing into megacities and city regions.

In megacities and urban agglomerations, the local governments most often are limited by administrative jurisdictions that do not match the extents of urbanisation (Baud and Wit, 2008, p. 8). Viewing megacities as processes, urges us to look beyond the logics of administrative and jurisdictional boundaries, observing the dynamic nature of part to whole relationships. Spatial, regulatory and financial provisions within these processes define parts, as a dynamic identity and its relationship with the megacity; owing to the multiple processes within megacities.

Decentralisation in India: the institutional framework

The 73rd and 74th Constitutional Amendment Act (CAA) introduced in 1992 can be viewed as a milestone in the attempt to decentralize and strengthen rural and urban local governments as the third tier within the federal structure. The 11th and 12th Schedules added through these CAAs give a detailed list of functions to be carried out at this level of government. The 73rd CAA has better implementation since it actively regulates decentralisation in rural areas through clear demarcation between state and panchayat raj; devolving financial and administrative power proportionately to function autonomously (Baud and Wit, 2008, p. 24). The 65th CAA 1990, a precursor to the 74th CAA failed to be implemented since it sought an unprecedented move within the federal structure, empowering the urban local bodies i.e. municipalities as the third tier of government. Opposed on the grounds of 'bypassing' the state government which are the building blocks of the nation i.e. 'India as a Union of states', the 74th AA toned down this proposition, offering state governments discretionary powers (Baud and Wit, 2008, p. 54). In Karnataka, Karnataka Municipalities Act and Karnataka Panchayat Raj Act provide the framework and institutional structures.

In the case of Bangalore creation of parallel modes of governance through parastatals and taskforces, citing technical expertise as the reason laterally shifts the decision-making power away from the ULBs which has been discussed widely discussed by scholars under the Collaborative for Advancement of Studies on Urbanism through Multi-Media (CASUMM). These studies also establish the undermined power of municipalities due to lack of devolution of power to the Ward Committees, capture of fiscal control and decision-making through creation of financial intermediaries and pre-conditioned loans from international financial institutions. It is in this context, Leo-Saldanha from Environment Support Group rightly points out that "we are ritually decentralised, but effectively centralised".

Studying the complexity of "market-based practices" in Bangalore, Benjamin (Benjamin, 2010)articulates that the impact of neoliberal forces when "policy and programmes favour the big interests over these everyday-practices" poses a threat to the essence of democratic processes and decentralisation. The current approach to democratic decentralisation coupled with regional competition (Kennedy, 2017) and corresponding policy incentives by the state government, are "removing the remaining obstacles to the global presence of capitalism" (Schuurman, 1997) which is discussed through the two cases.

More than two and a half decades after the CAAs, democratically elected urban local bodies remain disempowered. New forms of governance such as Special Economic Zones, Infrastructure Corridors, Industrial Townships, Smart City etc. can be seen as countering this intent, through creation of "enclaves of exception" (Idiculla, 2015, p. 20). We hypothesise that "exception" ((Schmitt, 1985; Agamben, 2005) as cited in (Idiculla, 2015)) as a key intent in these new forms of governance, is leading to various degrees and forms of 'disconnect'. Not only has this shifted decision-making outside the democratic realm and altered the dynamics of local governments, but the disconnects are posing challenges to dynamics within a megacity's parts as well as the regional dynamics. Viewing these disconnects as outcomes, this paper aims to unpack two instances (i.e. Electronics City Industrial Township Authority (ELCITA) and Smart Cities program) of such exception initiated through programmatic and financial exception respectively; implemented through alternate modes of governance .The authors unpack the resultant disconnects as outcomes of processes that contest, claim and retain decision making within the democratic realm and the dynamics of impairment and systematic shift in power away from local bodies aimed at serving other interests.

Case 1: Smart City

Megacity fueled by visions of a World Class city

According to Harvey long-term investments in built environment, infrastructure of communication, production to name a few, facilitate the 'circulation of capital' across time. (Harvey, 2000). Apart from utilizing land to accelerate peri-urban transformations, there is a rising interest in 'Urban Renewal' programs seeking to uplift the core city areas. It is through a combination of 'underestimated costs and overestimated revenues' that projects get approved and bring in funds (Flyvbjerg, 2005, p. 1) They project visions and rendered images of the the city on completion of the project. One of the recent proponent of this 'Urban Fantasy' (Watson, 2014, p. 215) in India has been the Smart City Mission. Often referred to as the 'pet project' of the Prime Minister, it is highly centralised in its conception of development, favouring a certain model of 'futuristic' development, often overlooking the actual needs of the cities or areas where the mission is implemented.

Basic Infrastructure vs 'World-Class Infrastructure'

Carrying forth the JNNURM model, the Smart City Mission seeks to bring in large amount of investment into cities. But just as JNNURM the Smart Cities Mission seeks to restructure the functioning of municipalities. This is usually at the cost of provision of basic services (Baindur and Kamath, 2009). In the mission mode, the State and ULB seek to create and demonstrate 'convergence' with larger national goals and other schemes. The cities conceptualise

projects to fit the requirements of the Central Scheme, the predominant incentive being access to the grants. In this process the convergent goals overlook the city's requirements.

Brigade Road, one of the 7km of roads in the core city of Bangalore selected for the 'Smart SURE' roads which will feature IoT (Internet of Things) based interventions. 'These roads will have 50 smart card-enabled public bicycle sharing points, 30 e-rickshaw stands, 35 e-toilets, water ATMs, 420 sensor-based smart dustbins and 50 designated vending kiosks -all of which will be connected to 1,250 smart telecom towers that will double as street light poles. Not to mention, these roads will also have wi-fi connectivity.' (Ministry of Urban Development, 2016). The disconnect between such proposals and the reality of the various parts of the city faces inadequate water supply, sewerage management and lack of basic services especially for the urban poor is evident.

A large part of the Pan City Proposal for Bangalore focuses on 'Smart' technocratic interventions such as e-governance, B-TRIPS etc. (Ministry of Urban Development, 2016). The call for an overhaul in governance with an intensive use of technology causes a disconnect in the system and induces a demand for 'expertise' which is to be fulfilled by a number of Private players offering allied products and services (Ong, 2011).

Focus on Area Based Development

Though ABD is intended to streamline the goals into smaller spatial entities to be tackled as a project, the Bangalore Smart City proposal is far from execution with very less transparency on the progress of the Mission. Officials claim that the DPRs (Detailed Project Reports) are being prepared at this stage.

The mission talks of concepts like 'Retrofitting' and 'Redevelopment' of existing areas; 'Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizen',this raises questions of equity and inclusiveness as various identities manifest spatially in cities. A look at the Smart City proposals of Bangalore shows trends that ABDs concentrate too much on spatial interventions alone, which view retrofitting and redevelopment as an exercise in aesthetics; modernisation, place-making, material changes etc. It is however a manifestation of 'splintered urbanisms' (Graham and Marvin, 2001) with resources being directed to select areas in the city. 2,090 crores are the current estimates for the projects under Bangalore Smart City with Rs 1,666 crores with over 80% just for the ABD projects (Ministry of Urban Development, 2016). The larger budget for the ABD projects will run the risk of creating 'islands of excellence' (Idiculla, 2015) creating a spatial disconnect between the selected areas in the core and other parts of the city.

Since a large portion of the financing of these projects relies on investments from the private sector and Public Private Partnerships, they depend on the market mechanisms for their completion. These Market forces will play out differently in different cities depending on various factors; highlighting existing patterns of boosterism and inter-region competition. The actual spatial forms that these economic forces would take in a city like Bangalore is to be seen. How they are linked with existing economic nodes would decide their feasibility and working.

Governance in an SPV model

The Smart City Mission aims to tap into the 'spirit of competitive and cooperative federalism' (Ministry of Urban Development, 2015) creating competition in the process of selecting the cities and in the delivery of the pre-defined projects. This would depend on the ambition,

ability to repay and the 'comfort' provided to the lenders. Apart from the influencing reforms and policies, certain financial tools like Special Purpose Vehicles are employed to create a financial island disconnected from the liabilities of the constituent partners. Special Purpose Vehicles have become increasingly popular in delivering and operating projects often compromising on transparency. They allow for securitization of assets, distribution of risks, and the goal-oriented approach seeks to instil confidence and minimise risks for the investors.

The Smart City SPV is to implement, plan, appraise, approve and release funds, manage, operate, monitor and evaluate the various projects. This is overseen by the State level 'High Powered Steering Committee'. An 'Apex Committee' at the central level would monitor the entire mission. This in a sense created parallel structure of entities disconnected from the democratic realm, with State and ULBs asked to delegate their powers to the respective mission counterparts.

