Research Paper

Multi-scale Spatial Layout Structure System

Experiences of Shanghai Mega City Spatial Planning

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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.

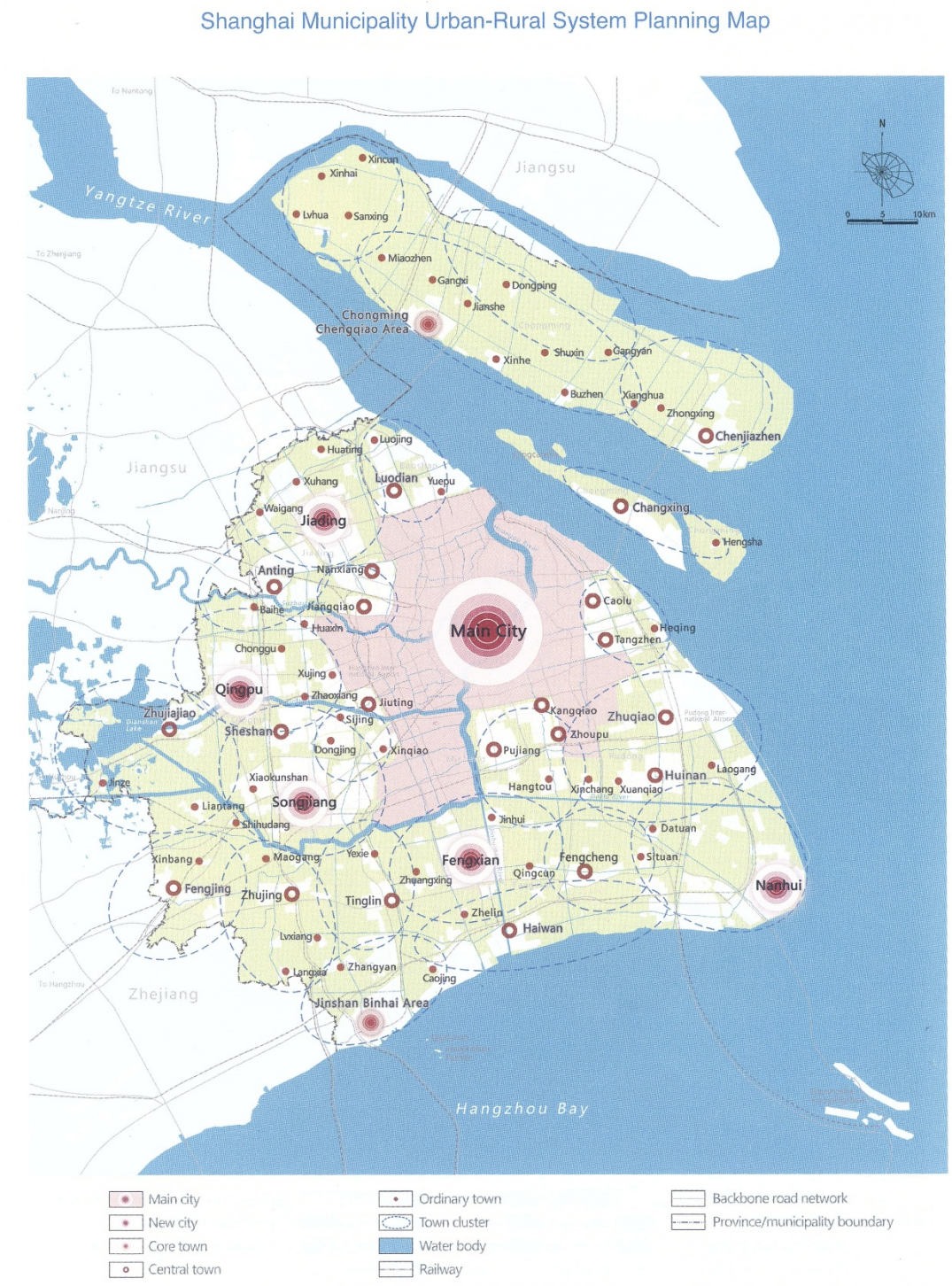

Figure 1: Shanghai Municipality Urban-Rural System Planning Map

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

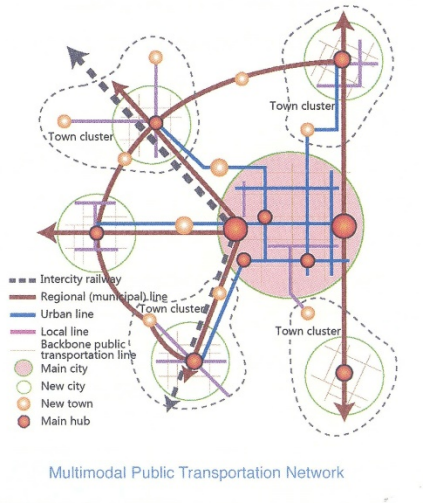

Figure 3: Multimodal Public Transportation Network

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).

