

Research Paper

RESEARCH ON THE BUILD OF A HEALTHY WALKING SYSTEM FOR URBAN CBD

A Case Study of Jiangbeizui CBD in Chongqing, China

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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

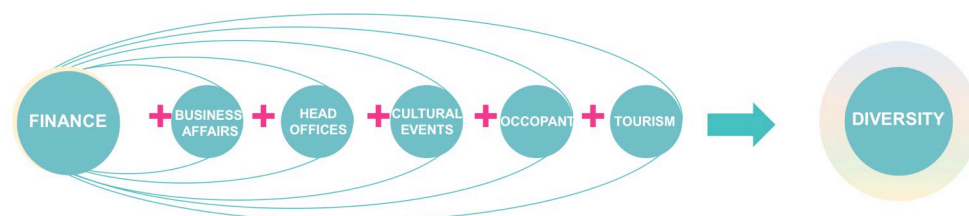
Central Business District (CBD), Healthy city, Regeneration, Walking system, Planning and design

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 opening-up policy. As for the large volume and numerous clients, the construction of the CBD is not a one-step process, which brings pros and cons to the city. It takes 10-15 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 first-tier 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 1 The CBD function changing trend

Zhang et al. (2017) conclude that today's CBD in China has the development trend that, following the international references, shows features of city-industry 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, pedestrian-friendly 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.

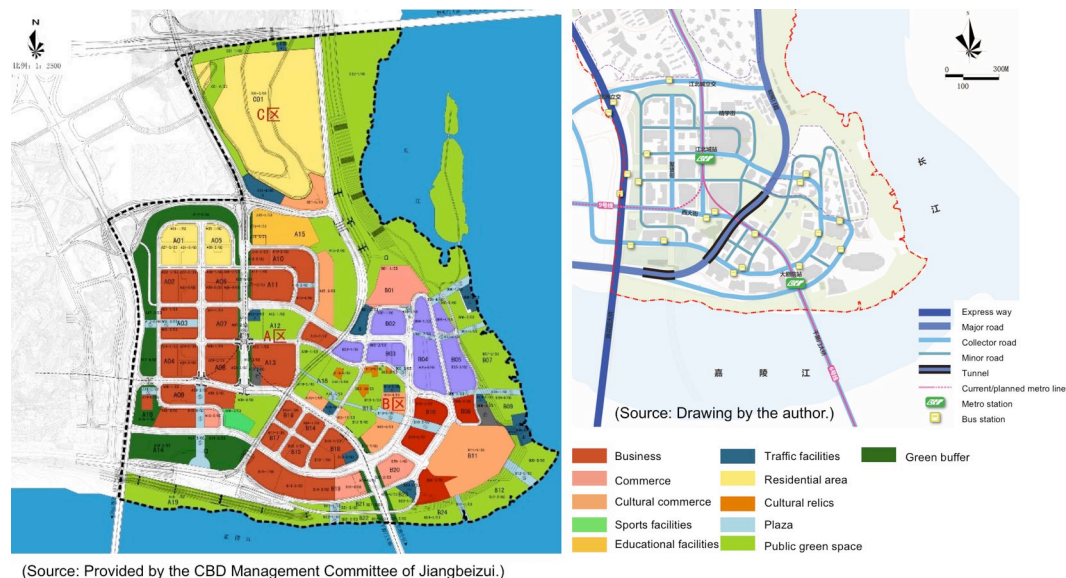


Figure 2 The land use map of Jiangbeizui CBD regulatory planning (2008) & road system

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.

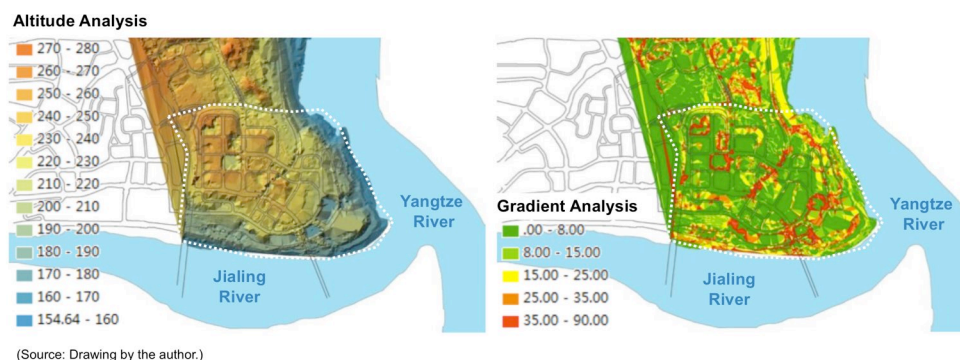


Figure 3 The topography of Jiangbeizui CBD

The normal water level of Jiangbeizui area is 175m, the once-in-100-year 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 hydro-fluctuation 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.