A large aspect of creating an SPV allows operational autonomy and acts as a means to bypass the local elected representatives and the democratic accountability. Fiscal decentralisation not the same as decentralisation as per the 74th CAA; 'withdrawal' of the Central and to an extent the State governments in the financing of the projects does not lead to autonomy for the ULBs functioning. The decision making in the case of the SCM is largely concentrated with parastatal intermediaries like KUIDFC, the 'High Powered Steering Committee' at the State Level, the monitoring and evaluation of the projects also rests with the SPV and not with the ULB.

There is no mention of the role of the Ward Committees or the elected corporator in the SCM document especially when it mentions the city level governance with the Smart City Advisory Forum. According to the document the forum will include the District Collector, MP, MLA, Mayor, CEO of SPV, local youths, technical experts, and at least one member from the area (Ministry of Urban Development, 2015). This further distances and takes away from the existing role and powers of the local representatives. The Ward Committees have started functioning now and it's largely the civil society pressure that has strengthened its position in the City. Though there are several shortcomings in its current functioning, State and Central policies are actively undermining its position and powers as laid out in the 12th Schedule.

Cities are not products but multiple processes that require constant dialogue with its citizens. The Mission document calls for the delegation of the powers and responsibilities that rests with the State/ ULB to the SPV. This erodes the current threads of accountability and limits the interaction of the citizens to a grievance interface. Its parallel mode of working creates disconnects in the larger system undermining the already disempowered local units of governance.

Case 2: Electronics City Industrial Township Authority (ELCITA)

With economic liberalisation in the 90s, Bangalore opened its markets to foreign investment and launched the Karnataka Information Technology (IT) Policy in 1997. Electronic city (e-City) which was set up as a hub for electronics industries in the 70s, underwent a paradigm shift from electronics to IT with the setting up of Software Technology Parks of India (STPI), (an autonomous society under the Ministry of Communication and Information Technology,

Government of India) in 1991 (ELCITA, 2017). Today e-City is known as the 'Silicon Valley of India', employs over 1.5million people and is spread across 903 acres. Entry of IT into the Indian market can be seen as the moving of capital, seeking new avenues and territories as discussed by (Harvey, 2003) outside of saturated capitalist economies, to gain from reinvestment. Spatially, this phenomenon is concentrated in the peripheries of cities not only because of land availability but the presence of non-capitalist strata ((Luxemburg, 1951) as cited in (Idiculla, 2015, p. 5)).

Creating the enclave of exception

At inception, in the 70s, the Government of Karnataka (GoK) along with Karnataka State Electronics Development Corporation Limited (KEONICS) developed e-City as a single land use estate reserved for electronics industries, imagining it as the future of the state. This defined the island of exception spatially and based on land use. After the entry of IT industry, the island was also defined institutionally in 1992 with creation of Electronics City Industries Association (ELCIA) and handed over maintenance in 1997; to cater to 'special needs' of industries within e-City (ELCIA, 2014; ELCITA, 2017). In 2012, BBMP passed a resolution (The Hindu, 2012) to include e-City under its jurisdiction viewing it as a revenue source in terms of tax, magnet to attract investment into the city, attract educated migrants and in turn boost the state economy. But ELCIA opposed this in order to avoid paying higher taxes to BBMP which is an Urban Local Body (ULB) versus the lower tax they were paying to the panchayats which are rural local bodies. Given these considerations by the GoK, ELCIA lobbied for the Industrial Township status (ELCIA, 2014) to secure the state of exception and operate autonomously, which was granted in 2013. e-City was managed by parastatals Karnataka Industrial Area Development Board (KIADB) and Karnataka State Small Industries Development Corporation Limited (KSSIDC) and KEONICS (ELCITA, 2017), violating the 73rd and 74th Constitutional Amendment Act (CAA) and with the Industrial township status, the village panchayats are facing a loss of revenue in addition to loss of power (since taxes are now collected by ELCITA and not the village panchayats), failing the intent of the 73rd and 74th CAA.

Governing council of ELCITA has elected and State Government nominated members (ELCITA, 2017). The system of nomination in every council allows the State to retain control and limit autonomy. The chairperson selected from the five elected members doesn't have any executive powers, while these powers are vested in the Chief Executive Officer (CEO) who is appointed by ELCITA, sometimes under political pressures from the state government (Aworti, 2003), challenging the exercise of autonomy. This reflects the nature of ELCITA as a local body which is not headed by a democratically elected representative but by an autonomous Authority which is under state control to an extent.

Enclave of exception; relationship between the megacity and its parts

"…Bangalore city has 45% leakage whereas 5% leakage with ELCITA distribution...everyday meter reading is noted and problems are resolved immediately… unlike BBMP, property tax collection is 95% this year and was 97% last year and we have a paperless office and all the work is online for transparent functioning…". During the interview, the CEO of ELCITA talks about the efficiency in governance and quality of service delivery within the e-City jurisdiction with a sense of accomplishment. It is the ring-fenced spending of revenues within the e-City jurisdiction that offers ELCITA the opportunity to provide, monitor and maintain services better. This has led to a stark contrast in quality of infrastructure and

service delivery which can be observed during surveys. This resultant disconnect is a function of the status of "exception", bureaucratic reach as well as the delimited technical expertise and financial power. Another outcome is compromised service delivery to other parts of the city owing to disproportionate distribution of resources and regional disparities (Tantri, 2014, p. 13). Examples in this case include limited fleet of air-conditioned buses on other routes in Bangalore as there is an oversupply on the e-City route, congestion enroute since elevated expressway to e-City is tolled etc.

Status of decentralisation in the case of ELCITA

The altered modes of governance lay out the spatial, legal and economic models for the development of enclaves. Institutional design, municipal autonomy, control over land and revenues of ELCITA within the e-City jurisdiction, has dictated the terms of development and undermined the local governments as discussed in this section.

Provisions to bypass the local body and reroute decision-making

Policy provisions to enable the state of "Exception": To attract IT companies to Bangalore and e-City, the GoK presented several subsidies and simplified the process. With the first Karnataka IT Policy released in 1997 (Government of Karnataka, 2011) it offered several tax subsidies (on computer hardware and peripherals, 50% subsidy on stamp duty and registration charges), exemptions (work contract tax, entry tax for five years, sales tax for ten years, electricity tax for captive power generation without limit, sales tax on fuel without limit) and land cost subsidy based on employment generated. Even with the electricity tariff slabs, software companies are considered industrial and not commercial thereby offering a subsidy on this front as well.

The Karnataka IT policy recommends the creation of a single window agency to administer the concessions and incentives which will be headed by the Principle Secretary Department of Commerce and Industries, retaining power at the state government level. The Industrial Policy has proposed raising bonds to raise funds for IT infrastructure and education. But the revenues from these bonds will be under the control of CM's task force, with no representation from the respective local bodies. The State Policy for Special Economic Zones (SEZ) (Government of Karnataka, 2009) recommends the declaration of SEZs as Industrial Townships under the 2002 Amendment to the Karnataka Municipalities Act. Even the choice of locating these large estates on the periphery of the city can be explained as "untrammelled accumulation" of capital to engage with non-capitalist space and strata to gain influence and initiate transformation ((Luxemburg, 1951) as cited in (Idiculla, 2015, p. 5)). GoK has plans of setting up several SEZs, industrial centers and the IT corridor in the future (Government of Karnataka, 2011) and these will occupy large footprints within the city limits or within village jurisdictions. In this context, the current policy provisions retract power from the local bodies on accounts of revenue streams, decision making as well as infrastructural capacity. In these systematic ways, by carving out enclaves from within the jurisdiction of the local bodies, granting clearances at the state government level and allowing a bigger stake for private actors, leaves the third tier of government as ceremonial, failing the intent of the 74th constitutional Amendment.

Planning exemptions and spatial implications: Creation of e-City as a single use land parcel and IT and Industrial Policy provisions were the first steps towards building-up the state of exception easing the regulatory requirements and process for industries. In case of IT and

industrial developments, the ULB is disempowered through certain planning exemptions as discussed below. Any IT development with less than 5kVA power consumption has no locational restriction, and the Karnataka Industrial Policy (Government of Karnataka, 2016) has recommended an amendment to the Karnataka Municipalities Act to give powers to KIADB and KSSIDC to approve building construction plan of industrial units notified as industrial areas/estates/townships. Not only does this violate the master plan provisions prepared by Bangalore Development Authority (BDA) (which is already illegal since BDA is a parastatal) but also takes away the ULB's role of building plan sanction and reroutes it through state level agencies such as KIADB and KSSIDC.

Growth of e-city involved physical expansion and acquisition of a larger land parcel. The state, in favour of a "business-friendly rather than market-friendly" approach ((Rodrik *et al.*, 2004; Kohli, 2006a, 2006b) as cited in (Idiculla, 2015)) acted as an agent to acquire land, and handed it over to private developers, aiding the corporate-led economic growth as well as the ensuing gentrification (Smith, 2002; Sampat, 2010) as cited in (Idiculla, 2015)).

