Research on the Development of Urban Mixed-Use Neighborhoods Under the TOD Model: The Case of Shanghai Chuangzhitiandi Neighborhood

Jiaxing Huang[a]
College of Architecture And Urban Planning, Tongji University, Shanghai, China

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Abstract: As China's industrialization and urbanization levels increase, cities will accommodate more and more people. To avoid the disordered expansion caused by the rapid development of cities, future urban construction needs reasonable theoretical guidance, and the transit-oriented development (TOD) development model has become an important reference for China's urban construction at this stage. This paper analyzes the advantages and shortcomings of the case study of Shanghai's Genesis World Neighborhood through the lens of urban design and puts forward suggestions for improvement. The Chuangzhitiandi Neighborhood attracts a large number of people through the public transportation hub, creating a vibrant business district. A convenient underground pedestrian system connects each building and directs the pedestrian flow brought by public transportation to the interior of the community. The reasonable pedestrian scale of the internal streets and the verticalization of building functions on both sides of the streets make the neighbourhood more dynamic. However, the single business format and lack of vitality of the sunken plaza are the shortcomings of the case. It is necessary to increase the number of restaurants and entertainment functions, as well as to add a more recognizable visual guide design for the underground pedestrian system. The urban design analysis of the Chuangzhitiandi neighbourhood can provide a reference for similar projects in the future.

1 INTRODUCTION

As China's level of industrialization and urbanization continues to rise, mega-cities are gradually becoming centers of population and economic concentration. It is expected that in the future, 70% of China's population will live in cities, many of whom will be concentrated in these mega-cities. With the massive influx of population, urban development is facing many challenges, such as over-sized cities, disorderly expansion of built-up areas, traffic congestion, and underutilization of urban space, etc. At this stage, new city construction and urban renewal need to be guided by a unified concept to avoid chaotic and unorganized urban construction. In this context, the transit-oriented development (TOD) model can guide new town construction and urban renewal (Shuai, 2024). The TOD development model can impro ve the efficiency of transportation travel and enhance the connection of urban areas. Comprehensive nodes formed around transportation hubs contribute to the construction of urban living circles, which is in line with the development needs of Chinese cities nowadays.

Most of the TOD development mode takes high-speed rail stations, bus stations, subway stations and other public transportation nodes as the center of the area, and builds relevant facility clusters within 10-15 minutes of walking distance (Perry, 2015). The internal functions of the clusters can satisfy the needs of the urban residents in terms of work, business, culture, education and residence, thus reducing the use of private cars and building a green city where public transportation is the main mode of travel. According to the study by Anna Ibraeva et al, According to Anna Ibraeva et al, although most of the research on the topic of TOD comes from the United States, there is also a growing interest in TOD in the Asia-Pacific region, and TOD-related research is spreading widely internationally (Ibraeva, 2020).

[a] https://orcid.org/0009-0007-5011-6182

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So far, Chinese scholars' research in the field of TOD mainly focuses on the integration of station cities and the perspective of land space policy. Yang Jiawen, Duan Yang et al. studied the land preparation mode in the process of TOD development in Shanghai, Dongguan and Shenzhen (Yu, 2020). Li Xi analyzed the architectural and traffic flow design of the station-city integration of Guangzhou Baiyun Station from the perspectives of traffic connection, functional layout and cultural design (Xi, 2024). Dai Peng et al. evaluated the renewal potential of rail transit stations from the perspective of TOD by establishing an index system (Peng, 2024). Liao Yuqing analyzed the practical process of promoting TOD station-city integration in Nanning City and made an outlook on the development prospect of TOD station-city integration in Chinese cities (Lu, 2023). These studies not only provide a theoretical basis for the development of the TOD model in China but also lay the foundation for its practical application in different cities. However, the existing studies focus more on analyzing and interpreting policy theories, development models and other macro perspectives, and less on the urban design perspectives of specific projects.

