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Urban Public Space Optimization Based on TOD Model--Reflections on Urban Public Space Construction Caused by the New Coronavirus

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ABSTRACT. *Recently, COVID-19 has spread all over the world, which makes us realize that emerging diseases have become an increasing risk, which makes the topic of virus and urban construction more and more concerned. The city's high-density space and high-density population characteristics have become a highly infectious medium of the virus. The severity of the epidemic is far beyond that of 2003.The speed of comprehensive construction of urban public health in China lags behind the speed of rapid growth of urban population, and the emergence of the virus deepens people's attention to urban public health facilities, making urban construction conform to the current situation of urbanization as much as possible. Good urban public space construction can not only make residents enjoy the corresponding service facilities more conveniently and quickly, but also improve the physical quality of residents, so as to play a good role in the protection of influenza. From the perspective of TOD mode, this paper will introduce the principle of urban public space optimization and the necessity of public space construction in TOD mode, so as to put forward the corresponding optimization analysis of urban public space, in order to reduce the impact of COVID-19 or other influenza on urban construction*

KEYWORDS: *TOD, city landscape, COVID-19*

1. Introduction

The more human changes to the environment, the more complex it is that the more likely we are to destroy ecosystems and provide opportunities for disease outbreaks, we live in high-density cities, high-density buildings, high-density populations, and high-density populations that promote new coronaviruses, and other viruses, are more likely to find vectors for transmission. High-density cities

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make urban space dense and overcapacity. From the aspect of disease generation, urban public green space, green corridor, wind duct, water system, appropriate isolation and other virtual space is an important part of urban physical space form, but also an important ecological chain in the urban ecosystem, large-scale development and construction encroaches on a large number of farmland, water, green space and forests, a large number of waste water waste and other household waste into the ecological chain, so that the material conditions on which human beings depend for survival have been seriously damaged, and then indirectly evolved into a series of urban disasters such as coronavirus. The outbreak poses a huge challenge to people's daily travel, with the lack of urban public spaces such as slow-moving systems reducing residents' outdoor time. The TOD (transit-oriented development) model refers to the "public transport-oriented development model". Public transport mainly refers to then to the bus stop as the center, to 400 to 800 meters (5 to 10 minutes walk) for the radius to establish a central square or city center, Its characteristics are the work, business, culture, education, housing and so on as one of the "mixed use", so that residents and employees do not exclude cars at the same time can easily choose public transport, bicycles, walking and other modes of travel. Although the use of public spaces in the outbreak is not very high, public spaces are particularly important in maintaining the daily lives and behaviour of residents.The public space system established by the TOD model can put forward a reasonable slow-moving system construction for the epidemic, and its development model can integrate urban space, adapt to high-density urban life and provide good public health conditions, and reasonably slow-moving system and high-density building form a good urban ventilation corridor, TOD will become one of the main models of the development of urban groups in the future.

2. Relationship between viruses and urban construction

2.1 Viruses promote the development of public health facilities in cities

In history, when people face epidemic sepsis, they have never succeeded in getting rid of this nightmare. In the repeated battles between people and infectious diseases, there are also many urban planning and construction policies and measures to clean up. Since the middle Ages in Europe, plague has erupted several times, and the plague epidemic has allowed Europeans to move away from the shackles of religion and move on to science. In many European cities before the Industrial Revolution, many of them had serious health problems, whether it was Paris, now considered the romantic capital, or London, which was once the capital of the Empire, where the poor health conditions made modern people bear to look straight. The lack of the city's sewage system, resulting in the arrival of rainy days, the city is full of sewage flow, the streets are full of air. Epidemics such as plague and cholera have re-emerged, cities' health systems have been tested, and the dark, damp nature of slums has exacerbated the outbreak. The epidemic of infectious diseases is beginning to make people realize that this is not only a "human disease", but also a "urban disease".At the end of the 19th century, colonial Hong Kong experienced

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severe plague, particularly in the slums of Taiping. The British colonial government at that time resorted to the burning area to try to root out the plague. However, the plague still reappears in Hong Kong every year. The government began to focus on urban construction, laying out a large number of sewage systems and improving ventilation and lighting in slum housing. Finally, after the Industrial Revolution, through the strengthening of urban health infrastructure, extensive repair of sewers, sewage systems and treatment systems, so that water-borne infectious diseases gradually under control. Most modern cities present a grid pattern, in addition to facilitating the calculation and management of land, but also conducive to the laying of water supply and drainage equipment. Most of these policies and norms to improve urban public health have been preserved and extended into the modern era. It can be said that plague, cholera, which once roamed the epidemic of infectious diseases also to a certain extent shaped the appearance of modern cities.

2.2 Viruses promote the construction of urban facilities

We must realize that rapid population growth is an irreversible trend globally. According to a report released by the United Nations Department of Economic and Social Affairs, the global population will increase by another 2 billion to 9.7 billion by 2050, compared with the current population. Currently, 55 per cent of the world's population lives in cities, up from 35 per cent 50 years ago, and will reach 68 per cent by 2050, according to United Nations projections.