All these provisions, have supported and strengthened the state of exception, providing the IT houses in the ELCITA jurisdiction more than the elbow room they were lobbying for through ELCIA.

Ambiguity, contradictions and violations

Ambiguity in provisions of the Amendment Act and implementation: Another instance that raises questions regarding the process, is monolithic industrial land use in e-City that afforded it the industrial township status. While the zonal regulations permit residential use and the Chapter XVI-A 364 (B) of the Karnataka Municipalities Act (Government of Karnataka, 1964, p. 869)on Industrial Township recommends a resident member in the council of the Industrial Township Authority, ELCITA was sanctioned since it did not involve any residential areas. It is for the same reason, Whitefield, another IT hub in Bangalore has not been granted this status as it is a mixed-use development.

Conversing with the CEO of ELCITA, we gathered that in the manner of consolidation of territory and granting the industrial township status to e-City, residential land use was consciously excluded while demarcating jurisdiction, resulting in a monolithic single-use fabric. This has led to a ripple effect on the housing real estate outside of its boundary which can be seen as "traces of planning" (Bhan, 2012) beyond the jurisdiction. Though these are pockets of reterritorialized power, their impacts are much beyond its jurisdictions, across sectors of infrastructure, real estate, economy etc.

Access to the township is thoroughfare but controlled. What this means is for those that are permitted it is free access, while hawkers and street vendors are restricted. This approach to decentralisation creates sterile spaces that are heavily controlled, and every enterprise measured and regulated resulting in a private enclave accessible only to its members. Unlike a public authority that provide services to all legal citizens, such enclaves operate on customer basis, including only those who pay for services (Baud and Wit, 2008, p. 19). Not only is this approach exclusive, but contradictory to public nature of the authority, constituted through the Karnataka Municipalities Act.

Violating the 73rd and 74th Constitutional Amendment Act (CAA): While the 12th schedule added under the 74th CAA mentions provision of public amenities as a function of the local body, the civic amenities sites are under the control of the development authority which is a

parastatal. In the case of ELCITA, after KIADB acquired the land and before handing over to ELCIA, the civic amenities sites were sold out. This not only deprived e-City the opportunity to develop public amenities but is illegal for the state controlled KIADB which acquired the land, to dispose it off without consulting the panchayat or municipality under whose jurisdiction the land parcel was located.

Planning carried out by BDA, a parastatal is against the 74th Amendment as the 12th Schedule mentions urban planning and planning of land use as the responsibility of the ULB. Land and development being controlled by a parastatal is also a key reason for no progress in implementing the Metropolitan Planning Committee (MPC) also recommended by the CAA.

Contradictions within constitutional provisions: Article 243Q of the Indian Constitution which mandates the constitution of a municipality in every state, makes the exception for areas notified to be an Industrial Township. The contradiction between Article 243Q and the 74th Constitutional Amendment Act (CAA), exempts areas declared as Industrial Townships from creating a municipal body. Utilising this contradiction within the constitution, in 2003, GoK introduced an Amendment to Karnataka Municipalities Act 1964 (Chapter XVI-A, 364(A) to 364(Q)) which includes the provisions to carve out Industrial Townships as autonomous municipal jurisdictions, governed by an Industrial Township Authority. Under the same provision, e-City jurisdiction was declared as an Industrial Township in 2013 and Electronics City Industrial Township Authority (ELCITA) was created.

Disconnects as outcomes

Disconnects as contradictions against the local setting: Large portion of ELCITA's revenue is property tax, Central Industrial Security Force (CISF) Security fee and water charges. This can be compared to the largest expenses on estate maintenance, municipal functions and security services (ELCITA, 2017). This one-to-one reconciliation of income and expenditure which is ring-fenced within the e-City jurisdiction affords high quality infrastructure and service delivery. Unlike a municipality or panchayat which collects tax under different slabs and redistributes it across the jurisdiction. This limits the financial ability to improve quality of infrastructure and service delivery. ELCITA on the other hand, with its niche industry members is able to shift to digital systems, improving tax collection etc. In addition to the resulting contrast in service delivery and infrastructure quality due to the ring-fenced spending, ELCITA's approach to administration accentuates this contrast, causing a physical disconnect as well as a systemic one. ELCITA promotes "transparency" in its functioning through its "paperless office" and "digital" platform (ELCITA, 2017). Considering majority of its adjacent areas are under rural jurisdiction, for these authorities to interact, this technocratic approach makes it inaccessible and exclusive. The state of exception and notion of an island is strengthened through exclusivity in process, deepening the disconnect.

Functional disconnect: ELCITA through its constitutional provision and legal mandate, is immune to local governance and has no obligation to the civil society. The functions of the Industrial Township Authority of "social development" and "safeguarding interest of weaker sections and improvement of slums" (ELCITA, 2017) do not come into the picture since the e-City jurisdiction is only industrial land use. In order to fulfil its municipal responsibility, it operates under "Corporate Social Responsibility (CSR)" initiatives through ELCIA but not through its own funds. CSR activities include initiatives in healthcare, education, capacity building, sewage treatment etc. in the neighbouring villages (ELCIA, 2014, 2015). These are project-based initiatives as good-will gestures of corporates and not in the true spirit of a

public body. This redefines the accountability an ULB holds towards its citizens since there are no individuals involved but institutions as corporate bodies to negotiate with. Increasing urban character within the majority rural surroundings, shift from agriculture to informal economy (such as drivers, housekeeping staff etc.), change in land use, are some of the changes that can be seen during surveys, as an outcome of such an approach. This has led to disconnects within the adjacent areas, where physical changes are not in complete sync with the demographics and governance, rural by jurisdiction while competing on urban terms.

During the same process, consolidation of territory and devolution of power to build competence through mechanisms such as industrial townships, infrastructure corridors, SEZs, smart city programs etc. "… underscores the importance of political leadership, of the state and other organized actors, both local and supra-local" (Kennedy, 2007). In the ELCITA case, since the autonomous municipal jurisdiction was carved out of two villages, the village panchayats lost control over these areas as well as revenue. In this manner, the power held by the panchayats prior to reconfiguration of jurisdiction was then re-routed through an additional Industrial Township Authority whose purview and interests are bound by the limits of the township. As a result, the neighbouring areas within the megacity are subject to spatial and functional disconnects. Can megacities afford these disconnects and imbalances as a cost to the current approach of decentralisation, given their primacy and growing needs?

(Keil, 1998) suggests viewing the globalised state as altered socio-spatial scales rather than as being replaced by market forces and the local state with perforations, negotiating alternatives to the hegemonic globalisation. In the case of e-City, ELCITA, the local authority is itself a product of hegemonic globalisation, the capitalist forces of the IT industry. Within enclaves such as ELCITA, how can we then perceive the local state as a space empowered for resistance and negotiation?

Discussion

Post economic reforms, role of the state is seen as transformed from a provider to a facilitator and enabler, with increased participation of private actors in service provision (Batley, 1996). (Swyngedouw, 2005) refers to the new modes of governance where administration and implementation is increasingcoply handed over to private economic actors as well as parts of the civil society, as "Governance-beyond-the-State". Though this arrangement is intended to empower grassroots and democracy, on the contrary, it has created new institutions, empowering new actors while disempowering others. The two cases of ELCITA and Smart City can be viewed through this lens, where these new institutions have been given municipal and financial powers respectively, disempowering the local government and altering the dynamic of the megacity Bangalore and its parts.

(Idiculla, 2015) argues that the state cannot be seen as withdrawn from its role as a provider, rather be viewed as in an "alliance" with influential private players. The terms of this alliance between the state and the private players are crucial to understand the impact on decentralised governance and extent to which the ULB is undermined or empowered. Looking at this flow of private capital as "neoliberalism as exception" (Ong, 2006), shows how the economic liberalisation has been more business friendly than market friendly ((Rodrik *et al.*, 2004; Kohli, 2006a, 2006b) cited in (Idiculla, 2015)), illustrating the nature of

this alliance and changing dynamic of the local governments. The state and its agencies have worked towards creating a business-conducive climate, through spatial, legal and infrastructure provisions; to attract capital in the form of IT companies, industries, infrastructure projects, state and central programs etc. These shifts and instances demonstrate how the state itself, has structurally and systematically, dismantled and limited the power of local governments.

The current approach to decentralisation shows devolution of responsibilities and liabilities while the power and funds are still held by the State. This demonstrates forms of "delegation" (Baud and Wit, 2008, p. 9) to parastatals such as the Bangalore Development Authority, semi-autonomous agencies such as ELCITA and SPVs such as the Smart City Mission, which are instances of "Governance-beyond-the-State" (Swyngedouw, 2005). Tasks and funds are power (Eaton, 2001) and to unpack why the current approach of decentralisation has not really devolved power, the "movers and blockers" (Baud and Wit, 2008, p. 10) of the process are critical to the conversation about decentralisation. In the competitive dynamic (Kennedy, 2017) state governments seem to be willingly or unwillingly handing-over reigns to private players and capital; through different policy, financial and legal provisions. The state government through these provisions and new governance models is enabling "enclaves of exception", thereby taking on the role of "movers" of the process. On the other hand, these enclaves of empowered private actors, utilise this state of exception and adopt exclusive approaches, leading to disconnects and eventually limiting and in some instances blocking the process of democratic decentralisation.