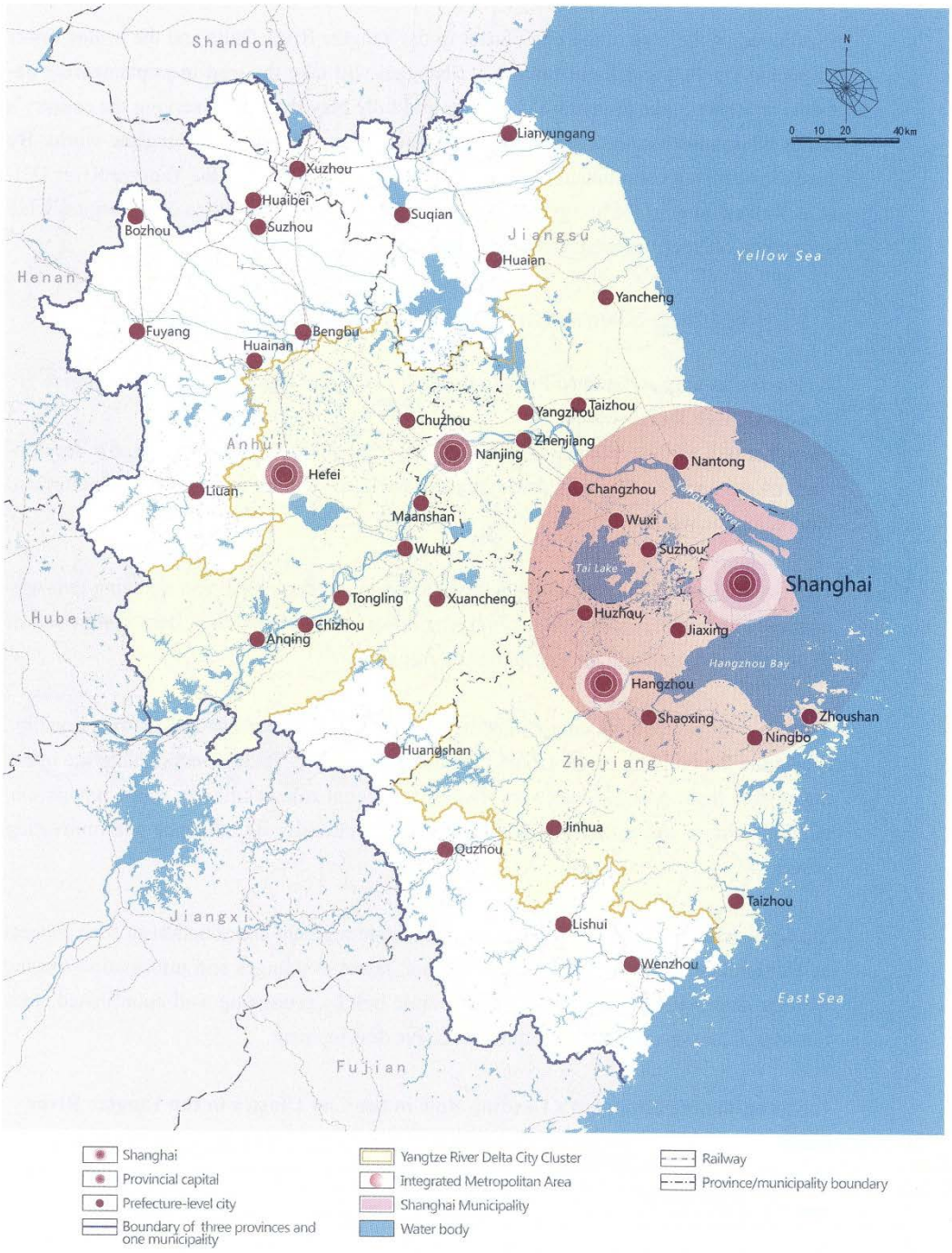

Figure 4: Shanghai Municipality Location Map

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.