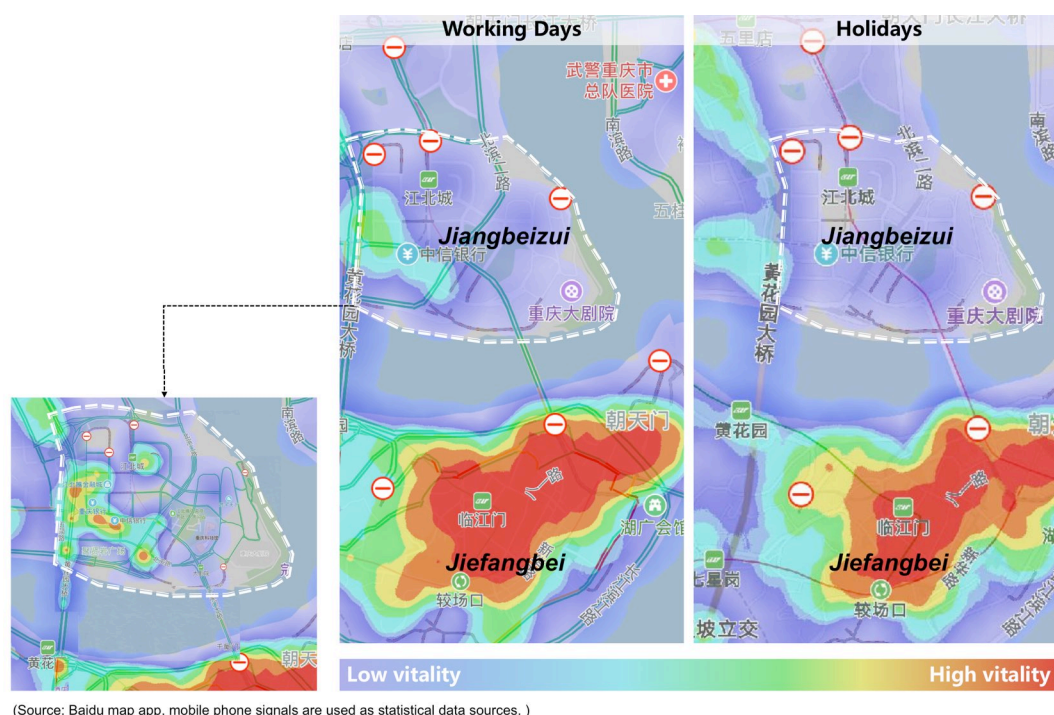


Figure 4 The heat map for urban activities of Jiangbeizui CBD & Jiefangbei

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 research method

2.1. Theory study: healthy city ideas in urban development in 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 health-oriented 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 (1990-2006): 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 (2006-2014): 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 multi-sectoral and multi-disciplinary mechanism has been formed.

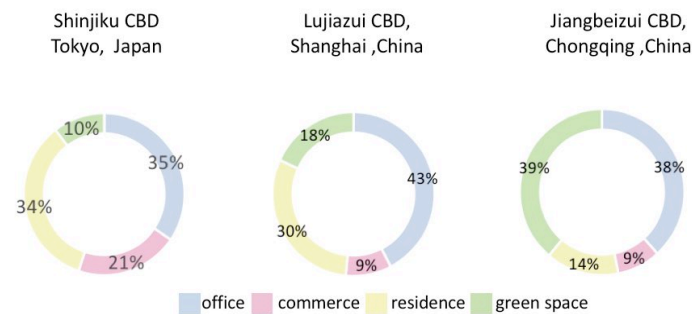
(3) Connotation expansion: After APA (American Planning Association) meeting in 2014, the concern of healthy city has been extended to equality and help resolve the non-communicative diseases which caused by unhealthy lifestyle that may have reasons of urban design (Wang & Ross, 2016).

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 Sub-CBD 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.)

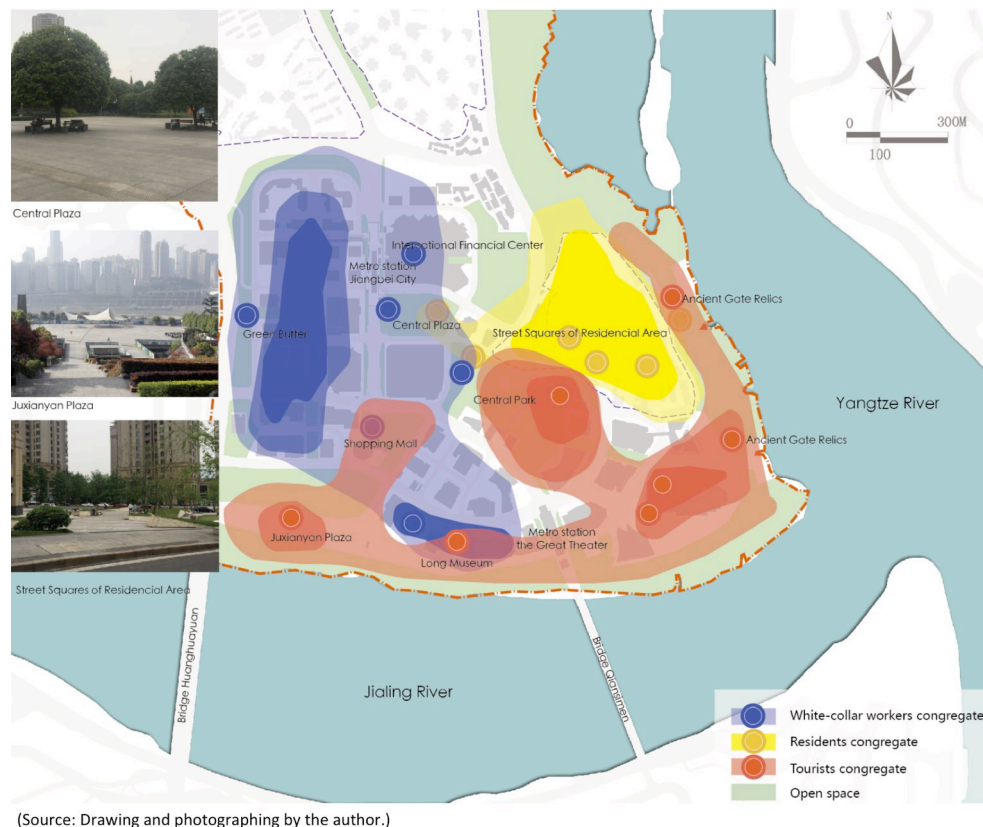
Figure 5 The land use composition of CBDs in comparison