In the current governance model of Bangalore, engaging with the question raised by (Schuurman, 1997) where decentralisation could be viewed either as a progressive political stance for people's benefit or a mechanism to ease the presence of capitalism; perforations for resistance (Keil, 1998, p. 617) in the local state (urban and rural local bodies in this case) are important. This will allow people to negotiate and resist the forms and boundaries of these enclaves so that democratic process precedes/guides private interests and flow of capital. As a result, we can view the "local state as linked to the nature of uneven social development" ((Duncan and Goodwin, 1987) as cited in (Keil, 1998)) working towards the benefit of people.

Conclusion

On the institutional front, Ward Committees must be empowered to act the basic units of city planning and administration; with the power to handle local politics. Instituting Metropolitan Planning Committee (MPC) as the clearance authority will help position these enclaves as part of the megacity system to develop a comprehensive vision and plan for the megacity and its parts. Parastatals who are currently involved even developing and delivering service, must limit their activity to developing infrastructure by putting to use their technical expertise and further engage in regular monitoring, evaluation and betterment and advising the local governments. This would not only result in compliance with the provisions of the 12th Schedule under the 74th Constitutional Amendment Act (CAA) but afford ULBs the opportunity to coordinate the city systems considering the growing and changing needs of a megacity.

The 73rd and 74th CAA proposed institutional frameworks such as Ward Committees (WC), Gram Sabhas (GS), District Planning Committee (DPC) and Metropolitan Planning Committee (MPC) along with setting up of Finance Commissions, to ensure integrated-contextual planning and accounting for financial requirements of the municipalities and panchayats. These provisions primarily seek to empower democratically elected local institutions who represent the people and the current approach has resulted in several disconnects. To fulfil the intent of democratic decentralisation and address the disconnects, instituting democratic process for people's engagement, is equally crucial. This requires "enabling conditions" where participation becomes "a means to hold the state accountable through new forms of governance that involve a more direct state-civil society relation" (Cornwall and Gaventa, 2001). While the disconnects as discussed earlier, are detrimental to this process, participation is pivotal in bringing power back into the democratic realm. This will facilitate shifting people's agency from being "users and choosers of services to makers and shapers of policy" (Cornwall and Gaventa, 2001). People can then enter the realm of "public service decision making" through active involvement but this also brings to the fore tension between "disputed identities of consumer, citizen"((Barnes, 1999) as cited in (Cornwall and Gaventa, 2001)). (Barnes, 1999) highlights the possibility of participation itself reinforcing exclusion and co-option by the powerful. In this scenario, it becomes important to discuss the "infrastructure of participation" as articulated by (Shah, 2013) to be able to leverage participation as integral to democratic process. Referring to participation as an opaque word which can be misunderstood as the same and every context, he urges us to understand the forms and mechanisms people have used to mobilise and negotiate power constellations. This also includes recognising and acknowledging the ownership, passages and regulators of access by ways of which participation is legitimised. Therefore, "infrastructure of participation" in addition to empowering local institutions is important to negotiate the shift from "consumers" to active "user involvement" (Barnes, 1999) and bring decision-making back into the public realm thereby paving the way for democratic decentralised governance.

References

Agamben, G. (2005) *State of Exception*. University of Chicago Press.

Aworti, N. (2003) *Getting fundamentals wrong : governance of multiple modalities of basic services delivery in three Ghanaian cities*.

Baindur, V. and Kamath, L. (2009) *Reengineering Urban Infrastructure: How the World Bank and Asian Development Bank Shape Urban infrastructure Finance and Governance in India Note about the authors*. Available at: www.bicusa.org.

Barnes, M. (1999) 'Users as citizens: Collective action and the local governance of welfare', *Social Policy and Administration*, 33(1), pp. 73–90.

Batley, R. (1996) 'Public-private relationships and performance in service provision', *Urban Studies*, 33(4–5), pp. 723–751. doi: 10.1080/00420989650011807.

Baud, I. S. A. and Wit, J. W. de (Joop W. (2008) *New forms of urban governance in India : shifts, models, networks and contestations*. SAGE Publications.

Benjamin, S. (2010) 'Manufacturing Neoliberalism : Lifestyling Indian Urbanity', in Banerjee-Guha, S. (ed.) *Accumulation by Dispossession-Transformative Cities in the New Global Order*. SAGE

Publications India Pvt Ltd, pp. 92–124. doi: 10.4135/9788132105923.n6.

Bhan, G. (2012) *In the Public's Interest: Evictions, Citizenship and Inequality in Contemporary Delhi*. University of California, Berkeley.

Brenner, N. (2013) 'Theses on Urbanization', *Public Culture*. Duke University Press, 25(1), pp. 85–114. doi: 10.1215/08992363-1890477.

Cornwall, A. and Gaventa, J. (2001) *From users and choosers to makers and shapers: repositioning participation in social policy*. No. 127. Brighton.

Duncan, S. and Goodwin, M. (1987) *The local state and uneven development : Behind the local government crisis*. New York: St. Martin's Press.

Eaton, K. (2001) 'Political obstacles to decentralization: Evidence from Argentina and the Philippines', *Development and Change*, 32(1), pp. 101–127. doi: 10.1111/1467-7660.00198.

ELCIA (2014) *Annual Report 2013-2014*. Bangalore.

ELCIA (2015) *Annual Report 2014-2015*. Bangalore.

ELCITA (2017) *The Making of Electronics City Industrial Township*. Bangalore.

Flyvbjerg, B. (2005) 'Machiavellian Megaprojects', *Antipode*, 37(1), pp. 18–22.

Goldman, M. (2011a) 'Speculating on the Next World City', in Roy, A. and Ong, A. (eds) *Worlding Cities: Asian Experiments and the Art of Being Global*. 1st edn. Blackwell Publishing, pp. 229–258.

Goldman, M. (2011b) 'Speculative Urbanism and the Making of the Next World City', *International Journal of Urban and Regional Research*, 35(3), pp. 555–581.

Government of Karnataka (1964) *The Karnataka Municipalities Act*.

Government of Karnataka (2009) *State Policy for Special Economic Zones*.

Government of Karnataka (2011) *Information and Communications Technology Policy*. Available at: https://www.investkarnataka.co.in/policies.

Government of Karnataka (2016) *Karnataka Industrial Policy (With Amendments) 2014-2019*.

Graham, S. and Marvin, S. (2001) *Splintering Urbanism*. Routledge.

Harvey, D. (1996) 'Cities or urbanization?', *City*, 1(1–2), pp. 38–61. doi: 10.1080/13604819608900022.

Harvey, D. (2000) 'MEGACITIES LECTURE 4: Possible Urban Worlds'. Amersfoort: Twynstra Gudde Management Consultants, p. 124. Available at: https://www.kas.de/c/document_library/get_file?uuid=1463ff93-1eab-8877-edfc-ccef8540c262&groupId=252038.

Harvey, D. (2003) *The New Imperialism*. Oxford: Oxford University Press.

Idiculla, M. (2015) 'Crafting City Spaces : New Spatial-Legal Regimes in India', in *RC21 International Conference on "The Ideal City: between myth and reality*". Urbino, Italy.

Keil, R. (1998) 'Globalization makes states : perspectives of local governance in the age of the world city', *Review of International Political Economy*, 5(4), pp. 616–646.

Kennedy, L. (2007) 'Regional industrial policies driving peri-urban dynamics in Hyderabad , India', 24(2), pp. 95–109.

Kennedy, L. (2017) 'State restructuring and emerging patterns of subnational policy-making and governance in China and India', *Environment and Planning C: Politics and Space*, 35(1), pp. 6–24.

Kohli, A. (2006a) 'Politics of Economic Growth in India, 1980-2005, Part I: The 1980s', *Economic and Political Weekly Political Weekly*, 41(13), pp. 1251–1259.

Kohli, A. (2006b) 'Politics of Economic Growth in India, 1980-2005, Part II: The 1990s and Beyond', *Economic and Political Weekly*, 41(14), pp. 1361–1370.

Luxemburg, R. (1951) *The Accumulation of Capital*. London: Routledge & Kegan Paul.

McKinsey Global Institute (2001) *India: The Growth Imperative*.

McKinsey Global Institute (2010) *India's urban awakening: Building inclusive cities, sustaining economic growth*.

Ministry of Urban Development (2015) *Smart City Mission Statement & Guidelines*. Available at: http://smartcities.gov.in/upload/uploadfiles/files/SmartCityGuidelines(1).pdf.