This paper aims to analyze the realization of station-city integration under the TOD mode from the perspective of urban design in terms of traffic flow organization and functional zoning layout by taking Shanghai Chuangzhidiandi Neighborhood as an example. By analyzing the overall planning and specific design techniques of the project, this paper can provide a reference for the future design of TOD urban integrated neighborhoods and the construction of urban living areas.

2 DEVELOPMENT AND ADVANTAGES OF THE TOD CONCEPT

2.1 Development of the TOD Concept

In the early 20th century, the Englishman Ebenezer Howard put forward the concept of garden cities, he pointed out that several garden cities should be built around a central city to form urban clusters. Each garden city covers an area of about 6,000 acres and contains industrial land, agricultural land, stores, schools and other services. The cities are linked to each other by railroads (Howard, 2013). The idea of clustering garden cities and linking them with railroads is already a prototype of the TOD model. In the 1920s, Clarence Perry, an American planner, comprehensively described the planning concept of Neighborhood Unit. He believed that the Neighborhood Unit is a “plan for a community that organizes family life” (Sharifi, 2016), and that in each unit there is not only housing, but also retail stores, schools, recreational facilities, and other public services, as well as requirements for specific planning details for each unit.

Since the 1980s, the concept of TOD has been gradually developed. Calthorpe, an American architect and urban planner, specifically defined TOD as “mixed-use neighborhoods within an average walking distance of 2,000 feet from transit stations and core business districts (Calthorpe, 1993). These neighborhoods include residential, retail, office, public service and open space components. Since then, the TOD concept has gained popularity and research has been abundant in this area.

2.2 Advantages of the TOD Development Model

The TOD model provides a fast and efficient green travel mode. Residents living in mixed-function urban areas within a certain range of public transportation nodes can enjoy a wide range of urban functions and public services within a 10-15 minute walk, which meets their daily needs. For long-distance travel needs, public transportation stations in the centre of urban clusters can be used to take public transportation, which enhances the use of public transportation, reduces the use of private cars, and is conducive to green and sustainable urban development. At the same time, public transportation stations in the TOD model can attract a large number of people. And because of its superior transportation and logistics conditions, it can form a business district with a strong consumer atmosphere, bringing economic vitality to the surrounding urban areas. In addition, the TOD model helps to change the development structure of the original urban sprawl and form new transportation hubs. It also relieves the pressure of traffic and pedestrian flow brought by a single city center, forming a multi-center urban development pattern.

3 THE CASE OF SHANGHAI CHUANGZHITIANDI NEIGHBORHOOD

With the gradual improvement of the TOD theory,

there is a growing interest in the construction of TOD projects worldwide. As a completed TOD urban mixed-use neighborhood project in China, Chuangzhitiandi Neighborhood has maintained sufficient vitality since its completion. Analyzing the urban design of the Chuangzhitiandi Neighborhood, can provide a reference for the construction of other TOD projects.

3.1 Overview of the Chuangzhitiandi Neighborhood

Located in the Wujiaochang sub-center area of Yangpu District, Shanghai, China, approximately 9km from the city center, the Chuangzhitiandi Neighborhood was developed by Shui On Land and master planned and designed by SOM Associates. Fudan University, Shanghai University of Finance and Economics, Tongji University and other institutions of higher learning are concentrated in the surrounding area. A large young population provides the area with plenty of vitality, and the resources of the universities have attracted many technology-based companies and entrepreneurs to move in. Therefore, the Chuangzhitiandi Neighborhood needs to be planned to meet the consumption needs of the relevant population. At the same time, the project should provide a suitable environment for business members and innovative entrepreneurs in the knowledge-based community, such as a collection of office spaces for R&D, education, training, investment and incubation organizations, and a vibrant public sports space and living community within the site.

3.2 Traffic Organization

The case block is located in the Wujiaochang urban sub-center of Shanghai, with Songhu Road, the city's main artery, running through the site. Wujiaochang is named after the intersection of Handan Road, Siping Road, Huangxing Road, Xiangyin Road and Songhu Road in the northeastern corner of Shanghai, and is an important transportation hub in the northeast of the city. The transportation network in the area is complete, with Metro Line 10 passing through and including Wujiaochang Station and Jiangwan Stadium Station. More than 10 bus routes run through the area.

