Thoughts on Urban Planning of Big Cities in China Caused by the COVID-19 Epidemic

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Abstract: Public health emergencies such as the COVID-19 outbreak has made all industries to reexamine the way the cities have always grown. Urban planning is no exception. Based on the analysis of the development track and phenomenon of Wuhan City, this paper puts forward the planning thinking of the development of China's big cities. According to the study, it is urgent to study the suitable size, structure and form of big cities. The consistent practice of high-intensity development needs to stop. Urban development should pay more attention to the space that can not directly generate economic benefits.

1 Introduction

The COVID-19 epidemic has brought great challenges to China's city, especially the big city, which has been developing rapidly in recent years. All the slogans of building *resilient city*, *healthy city* and *smart city* and so on seem extremely feeble under the devastating ravages of the epidemic.

Finally, under the powerful organization of the Chinese government, the situation has been reversed and urban life has gradually returned to normal. Although the epidemic has been brought under control, this incident has prompted us to think about urban construction, including re-examining the usual practices from different perspectives such as urban planning, urban governance and public health planning[1-3].

From the perspective of urban planning, this paper mainly discusses the thinking of China's current big cities.

2 Common Development Tracks and Phenomena in Big Cities in China

2.1In terms of urban development direction, the city not only expands rapidly in the horizontal direction, but also develops continuously in the vertical direction.

That is, in the case of increasing urban construction land area, the city is also constantly growing taller, and often hundreds of meters of buildings are almost everywhere.

Taking Wuhan City as an example, it can be seen from the urban form change chart (Figure 1) that the urban construction land has been rapidly expanding after the founding of the People's Republic of China, especially after the reform and opening up (1980). The urban construction land gradually spread from the initial point and line along the River to the vertical and horizontal direction, and gradually turned into the shape of flake and block urban land. The urban spatial layout shows the evolution path from dispersion, cluster to agglomeration.The urban built-up area also increased from 30 square kilometers in 1949 to 178 square kilometers in 1984 [4], and then to 723.74 square kilometers [5] in 2018 (24 times that of 1949).

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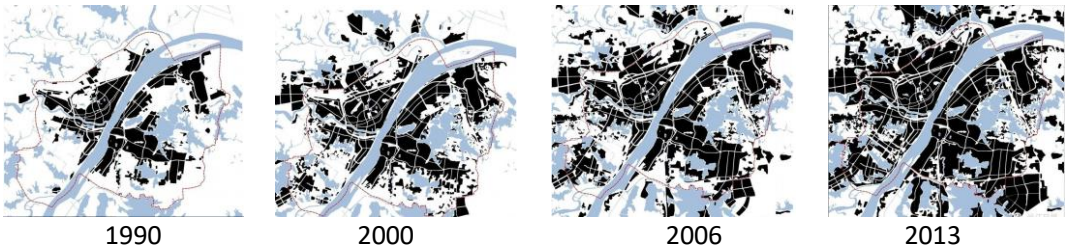

Figure 1: Urban morphological Changes of Wuhan City
Source: Digital Wuhan - Time and Space change[6]

On the other hand, the city is growing "high" while growing "big". Public buildings bear the brunt of the city's rise. Table 1 shows the changing history of the tallest building in Wuhan. It can be seen from the table that since the 1980s, the speed of high-rise buildings in Wuhan has accelerated, breaking through 100 meters, 200 meters and 300 meters. Now it is the 400 meters era.

The city is higher, not only in core areas such as business districts and some important public buildings, but also in the general areas and common residential buildings. Table 2 shows the residential development projects announced before the approval of construction projects in early September 2020 in Wuhan, with the average maximum building height of 131 meters.