Ministry of Urban Development (2016) *The Smart City Proposal*.

Ong, A. (2006) *Neoliberalism as exception : mutations in citizenship and sovereignty*. Duke University Press.

Ong, A. (2011) 'Introduction: Worlding Cities, or the Art of being Global', in Roy, A. and Ong, A. (eds) *Worlding Cities: Asian Experiments and the Art of being Global*. 1st edn. Blackwell Publishing, pp. 1–26.

Rodrik, D. *et al.* (2004) *From Hindu Growth to Productivity Surge: The Mystery of the Indian Growth Transition; Dani Rodrik and Arvind Subramanian; IMF Working Paper 04/77; May 1, 2004*.

Sampat, P. (2010) 'Special Economic Zones in India: Reconfiguring Displacement in a Neoliberal Order?', *City & Society*, 22(2), pp. 166–182. doi: 10.1111/j.1548-744X.2010.01037.x.

Schmitt, C. (1985) *Political theology : Four chapters on the concept of sovereignty*. University of Chicago Press.

Schuurman, F. J. (1997) 'The Decentralisation Discourse : Post-Fordist Paradigm or Neo-liberal Cul-de-Sac ?', in Kay, C. (ed.) *Globalisation, Competitiveness an Human Security*. London: Frank Cass, pp. 150–167.

Shah, N. (2013) 'Do we overestimate the potential of the Internet for participation and democracy?' Available at: https://www.youtube.com/watch?v=YD8BV84y30E.

Smith, N. (2002) 'New Globalism, New Urbanism: Gentrification as Global Urban Strategy', *Antipode*. John Wiley & Sons, Ltd (10.1111), 34(3), pp. 427–450. doi: 10.1111/1467-8330.00249.

Swyngedouw, E. (2005) 'Governance innovation and the citizen: The Janus face of governance-beyond-the-state', *Urban Studies*, 42(11), pp. 1991–2006. doi: 10.1080/00420980500279869.

Tantri, M. L. (2014) *Promises and Paradoxes of SEZs Expansion in India*. 331. Bangalore.

The Hindu (2012) 'ELCIA to resist move to bring Electronics City under BBMP'. Available at: https://www.thehindu.com/news/cities/bangalore/elcia-to-resist-move-to-bring-electronics-city-under-bbmp/article3713830.ece.

United Nations (2018) *The World's Cities in 2018*. doi: 10.18356/c93f4dc6-en.

Watson, V. (2014) 'African urban fantasies: Dreams or nightmares?', *Environment and Urbanization*. SAGE Publications Ltd, 26(1), pp. 215–231.

Case Study Paper

Preparation of the National Urban Policy Framework

Practical point of view

SIMKUTE, Z; Lithuania

Abstract

In the end of 2018, The Ministry of Environment of the Republic of Lithuania released a third draft or Lithuanian Urban Policy Framework (LUPF). The document is still reviewed by the National government and relevant stakeholders. Official approval is pending. Efforts to prepare such a document started in 2008 but were unsuccessful. Latest draft of LUPF was based heavily on the International guidelines of urban and territorial planning (IG-UPT), New Urban Agenda, Agenda for Sustainable development 2030 and reacted to the IPCC report published in the end of October 2018. The Goal of LUPF was to create the value basis and precondition for inter-institutional, cross-sectoral cooperation between different administrative levels and stakeholders in order to achieve sustainable urban development. The LUPF was not supposed to be a vision, nor it was supposed to become a toolbox of development guidelines. The document was a basis to restart a planning culture in a country that historically has a difficult relationship with it. It was intended to be a document defining relationships between stakeholders who directly or indirectly impact development decisions no matter how powerful they are or what sector they present. Prepared proposal is not a final document and is intended to be a live framework that must be updated and reviewed in a circular way. This paper will review the preparation process, structure and the content of the document. Paper will conclude with a list of questions that still need to be answered and advice to countries and cities who are planning to prepare such a document in the future.

Keywords

National urban policy framework, planning culture, urban governance

1. Towards an urban policy framework - two failed attempts and one pending

The proposals for the Lithuanian Urban Policy Framework have been prepared in 2018 after recognizing the need to holistically look at the development of urbanized and urbanizing areas, considering the value of culture, existing and planned infrastructure, harmony between nature and heritage.

There were two big efforts before to prepare such an urban policy (in 2009 and 2016) which were both unsuccessful. First attempt might have failed due to an introvert preparation process, while second attempt focused too much on specific territorial planning problems failing to see the bigger picture of Lithuania in the global context of development challenges.

Thus, a decision was made in 2018 to step back and take a deeper look at what is really needed to be successful on the third attempt.

1.1. First attempt

The issue of the National Urban Policy Framework (or Urban Agenda) for the Republic of Lithuania was first raised in 2007, during the first Lithuanian Urban Forum. The Resolution of the Forum states "The current situation of urban development in Lithuania raises legitimate concerns for the professional and civil society. It is necessary to formulate a new type of urban policy oriented towards sustainable development and quality of life, which respects private property and at the same time gives directions and guidelines for urban development in Lithuania."

In 2009, a draft of Lithuanian urban policy framework was prepared. It was reviewed by the National Government but not approved. The formal reason for which was that the document did not meet the legal requirements for the structure and language in which such a document should be prepared. Looking retrospectively, it might have had something to do with the fact that although the policy draft was contracted from a group of respected planning specialists, it was prepared in isolation without involvement of either governmental institutions, professional networks, academia or civil society.

1.2. Second attempt

In 2016, after the annual Lithuanian Urban Forum, a resolution was drafted which initiated the preparation of Lithuanian Urban Charter. The resolution states "Following the global and European trends, the knowledge of ten-year urban Forums could become a base of the Lithuanian Urban Charter – Lithuanian Urban Development Guidelines by 2030, which would set the main goals of urban development, housing, strategy and would include urban terms adopted by the EU."

In the end of 2016, the Ministry of Environment of the Republic of Lithuania initiated the creation of the Lithuanian Urban Charter preparation group. This group was made of representatives from the ministry, academia, professional community and young planners' network. At the beginning of the year, different stakeholder groups were invited to the meetings of the working group to discuss the issues of urban development in Lithuania. Based on the reflections collected in these meetings, Ministry prepared an outline for the Lithuanian Urban Charter which was presented during the 11th Urban forum in the autumn of 2017.

The outline for the Charter provided an overview of the problems of urbanized territories and gave preliminary suggestions how urban development should move forward/how these problems could be solved. The biggest challenge of this outline was that the problems defined in the meetings were very specific to specific stakeholder groups. These required solutions that are as specific as the problems themselves. **Charter become a checklist of problems with specific solutions rather than becoming a document of guiding value-based principles and tool for cooperation** which was named as one of the major problems stopping urban areas to develop in a sustainable way. On the other hand, unlike the first

attempt, the process to prepare the Urban Charter was open to different stakeholder groups and their opinions and suggestions shaped the document.

1.3. Third attempt

In summer of 2018 the Ministry of Environment commissioned the preparation of "Proposals for the Lithuanian Urban Policy" (LUP). The firm chosen for the job was our young urbanism-architecture office that was involved in the working group of the Urban Charter. Thus, began the process which is the key topic of this Case Study paper.

2. Context of Lithuania

2.1. Status quo

Figure 1 Location of Lithuania (LT) in Europe

To understand better Lithuanian Urban Policy Framework and why it is the way it is, it is important to understand several key facts about the country its culture and mentality of Lithuanians.

Lithuania is a small, post-socialist country with a population of less than 3 million people in in Eastern Europe (Figure 1). Since country restored its independence from Soviet Union in 1990, it has been developing fast. On May 1st, 2004 Lithuania became part of the European Union. As a new member, country got access to EU structural funds that were used to improve, transport, communications and social infrastructure, upgrade public spaces, increase productivity of agriculture and industries and other. European investments

contributed heavily in the growth of the economy and improvement of quality of life. Being a member of EU also resulted in an opportunity for people to move freely for work, education or leisure to other EU countries. Between 2004 and 2017, more than 600 000 people emigrated from Lithuania, around 100 000 only between 2004 and 2005 (European migration network, 2019). According to the department of statistics, 67% of people in Lithuania live in urban areas. Average population density in the country: 4,.08 persons/square kilometre. Due to internal and external migration, most concentrate in big cities while regions end up shrinking. While most of the population lives in apartment blocks, most development is happening in suburban belts around cities.

Country is mid-way to prepare the National General Plan. Current state analysis of the plan concluded seven major problem areas for the country that are related to human resources, economic activity, unsustainable urban development patterns, environmental pollution and conflicts of interest in costal, boarder and natural areas.

2.2. Post-socialist baggage

After the Second World War, while western countries developed their planning culture, explored best ways to meet society's needs, Lithuania was part of the communist bloc. Here, progress was slow, and times were unpleasant. 50 years of occupation left its mark in the history, in the shape of cities, in behaviour and culture of society.