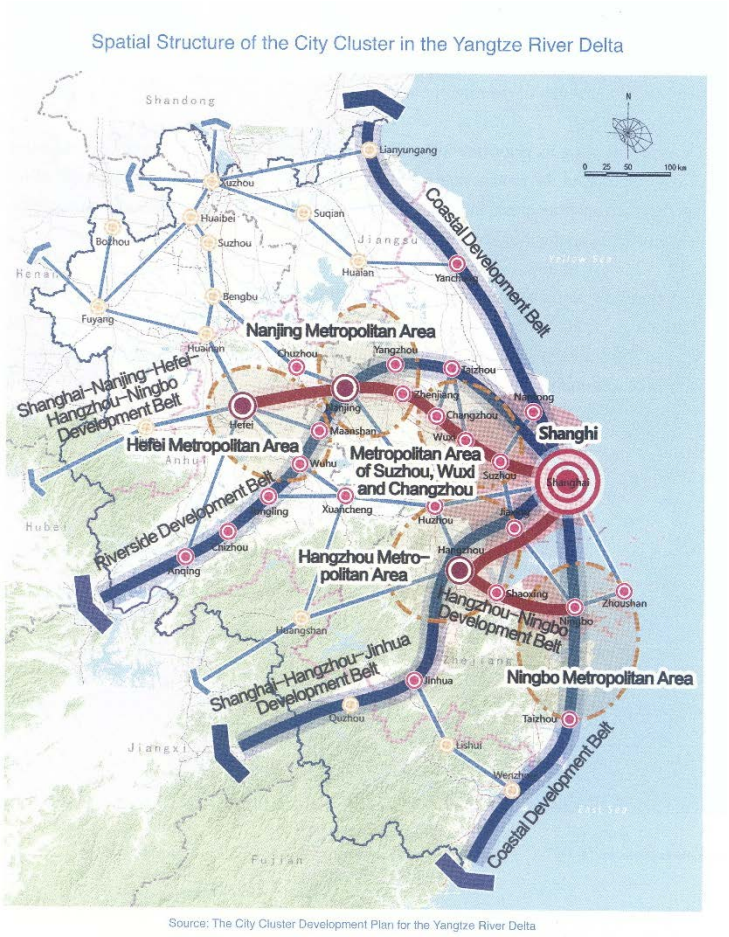

Figure 5 Spatial Structure of the City Cluster in the Yangtze River Delta

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).

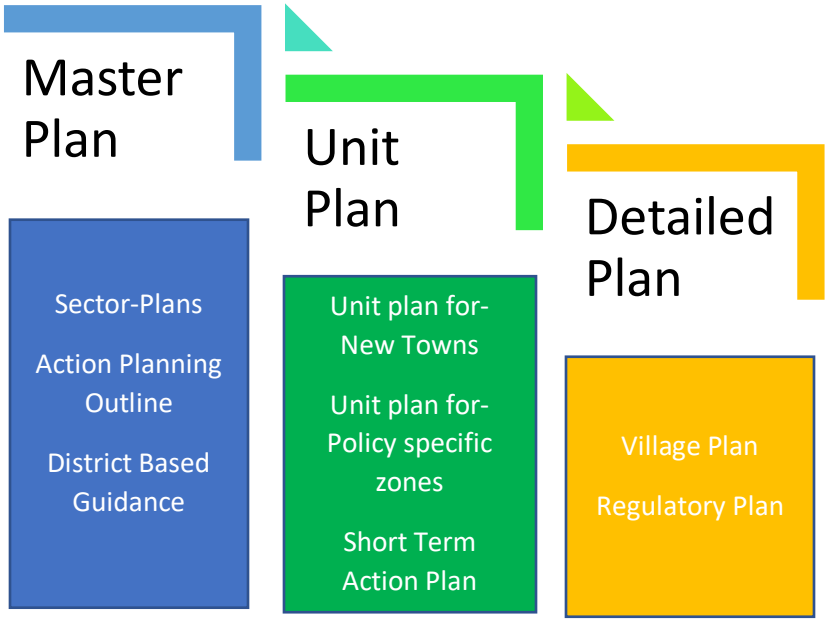

Figure 6: Multi-level plans in planning Implementation process

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.

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