Table 1. Comparison study of CBD

CBD	General situation		Public transportation		Commercial composition			pedestrian system
	Size/ km ²	Population	Metro line	Public transportation sharing rate	High- 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 high-end 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 m² 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 hydro-fluctuation 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 6 Gathering area of people's activity

The evaluation of indicators is only one aspect, in fact, whether there is a sure-enough 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. White-collar 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 post-meal 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
White-collar workers	◇ Bus lines are absent so commuters rely on metros ◇ Hard to find parking space ◇ Lack of shuttle bus	◇ Lack of CVS/restaurants/gym/daily 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 well-being and there's few chance for different group of people to have intercourse.

For CBD areas in a city with high-intensity 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 7 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 strategies

The book “Healthy Cities: Public Health through Urban Planning” (Sarkar et al., 2014) proposed that the medium-level individual healthy niche concerns habits and lifestyles, and the macro-level concerns the household-neighbourhood-city 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.

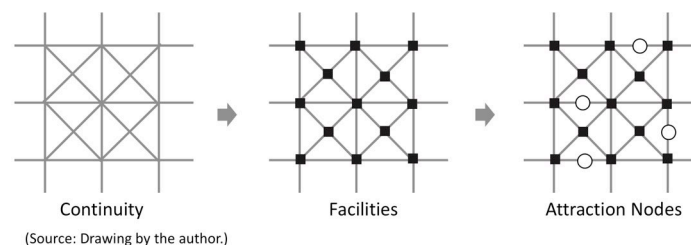


Figure 8 Strategy pattern diagram

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 well-established 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 1: 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 40°C⁰). This is an urgent recommendation of white-collar workers.

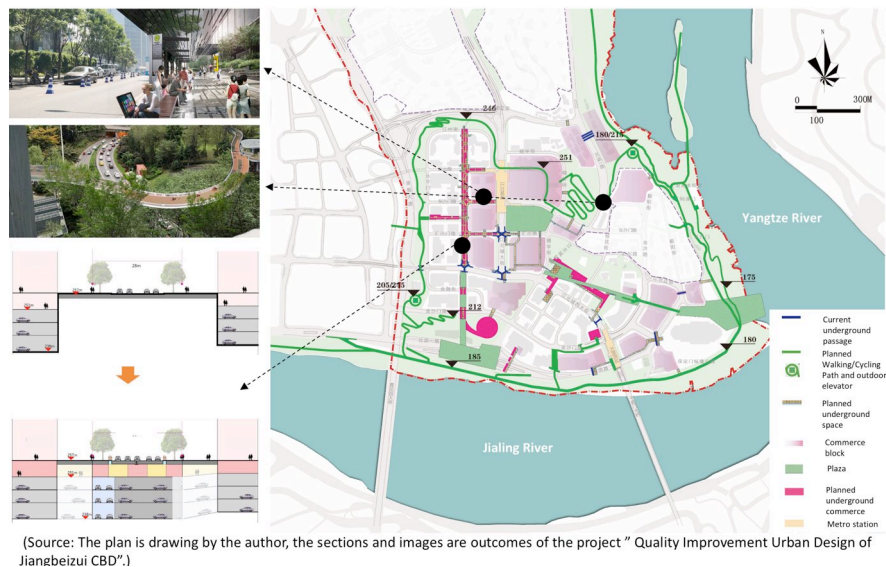


Figure 9 Walking system design plan and example section of underground space design

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 5-6 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 2-4 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 m² of commercial space. This type of space is public property managed by government departments. Therefore, it can cooperate with policy conditions to introduce community-based businesses with lower rents, providing a more affordable consumption environment for white-collar workers and residents. Besides, movable smart boxes (approximately 20-50m²) (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 Facilities and attractions nodes plan

3.3. Strategy 3: Attraction nodes for public intercourse

The attraction nodes plan directs at the third hierarchy in healthy life requirements, taking use of current green space. The space between the hydro-fluctuation 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 circulation for urban 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.

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