The five-year plans guided development in the Soviet Union. They defined what was to be produced and therefore what conditions are needed for this production and therefore how cities look like and function. Every aspect of life of people was planned: what people do, how they move, where they live, how they live, what they work, where they learn, how they spend their leisure. Planning and architecture were perfect tools to realize political agendas, implement the five-year plans and control societies.

In 1990 Lithuania restored its independence. There was a lot of anger and natural rejection of the old system and many attributes associated to it. Statues of Stalin and other soviet heroes fell, were destroyed or were taken to landfills, many nationalized industrial sites were abandoned. People of an independent Republic could finally choose where and how to live.

Although zoning plans remained as the main tool to control urban development, territorial planning efforts gave little or no direction. “Lithuanian cities underwent big transformations which frequently took place without any clear strategy or masterplans” (Bardauskiene, D, 2007).

Contemporary post-socialist has been going through a complex transitional period from Socialist Ideology to a free market-oriented economy. Orientations to private funds and a more global neo-liberal approach to planning is common to the whole of Europe, but the process is gradual, (Newman & Thorneley 1996) while Eastern cities are going through a ‘Shock therapy” (Smith 2007) period. The collapse of Communist state meant that all policies and attitudes had to be changed or revised in a matter of years. The new law of territorial planning on an independent Republic was adopted in 1995. General tendency for cities was to plan for growth, for private car, for private house, for shopping malls. Throughout

independence period, sprawl, big scale commercial developments, reduced quality of public space and automobilization become dominating patterns of a contemporary Lithuanian city.

Socialist period made a huge damage for planning culture in Lithuania and probably other countries of the former Soviet bloc. After being oppressed for 50 years society nobody, especially national government should restrict people achieving their personal ambitions. Planning with common good in mind was "the thing of the past". Every person got an opportunity fight for their own rights, their own land, their own wellbeing, private land is untouchable.

This change in mentality is crucial to consider when talking about why the proposal for the LUPF focuses on recreating planning culture rather than on the vision for development and sustainable development guidelines and why this proposal as well might be rejected.

3. Process of preparing the proposal for the National Urban Policy Framework

A contemporary country with growing economy, beautiful nature and cultural heritage but low capacities of cooperation between sectors and institutions, imitation of procedures for stakeholder involvement but an enormous potential of a well educated innovative society took a step for the third time to prepare a document that was no longer development guidelines but a "relationship contract" for sustainable urban development.

Proposal for the Lithuanian Urban Policy Framework **aims to create a flexible framework and a prerequisite for inter-institutional, cross-sectoral cooperation between different levels of administration with a view to the sustainable development of urban areas.**

Document emphasizes on the role of territorial planning for sustainable urban development. Territorial planning is seen as a tool to create conditions for democracy, equity, prosperity, adaptation to climate, economic and social changes.

Proposal for LUPF is NOT: a development vision, a set of development guidelines, rules for territorial planning or a planning document of some sort as it is defined in Lithuanian legal system.

The preparation process was divided into two parts: Analysis of international and local documents and relevant cases and definition of the guiding themes, the structure and content of the document

Final document is composed of three interconnecting sections: Directions (1), roles and responsibilities (2) and implementation and monitoring measures (3). LUPF defines four themed directions (1) that local and national governments and relevant stakeholders should follow to ensure Sustainable development of Lithuanian urban areas.

Four directions: Mitigation of climate change impacts and resilience to climate change; Synergy and strengthening of urban links; Liveability and social equity and sustainable spatial development. Roles and responsibilities (2) for National and local governments and relevant stakeholders were prepared reusing and localizing most of the recommendations from the IG-UTP. This section defines roles of each interest group in the implementation of the value driven directions for sustainable urban development. Last part – implementation and

monitoring (3) – is a part where suggestions are given to how to start the implementation of guidelines and responsibility division. This part consists of four sections: Monitoring and evaluation of sustainable development; Participatory decision-making process; Partnerships and Capacity Building.

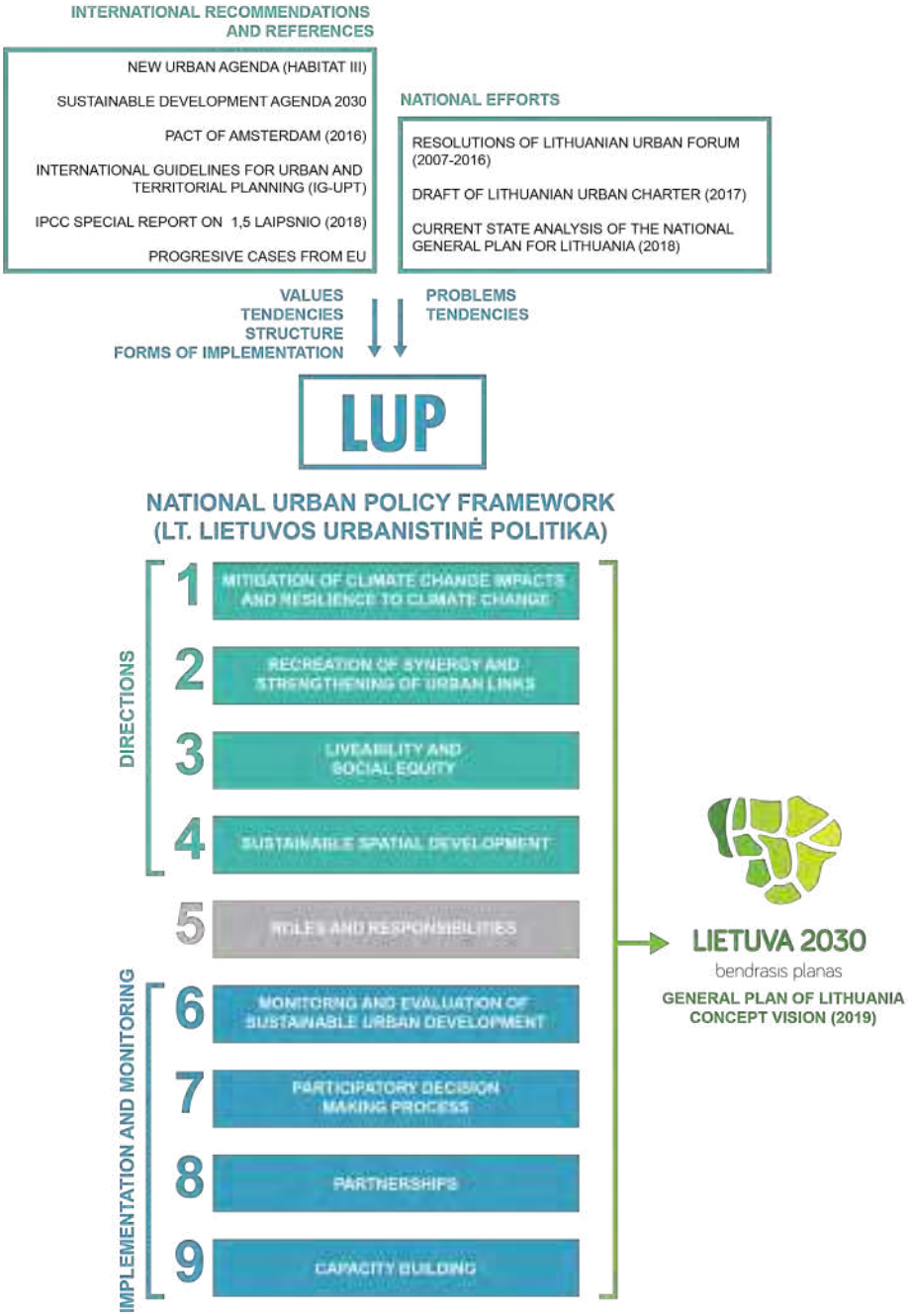


Figure 2 LUPF methodology

3.1. Preparation process

The process started with an in-depth review of international recommendations, Lithuanian strategies and policies connected to the object of the LUPF and previous attempts to prepare urban policy framework and finally bring everything into a coherent, easy to understand value-based document.