In the global environment, according to the World Health Organization, the number of people without access to clean drinking water increased from 540 million in 1990 to 760 million in 2012. Although many cities have invested enormous resources in solving the public health problems of urban dwellers over the past two decades, this growth reflects that the pace of construction of public health facilities in cities around the world is still not keeping pace with the rapid pace of urbanization.

China's urbanized population was 520 million in 2003, and in 2019, china's urbanized population grew to 840 million. However, the severity of the new coronavirus outbreak far exceeds the atypical pneumonia in 2003 and is difficult to manage, which reflects that the speed of urban public health construction in China lags behind the rapid growth of urban population, but the emergence of the virus has deepened the importance of urban public health facilities, making urban construction as far as possible in line with the current status of urbandevelopment.

2.3 Population characteristics of cities: proximity to space, population density

We know that cities are population clusters, and their spatial proximity and population density are the most prominent features. Population density can accelerate the spread of infectious diseases, especially respiratory-transmitted diseases, which are the most inaccessible. The large-scale movement of high-density population and population in cities makes it easy to expose people to the limited

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space of infectious diseases such as new coronaviruses, so the overly tight population distribution greatly increases the prevalence of infectious diseases, so in urban construction, better coordination of urban public spaces and the relationship between urban functions, limiting overcrowded populations, providing parks for residents' travel activities and public spaces, such as urban construction measures are particularly critical.

3. Urban Public Space Optimization in TOD Mode

3.1 Principles of Public Space Optimization in TOD Mode

(1) Ecological livability, return to the principle of human nature

TOD-oriented urban development, mainly through the adjustment of urban transportation planning model, optimize the management of public transport organization, to provide residents with a walkable, mixed-use transportation center, so that residents and foreign tourists can enjoy a walking environment, this model is also the current urban automobile to public transport development of the new model, is the demand of urban development, the return of natural person. Through the development concept of TOD, to build a city in the premise of meeting the functional needs of the city, to create a natural, ecological, comfortable landscape space, where people feel soothing, quiet, harmonious, quiet.

(2) The principle of integration between man and nature

The essential idea of TOD model is actually to make people live in order through a guide of the public system, to reduce human interference with nature as much as possible, to echo the ecological needs of nature and society through the construction of green landscape, thus creating a low-carbon living space, emphasizing the dialogue between ecological space and urban space, architecture, environment and man, creating a harmonious space between one person and one person and man, a harmonious space between man and nature, a harmonious space of nature and a harmonious space of nature.

3.2 New coronaviruses make TOD model the main development model of future cities

(1) Mixed public spaces

New coronaviruses are driving the emergence of more mixed public spaces. "Public space, public domain" is a space in a city that can be freely accessible without any restrictions. In the face of the epidemic, the public domain is an important tool of governance, that is, an important container to carry the social life of citizens, an important space carrier to maintain public health and public health in the city, or a basic network to maintain the social relations of the whole city. People in the current outbreak need more functional mix edile public spacetoto to meet their

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daily life and activities. In THE TOD Standard 3.0 published by the Institute for Transport and Development Policy (ITDP), two public health-related indicators are also identified in Principle 5 "Hybrid" (which requires walking distance from primary schools, medical facilities or pharmacies, fresh food supplies) and "parks and playgrounds within 500 metres of walking distance".

(2) Protect the ecological environment and set aside high-quality public space

The impact of the new coronavirus has made us realize that the construction of urban public space needs to pay more attention to the construction of urban ecological space, improve the living environment, and create a mixed high-quality urban community public space. On the one hand, it can improve the quality of urban landscape, maintain biodiversity, and reasonable public transportation and public space construction can form good urban ventilation corridors with high-density buildings. On the other hand, high-quality public space systems are helpful for epidemic prevention and control, as well as for the health of urban residents in the outbreak. TOD's development model can integrate urban space seisiscope, meet the daily life of urban residents under the epidemic, make it more convenient to enjoy supporting services, and provide healthy public health conditions in high-density urban life.

4. The Importance of Public Space Construction in TOD Mode

4.1 Relieve strain on traffic

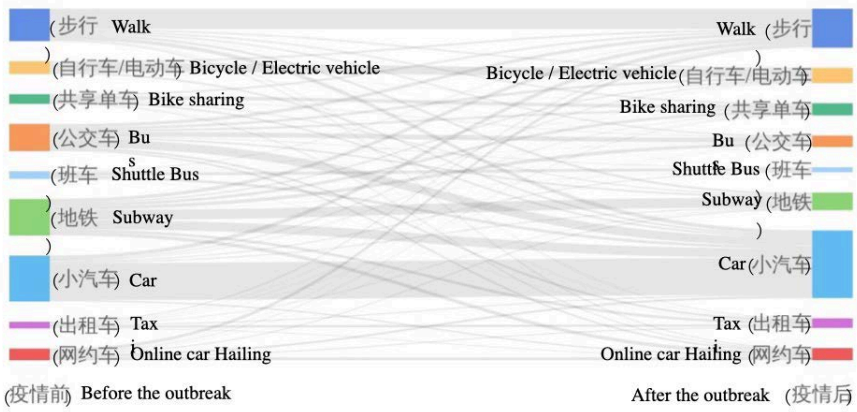

Figure. 1 Changes in people's choice of travel before and after the outbreak Photo credit: Transport and Development Policy Institute (ITDP)