In addition, the Middle Ring Road and Railway Line 10 build a three-dimensional transportation network through elevated roads, vehicular tunnels and underground pedestrian systems. The sunken plaza at the center intersection is directly connected to the basement level of the Pentagon Center subway station and surrounding buildings. When passengers exit from the Wujiaochang subway station, they can pass through the sunken plaza and directly enter the interior of the surrounding buildings. The commercial street constructed underneath Songhu Road becomes a corridor linking the Wujiaochang Metro Station and the Jiangwan Stadium Metro Station. Through the commercial street, the pedestrian flow will be directed to the Metro Station, Daxue Road, Zhengmin Road, Zhengtong Road, Jiangwan Stadium, Chuangzhitiandi Plaza and other places along the route. Pedestrians no longer have to cross the street from the ground level and jostle with the traffic. The overall business atmosphere is perpetuated, while the pedestrian flow from the two metro stations ensures the commercial vitality of the neighborhood. The use of convenient public transportation to drive development is in line with the development ideas of the TOD model. Figure 1 shows the underground pedestrian system in the area.

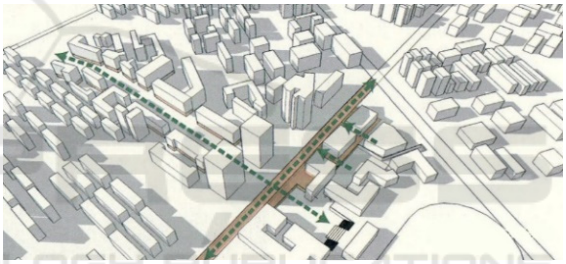

Figure 1: Underground pedestrian system(Huang, 2021).

The public space on the ground level is organized on the axis of Songhu Road and Daxue Road (Figure 2). The sunken public square along Songhu Road has a total area of about 13,000 square meters. It can be divided into two sunken plazas in the north and south, with a sinking depth of about 5 meters. The north sunken plaza consists of 7 modern-style intelligent office buildings and is connected to the south sunken space, with an area of more than 5,100 square meters; the south sunken space is directly opposite the Jiangwan Stadium and is also the main entrance to the entire sunken space, which is roughly a rectangular space with a width of 6 meters and a length of 120 meters. The area is about 7,800 square meters. On the south side of the area are two separate office buildings. The sunken plaza is directly connected to the pedestrian system on the ground floor, forming a continuation of the pedestrian network. Company employees can come to the industrial park directly through the pedestrian system. On both sides of the

axis where Daxue Road is located, residential and recreational functions are dominant and the overall atmosphere is more relaxed. Four public squares are connected through Daxue Road, forming a public space system for the street. It enhances the walking experience and creates a more casual street atmosphere.

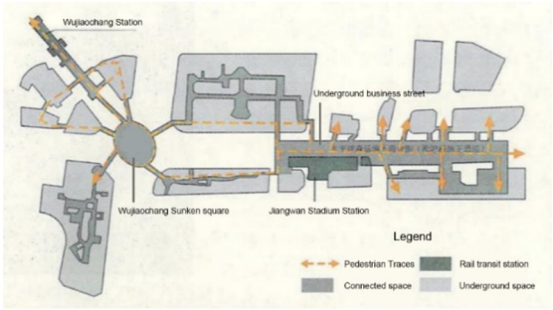

Figure 2: Songhu Road and Daxue Road axes (Huang, 2021).

3.3 Functional Layout

According to the overall plan, the Chuangzhitiandi Neighborhood needs to be multi-functional for work, life and leisure. The whole area is divided into four parts: Chuangzhitiandi Technology Park, Chuangzhi SOHO, Chuangzhifang Residential Area and Jiangwan Stadium. The northernmost part of the area, the Chuangzhitiandi Technology Park, takes full advantage of the resources of the surrounding universities and gathers a large number of technological enterprises. INNOSPACE+ on the north side of Chuangzhi SOHO assumes the function of business incubation for small and medium-sized enterprises, and serves as a spatial carrier for maker spaces, co-working and incubation platforms. Chuangzhifang Residential Area is a knowledge community with a focus on living and residential functions, mainly including a purely residential high-end neighborhood in the northwest corner of the community and a mixed commercial and residential area on both sides of Daxue Road. The Jiangwan Stadium is a historical building conservation and utilization area. Based on preserving the original building structure, more public sports space has been added. It is also revitalized by modestly implanting commercial functions in the surrounding area.