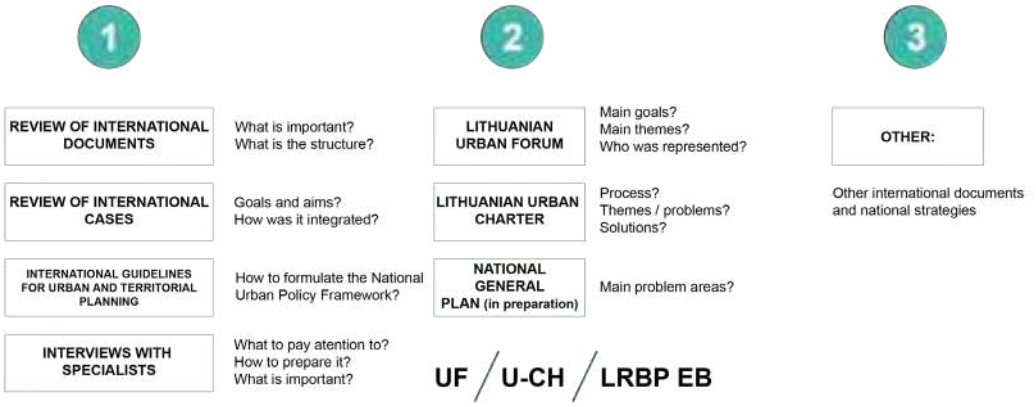


Figure 3 LUPF analysis methodology

3.1.1. Analysis of international recommendations and references

First step of the analysis was to analyse international documents related to sustainable urban development that included: Sustainable development agenda 2030, New Urban Agenda, Pact of Amsterdam, European Urban Charter, Leipzig Charter. These documents provided a better understanding of possible structure of the document, how to formulate ideas and what themes are important to consider.

International Guidelines on Urban and Territorial Planning (UN Habitat, 2015), *International Guidelines on Urban and Territorial Planning (IG-UTP) Handbook* (UN Habitat, 2018) and *National Urban Policy: A Guiding Framework* (United Nations Human Settlements Programme, 2015) were key documents, from where a lot of concepts and ideas were reused and localized to Lithuanian context. These are truly most useful sources that have bulletproof structures and logic that cover complex concepts.

Three cases chosen for reference analysis were: Agenda Stad (2017), Project Ireland 2040 (2016) and Sustainable development agenda of Estonia (2015). Agenda Stad is concept adapted in the Netherlands in 2017 that aims to encourage economic growth, living quality and innovations by encouraging collaboration between cities to solve urban challenges. Agenda Stad proposes to create partnerships between cities and regions called “City deals”. These partnerships are based on development themes such as new economy, adaptation to climate change, attraction of talents and circular cities. This document inspired to include possible partnership themes in the proposals for LUPF as one of implementation measures. The National Planning Framework and its National Strategic Outcomes and priorities of the National Development plan “Project Ireland 2040” gave an overview of how country that as Lithuania faces problems of shrinking urban regions, define their priorities and development goals. This document inspired to look deeper into possible relationships between urban and rural areas in Lithuania. Sustainable development agenda of Estonia was a case from a neighbouring country with similar history as Lithuania. This document inspired to look further into how country views local challenges of emigration, preservation of local culture and global challenges of adaptation to climate change.

3.1.2. Analysis of Local documents

Second step was to form informative conclusions from the previous efforts to prepare the national urban policy and understand better evolution of problematics that was used in Lithuanian urban forums between the years 2007 and 2017.

Analysis showed that same topics concern planners in Lithuania for more than ten years and yet there is no solution for these problems (poor inter-institutional collaboration, poor cross-sectorial problem solving, uncontrolled, fragmented urban development etc.). This showed that yet another attempt to define problems that were discussed among planners for 10 years in the form of a draft for Lithuanian Urban charter, was not a solution. As explained previously, the second attempt to prepare the national urban policy was concentrating on collecting ideas from relevant stakeholders and the document ended up as a checklist specific of problems with specific solutions, solving which will not tackle systematic problems with urban planning and urban development. These observations helped build a stronger argument that development guidelines or sustainable development toolbox is not a for a country that needs a reboot of a planning culture in general.

3.2. Directions

The selection of direction was a back and forth process. First suggestions for directions focused on the triad of sustainable development: social, economic and environmental aspects. It was later decided that as sustainable development is not a divisive concept and any topic should consider all three aspects of the triad at the same time, therefore it is not a good idea to separate directions into these three topics. Directions in the proposal for LUPF are understood as aspects to be considered while making national or local spatial development decision. At the same time any decision should inherently be aiming for sustainability (social, environmental and economic at the same time).

Proposal offers four directions:

3.2.1. Mitigation of climate change impacts and resilience to climate change

Direction suggest guiding sustainable development in a way that would help mitigate climate change impacts and increase resilience to climate change effects. It calls for ambitious actions to implement decarbonization measures in all sectors, reduce consumption, get ready for extreme events in order to ensure provision of essential services in case of an natural disaster.

3.2.2. Recreation of synergy and strengthening of urban links

Direction suggest looking at urban and rural areas as urban regions: territories that are associated with urban centre by energy provision, goods distribution networks, people commuting to work, water and waste management. It is emphasised on the necessity to create synergies between urban and rural areas, to collaborate and complement each other, share resources. It is encouraged to use territorial planning as a tool for creating conditions for territorial cohesion, reducing ecological footprint, encouraging circular economy.

3.2.3. Liveability and social equity

Strong communities are essential for liveability of urban areas therefore direction suggests creating conditions for community development, economic opportunities for small and social business, creation of possibility to consume culture and preserve tangible and intangible cultural heritage.

3.2.4. Sustainable spatial development

Direction emphasises on spatial aspects of urban development and is divided in four sub-sections: Accessibility to housing, sustainable mobility, engineering services and public spaces. Emphasis is placed on creation of compact environments, effective use of resources, accessibility to water and sanitation, monitoring of housing provision, encouragement of public-private initiatives to upgrade public spaces.

3.3. Roles and responsibilities

The implementation of Lithuanian urban policy framework will require inter-institutional, cross-sectoral co-operation and an inclusive decision-making process. LUPF encourages to look at urban development beyond the administrative boundaries, to look at urbanized and urbanizing territories holistically in order to achieve systematic changes.

IG-UTP (2015) is an irreplaceable source of definitions of different roles and responsibilities for five main groups that directly or indirectly effect urban development: National institutions, Local administration, Professionals and professional organizations, Civil society and NGOs. A fifth group (academic society) was added to the list.

Essential aspect about this section that each group gets a definition of their role and responsibility in urban development and within these rules and responsibilities they relate to other groups. For example, Local administration should encourage access to decision making for the civil society, while civil society should actively participate in the planning process. In this way, a network of interlinked participatory process is created.

3.4. Monitoring and implementation

Last section of the LUPF is composed of four sections: Monitoring and evaluation of sustainable urban development; Participatory decision-making process; Partnerships and Capacity building.

3.4.1. Monitoring and evaluation of sustainable urban development

Throughout the preparation process of the LUPF it became evident that there is a gap in knowledge of how cities are developing. It was impossible to say if cities were developing in a compact way or not as there was no data to support it, no measurable definition with indicators. One could only make conclusions from observation and they would be correct. This section calls for definitions of what sustainable development is and measurable indicators to monitor it.

It is suggested to start with a perception questionnaire to understand better how cities perceive their own plans, what concepts are unfamiliar to them or where most misunderstanding lies.

3.4.2. Participatory decision-making process

Proposals for LUPF highlights the importance of inclusion for urban development. Successful implementation of the LUPF requires openness and the involvement of stakeholders and communities. Inclusion methods require continuous development and maintenance of a community. Section brings attention to the fact that it is common that civil society lack skills to give informed opinions about technical documents therefore it is essential to create conditions of involvement in a language and media different people could understand and respond to. Moreover, it outlines rules for participatory process: consistency, feedback, respect for time and knowledge, understandable media, establishment of common ground and transparency which are essential for a dialogue.

3.4.3. Partnerships

LUPF suggests establishing voluntary engagement partnerships between state, municipal institutions, business representatives' professional associations, NGOs and academic community. Partnerships could be a great way to start sharing experience between cities. It is suggested to create cross-sectoral partnership themes which would bring a more diverse stakeholder group to the table.

3.4.4. Capacity building

Last section of the LUPF emphasises on the need to raise competence of all actors involved in the urban development process. It is focused on administrative and organizational skills, learning about innovative planning methods and systematic thinking. All of which is essential for a constructive dialogue between different institutions and representatives of different specialist fields.