Table 1. The changing history of the tallest building in Wuhan[7-9]

Completion time	Building name	Total height (m)
1909	Hankou water tower	41.32
1924	Wuhan Customs	83.8
1984	Qingchuan Hotel	88.6
1996	Taihe Plaza	176
1997	International Trade Building or Cetra Building	212.5
1998	Jiali Plaza	251.44
2010	Minsheng Bank Building	336
2015	Wuhan Center	438
2020	Wuhan greenland center	455

Table 2. Plot ratio and building height of residential development projects announced before approval of construction projects in early September 2020 in Wuhan [10]

Project	Plot Ratio	Building Height (maximum) (m)
Project1	4.53	140.3
Project2	3.5	141.2
Project3	2.8	98.75
Project4	3.65	99.8
Project5	3.79	139.9
Project6	3.42	168.3
Mean value	3.615	131.375

Source: according to the pre-approval publicity of construction projects published on the official website of Wuhan Municipal Bureau of natural resources and planning in early September

2.2 In terms of urban development intensity, the trend of high-intensity development remains.

Plot ratio is obtained by dividing the gross floor area of the building by the area of the site on which the building is erected.It is often used as a means for the government to control population density, and is an indicator reflecting the intensity of land development.Taking residential development in Wuhan as an example [11], table 3 and table 4 show the plot ratios of residential development projects in the main urban area and the suburbs of Wuhan in recent years.

As can be seen from table 3, the plot ratio of residential development projects in the main urban area reached above 3.0 from 2015 to 2017, and gradually increased, which fell to 2.634 in 2018, and then rose gradually.By analyzing the information of development projects from 2018 to August 2020, we can find that the reason for the decline of plot ratio is that the developed projects occupy a considerable proportion near the scenic spots, and their plot ratios are mostly between 1.35 and 1.5, which leads to the lower average of the overall data than the data from 2015 to 2017. In fact, from the information in Table 3 (the information of several residential development projects announced before the

approval of construction projects in early September 2020), we can see that the average plot ratio has reached 3.615.This means that if some low-intensity projects of scenic spot development are deducted, the actual plot ratio of projects in other areas should be higher than that of 3.449 in 2017. Similar situation also happened in the far city of Wuhan, but the average value was slightly lower than 3.

Table 3. Plot ratio of residential development projects transacted in land exchange market in Wuhan City in recent years

Year	2015	2016	2017	2018	2019	2020
Average plot ratio	3.015	3.169	3.449	2.634	2.933	2.77
Peak plot ratio	4	4.07	4.3	5.21	6.39	4.22
Number of projects involved (piece)	12	22	25	25	26	6

Data source: land transaction information disclosed by Wuhan land market website[12] Note: the data in 2020 are up to August 2020

Table 4. Plot ratio of residential development projects transacted in land exchange market in the suburbs of Wuhan city in recent years

Year	2015	2016	2017	2018	2019	2020
Average plot ratio	2.528	2.818	2.825	2.731	2.965	2.44
Peak plot ratio	2.95	5.27	3.8	5.79	4.5	3.6
Number of projects involved (piece)	15	31	37	53	32	17

Data source: land transaction information disclosed by Wuhan land market website[12]
Note: the data in 2020 are up to August 2020

2.3In terms of urban land distribution, although more attention has been paid to the construction and improvement of urban ecological space, public space, public service and infrastructure land, the efforts are still insufficient.

Some natural ecological green lands are constantly eroded in the increasingly strengthened protection. Some functional land for ensuring the normal operation of the city, such as the land for infrastructure and social facilities, are vulnerable groups that are easy to be occupied.....This will not hinder the normal operation of the city, but in the event of a public health emergency like the COVID-19, the risks and inconveniences will be exposed.

3 Thinking on the Urban Planning of the Development of China's Big Cities

3.1It is necessary to study the appropriate size, structure and form of large cities suitable for China's national conditions.

What is the proper size of a city? For example, Wuhan has grown from 2.765 million (1.746 million in urban areas) in 1949 [13]to 11.212 million (9.0245 million of urban population) by the end of 2019. Figure 2 shows the number of permanent residents in Wuhan from 2015 to 2019, which shows that the population maintains a relatively stable growth trend. Does that mean that the city will continue to expand like this?