Inside the neighborhood, the Chuangzhitiandi Neighborhood adopts a vertical commercial model. Ground-floor stores along the street are provided with out-swinging commercial areas along the street, enhancing the commercial atmosphere of the street. Sidewalks are also maintained at a width of 4 meters or more for high passability, creating a pedestrian-friendly neighborhood scale. The stores along the street are commercial functions such as restaurants, stores and bookstores. The upper floors of the stores have a mixed residential and office space pattern with localized voids and relatively flexible functions. The verticalized mix of functions spreading upwards from the ground floor commercials also makes the space richer.

3.4 Recommendations for the case

Most of the commercial stores in the sunken plaza of Creative World along Songhu Road tend to be educational and office functions, with only a small portion of catering and recreational functions supplementing them. Combined with the characteristics of the sunken outdoor leisure activity space, this is not conducive to people staying in the sunken space for a long time. Although the sunken plaza, the subway station and the underground commercial street are whole from the perspective of the pedestrian system, the commercial atmosphere is not carried over to the sunken plaza at present, which seems relatively cold. It is possible to increase the proportion of food and beverage and entertainment functions in the sunken space, make better use of the human resources brought by the transportation nodes, and enhance the commercial vitality of the sunken space. Because of this, the connection between the transportation node of the subway station and the sunken plaza is particularly important.

The main way to reach the transportation nodes of the subway stations and the surrounding neighborhoods is through the underground pedestrian system. However, the underground pedestrian system has many exits, and it is easy to get lost when passing through the underground passageways due to the lack of ground level references. The lack of a clear signage system for the contact passages does not guide the flow of people to the exits of the sunken space. For youthful neighborhoods like Chuangzhitiandi, personalized expressive devices can be added to the underground pedestrian system, so that visitors arriving by public transportation can experience the unique neighborhood culture. The related venues can also be made more unique to the area to attract more people. For example, it is possible to add hints to the ground-level content in the visual design of the underground pedestrian street and set up markers to indicate the intersection of the underground space and the two axes of Daxue Road and Songhu Road.

To summarize, the current sunken plaza of Chuangzhitiandi is single-functional and lacks

vitality. There is a need to increase the number of food and beverage and entertainment functions, as well as to add a more recognizable visual guide design for the underground pedestrian system.

4 CONCLUSIONS

This paper selects Shanghai Chuangzhitiandi Neighborhood as a case study. It analyzes the realization of station-city integration under TOD mode from the perspective of urban design in terms of project overview, traffic organization and functional layout, and gives the author's evaluation and suggestions.

Located in the Wujiaochang sub-centre of the city, the Chuangzhitiandi Neighborhood is easily accessible by one subway line and more than ten bus routes. A convenient underground pedestrian system connects the two subway stations to the surrounding buildings as a whole. Convenient public transportation is used to bring in sufficient pedestrian flow, which in turn drives development. The above ground space is distributed along the axis of the two main roads in the area. According to the overall planning layout, the Chuangzhitiandi Neighborhood combines multiple functions such as work, life and leisure. Inside the neighborhood, the verticalization of functions through the upward spread of ground-floor retail makes the space richer. The shortcomings of the case are that the sunken plaza of Chuangzhitiandi is relatively single-functional and lacks vitality, which needs to be increased in terms of food and beverage and entertainment; the design of the underground pedestrian system lacks recognizability and needs to be improved.

Overall, as an excellent case of TOD urban mixed-use neighbourhood, Chuangzhitiandi Neighborhood shows us the feasibility of using public transportation to drive development. It also provides a reference for future urban renewal and new town construction programs in China.

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