3.5. LUPF as a system

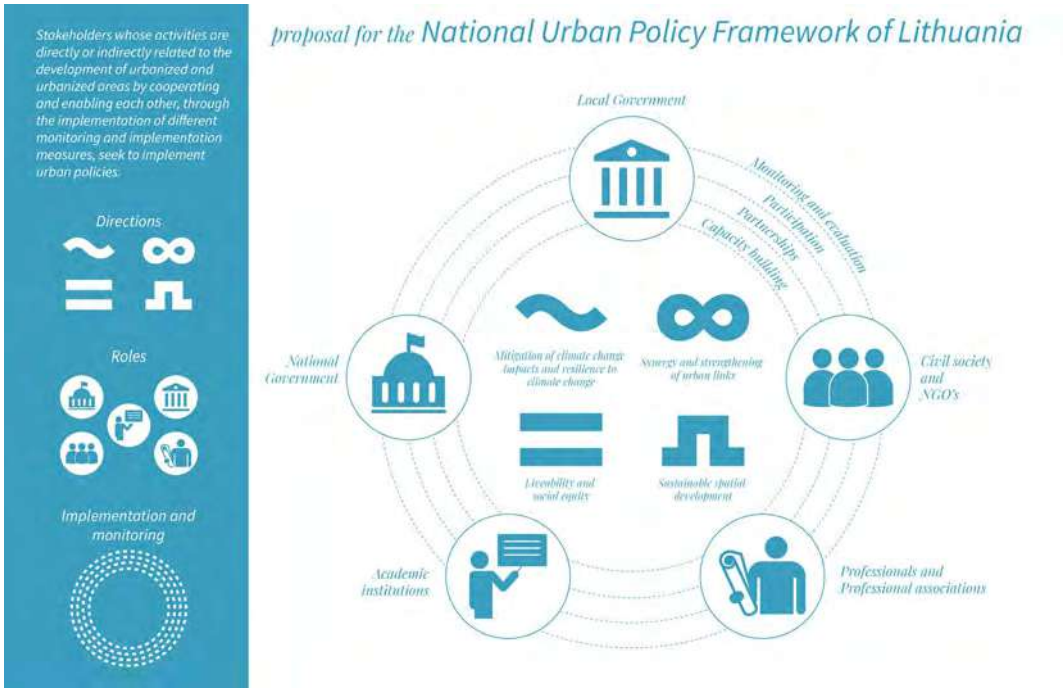


Figure 4 Structure of the Lithuanian Urban Policy Framework

Directions, roles and implementation and monitoring measures are a part of a LUPF system. One part cannot work without the other. The logic of the structure is that LUPF directions for sustainable development can only be achieved if all stakeholder groups work together in implementing, monitoring, sharing knowledge through partnerships, and building their capabilities.

4. Conclusions

The case of Lithuanian Urban Policy Framework is an example of an attempt to organize a system of collaboration, create a base for the National tradition of planning. Although there is a great amount of knowledge and valuable experiences to learn from, localizing logical, sustainable, time proven directions is not an easy task. It makes it even more complex if the culture is resistant to accept necessity to plan in a collaborative way. There is a need for a flexible process, a multi-disciplinary language that is necessary not only to adapt knowledge and good experiences but also to create a new one.

4.1. Reuse and adapt

Although there is a tremendous amount of immensely valuable recommendations prepared by international planning society that could just be translated and used, in countries like Lithuania, that does not have a strong planning culture, direct implementation would mean making a leap in knowledge of how urban areas should develop and there is resistance to making this leap. Therefore, it is an interest of us to share our experience and discuss with fellow planners on how to deal with these issues and integrate international knowledge locally.

4.2. Establish a base before defining development guidelines

Original ambition of the Ministry was to prepare guidelines for urban development. Document was intended to become a toolbox of general truths about urban development concentrating spatial aspects of the city: compact city development, sustainable mobility, quality of public spaces. Soon into the process it become evident that such guidelines are necessary, and they should be further elaborated based of the overall development vision for Lithuanian cities which was to be outlined in the new comprehensive plan for the territory of Lithuania. Preparing development guidelines before the National development vision would be counterproductive as process for generating a vision and further development guidelines requires a very different process that what was planned for this document. What was clearly missing before starting to work on a vision, was a urban policy framework - a value base that defines general directions and relationships between different groups involved in urban development.

4.3. Connect policy with something of national importance

Proposal for LUPF got more weight because it was connected to the preparation of the new General Plan of Lithuania. Original intention was to include different aspects of the policy to the development of the vision for Lithuania 2030. In this way, valuable aspects from the policy become part of a legal document that will guide development for upcoming 11years.

5. References

Bardauskiene, Dalia (2007) “Miesto bendrasis planas ir ekspertiniai vertinimai”, Town Planning and Architecture, XXXI tomas, Nr 3

Thorney, Andy; Newman, Peter. Urban Planning in Europe: International Competition, National Systems, and Planning Projects. Routledge, 1996.

Smith, Adrian. Articulating neoliberalism: diverse economies and everyday life in ‘postsocialist’cities. Contesting neoliberalism: Urban frontiers, 2007, 204-222.

UN-HABITAT (2015). International guidelines on urban and territorial planning.

UN-HABITAT (2018). International Guidelines on Urban and Territorial Planning (IG-UTP) Handbook.

Ministry of Environment of the Republic of Lithuania, Živilė Šimkutė (2018) “Pasiūlymai Lietuvos urbanistinei politikai”. Retrieved from: www.urbanistinechartija.lt

Agenda Stadt (2018). Retrieved from: https://agendastad.nl/

Project Ireland 2040 (2018). Retrieved from: https://www.gov.ie/en/policy/project-ireland-2040-policy/

Estonian Commission on Sustainable Development (2005) Sustainable Estonia 21, Estonian Ministry of the Environment, 2005.

All illustrations were prepared by the author of the paper.

Participation in the congress is supported by the by the Lithuanian Council for Culture

LITHUANIAN COUNCIL FOR CULTURE

Case Study / Project

Un-planning the Metropolis

Urban Transformative Capacity as a Transdisciplinary Heuristic and Disruptive Sustainability Strategy

Marc WOLFRAM

Abstract

Transforming urban areas and processes represents a core challenge and necessity for shifting current development pathways at all scales towards sustainability (UN, 2016; Acuto et al., 2018; CitiesIPCC, 2018). While empirical insights into the transformation dynamics of sectoral and/or geographically delimited socio-technical and social-ecological systems have multiplied over the past decade, very little is known so far about the particular dynamics of urban transformations i.e. deep and radical shifts in the interdependent cross-scale configurations of multiple complex systems including e.g. water- energy- and food provision as well as transport, housing, production and consumption. Approaches to conceive of and practically shape such highly complex and uncertain processes are therefore dearly needed (Elmqvist et al., 2018; Frantzeskaki et al., 2016; Webb et al., 2017; Wolfram et al., 2017).

This presentation takes up this question of what can help or hinder cross-scale systemic urban change by discussing the concept of urban transformative capacity (Wolfram et al., 2019) - a relational form of power resulting from particular forms of agency and interactions in a given institutional and spatial-material setting. Drawing on recent empirical and conceptual contributions, it reflects specifically on the utility of this lens to enhance critical knowledge co-production processes and help the shaping of new coalitions and strategies for addressing urban transformations in practice. Urban transformative capacity thus opens up novel perspectives for deep systemic change within and beyond the metropolis through dismantling path-dependencies and supporting emergence i.e. un-planning: It provides both a heuristic tailored to guide the transdisciplinary exploration of barriers and drivers in multi-system reconfigurations, and a framework for deriving actions that enable desirable transformations while preventing undesirable ones or lock-in.

Four entry points are highlighted as key to trigger the development of urban transformative capacity in practice:

1) Adopt novel transdisciplinary self-assessment techniques for transformative capacity,
2)Foster inclusion and empower deviant agency and its diversity;
3) Close the intermediation gap and partner with local academia working on sustainability,
4) Challenge and reinvent formal and informal urban planning institutions and practices.

References:

Acuto, M., Robin, E., Lane, S., 2018. Interim report of the Nature Sustainability expert panel (UCL city leadership lab report). University College London, London. CitiesIPCC, 2018. Global Research and Action Agenda on Cities and Climate Change Science. Cities and Climate Change Science Conference.

Elmqvist, T., Bai, X., Frantzeskaki, N., Griffith, C., Maddox, D., McPhearson, T., Parnell, S., Romero-Lankao, P., Simon, D., Watkins, M. (Eds.), 2018. Urban Planet: Knowledge towards Sustainable Cities, 1st ed. Cambridge University Press. https://doi.org/10.1017/9781316647554

Frantzeskaki, N., Coenen, L., CastÃ¡n Broto, V., Loorbach, D. (Eds.), 2016. Urban Sustainability Transitions, Routledge Studies in Sustainability Transitions. Routledge, New York. In Press. UN, 2016. New Urban Agenda (No. 71/256). UN General Assembly.

Webb, R., Bai, X., Smith, M.S., Costanza, R., Griggs, D., Moglia, M., Neuman, M., Newman, P., Newton, P., Norman, B., Ryan, C., Schandl, H., Steffen, W., Tapper, N., Thomson, G., 2017. Sustainable urban systems: Co-design and framing for transformation. Ambio. https://doi.org/10.1007/s13280-017-0934-6 Wolfram, M., BorgstrÃ¶m, S., Farrelly, M.A., 2019. Urban transformative capacity: From concept to practice. Ambio 48. https://doi.org/10.1007/s13280-019-01169-y

Wolfram, M., Frantzeskaki, N., Maschmeyer, S., 2017. Cities, systems and sustainability: Status and perspectives for research on urban transformations. Curr. Opin. Environ. Sustain. 18-25. https://doi.org/10.1016/j.cosust.2017.01.014

ISOCARP
Knowledge for Better Cities

IKATAN AHLI PERENCANAAN INDONESIA IAP