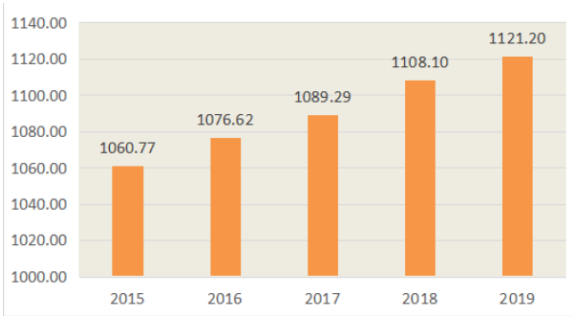

Figure 2. Permanent population of Wuhan from 2015 to 2019 [14] Unit: 10000 people

Each city is located in different natural environment and has different economic and social development conditions. What is the appropriate urban structure and form?Just like the change of urban form in Wuhan, no matter how we beautify it, it is actually the development trend of continuous expansion from the center to the outside. What is the expected state of a city's development? In the

past, we thought that the urban vitality was brought by its population agglomeration. Now, as can be seen from the epidemic situation, it is also the high-density agglomeration, which makes it difficult to control this infectious disease timely and effectively.So, in addition to thinking about how to optimize the city to solve this urban disease, should we re-examine the macro issues of urban development, such as whether to reach a certain scale, the focus of development of big cities will turn to optimize the economic structure, improve the living environment and others, rather than continue to expand? This is from the view of the city, how to control the direction of development.

To solve the problem of sustainable expansion of big cities, we need to start from the national level. For example, is it necessary for the state to make overall planning and coordination to focus on the construction of surrounding small cities or towns to attract or accommodate new urban population? In the current development situation, large cities are more attractive to population than small and medium-sized cities. In order to break this situation, the state should give more preference to the surrounding small cities in terms of resource allocation, so that people can have more choices, and they don't have to be in those super cities. Only in this way can we fundamentally solve the problem of endless growth of big cities and realize the common development goal of all cities in the country.

In short, urban scale, urban structure and urban form, which have been discussed since the formation of urban planning discipline, are worthy of our attention in today's rapid development of China.

3.2 The consistent practice of high-intensity development in big cities should be limited.

It is a normal phenomenon that the population density of big cities is large. In order to better accommodate the population, the common practice of cities is to improve the efficiency of land use and carry out high-intensity development. However, in order to create a suitable living environment, should this "high" be set a limit? I don't think it is the goal of our city development that people live at a height of more than 100 meters. From the beginning of its formation, cities exist to provide a safer and better living environment. If the resources are not extremely limited and forced, the residence over 100 meters should not be the common form of living. Because what cities provide is not to let people live like birds in cages, but to make people live better.

3.3 More attention should be paid to the space where economic benefits cannot be directly generated.

Under the market economy, the power of capital is strong. Projects that generate direct economic value are often easier to get the space they need, and accordingly, other functions of the city often need to be adjusted. Is this planning and management right? The answer is obvious, No. Therefore, in urban planning, we should pay attention to the total amount and distribution of these spaces which can not directly generate (considerable) economic benefits in the city. For example, we should pay attention to the quantity and quality of green ecology, the infrastructure that affects the normal operation of the city, the social facilities that can affect the adaptability and risk bearing capacity of the city under special circumstances, and the construction of public space that can provide social interaction for the public....

4 Conclusion

The Covid-19 epidemic is the most serious and most influential "urban diseases" we have encountered so far. From this incident, we need to reflect on the thinking mode and planning method of urban development that we are used to. In China with a large population, every city, especially a big city, needs to study its own appropriate size, structure and form. The consistent practice of high-intensity urban development needs to stop. Urban planning should pay more attention to the space that can not directly generate economic benefits.

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