Because of the outbreak, concerns about public travel have also brought about changes in residents' travel choices, according to a study conducted by the Institute

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for Transport and Policy on the choice of transportation for residents during the resumption of work. As a result of the new crown virus epidemic, the proportion of public transport travel in the city showed a relatively large reduction, especially in the past, the huge passenger capacity of the subway, subway, this mode of public transport travel, from the original 29.2% of travel options reduced to 13.5%, a decrease of more than 50%, the regular bus also showed the same decline. Against this backdrop, residents are more inclined to use cars when they go out, with the number of people using cars increasing from 36.8 per cent to 40.1 per cent. Although with the increase in the control of the epidemic and the progress of medical conditions, people began to gradually return to work, but the choice of public transport people still have fear, people are still willing to try not to choose public transport travel, subway and bus travel choices decline, which means that people during the outbreak more inclined to private transport options, but with many companies and other companies gradually return to work, the increase in car changes will inevitably bring significant increase strain on the road, so, In the coming resumption of the epidemic, how to meet the non-car owners of public transport safe travel, reduce people's fear after the outbreak, is at this stage for urban construction needs to work hard direction. We can observe through the picture (Figure 1), in order to avoid the fear caused by the virus, residents choose to walk or bicycle and other slow transport has also seen a small increase, so the construction of slow-track system in the field of public space is more attention and strengthening, we can through the concept of TOD, reduce the traffic pressure of cars on the road, while creating high-quality and reasonable slow-walking space, through walking and cycling to complete their own purpose. This not only alleviates the traffic pressure caused by the growth of cars, but also helps to improve the physical fitness of the whole population on the other hand.

4.2 Relieving the pressure on residents

Residents tend to live at home during the outbreak, through the form of online questionnaires, in the form of online questionnaires, only about 12% of the 108 questionnaires collected, only about 12% of the residents said they enjoy living at home more; Long-term home is prone to internal family contradictions, because their community is not equipped with the corresponding service facilities caused by inconvenience in life, long-term residence at home is more likely to produce mild depressive symptoms and long-term residence at home more likely to cause obesity, vision loss and cold and other symptoms. Among the residents who said they were boring and under some pressure during the outbreak, 83% said they would like a safe place to do outdoor activities and physical exercise; About 24 percent of people are more likely to experience mild depression due to prolonged staying at home, mainly because they are depressed and lack of motivation to do things, and about 67 percent of residents say they are obese due to prolonged absence from outdoor activities, impaired vision due to excessive attention to electronic products, and a decline in physical fitness leading to mild colds. Therefore, in the outbreak, the public space in the city is more important, but because of the public nature of space, we need to build public space need sings more consideration between time and

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space scale. At the community level, we can implement an organic coordination model based on THE compact development of each community group, setting up commercial, residential, office, park and public buildings within the range of pedestrian bus stops, building a walkable street network, connecting residential buildings, mixing housing of many types, densities and prices, and making public space the focus of building orientation and neighborhood life. The "Public Health Unit" is delineated through the "15-minute community life circle". Depending on the size of the community population, the public health unit can cover one or more living circles and take into account health facilities and services: First, for daily health, the construction of reasonable public space, and in time and space on the time and space, sub-local and for different groups of people, occupation, etc. to carry out reasonable outdoor activities, and the relevant epidemic prevention personnel for timely sterilization treatment. The second is to equip the living circle with more complete services to ensure that people can enjoy these services up close in the event of an outbreak and avoid cross-infection after long-distance travel.

5. Conclusion

With the passage of time, the new coronavirus epidemic in china's form is getting better and better, which can not but the national unity of the anti-epidemic, China's comprehensive urban public health construction can not keep up with the rapid growth of China's urban population, urban high-density life makes people exposed to the threat of viruses, TOD model can not only for the outbreak caused by the problem of too many cars to make reasonable solutions, but also through the construction of slow-moving system to change the way residents travel, To encourage residents to choose walking and cycling modes of travel, both low-carbon and healthy. The TOD model, through the integration and distribution of reasonable public resources, makes people eliminate the fear of communication in public space, people can enjoy the service facilities through reasonable walking range, which can greatly reduce the possibility of cross-infection brought by long-distance walking. It can be said that the emergence of the virus has deepened people's attention to urban public health facilities and public space construction, so that urban construction can be as far as possible in line with the current status of urbanization development.

The outbreak of the new coronavirus in the world has made more and more people recognize that mankind is a community of destiny, this is not a war of a region or a country, but a struggle of all mankind, in the history of mankind has repeatedly fought with the virus in a smoke-free war, but human beings always by their own wisdom, do their best, for their own children and grandchildren and finally won. Tens of thousands of people bow, a total of one shot, all in. It is believed that in the near future, humans will defeat the new coronavirus.

Here we pay tribute to the health care workers who went to the front line to guard national security and to all those who have paid to fight the epidemic.

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