

Application of Transit-Oriented Development (TOD) in China: A Case Study of Shanghai Hongqiao Tiandi

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Abstract

Since the initiation of reform and opening-up, the level of urbanization in China has continuously risen. The influx of rural labor into urban areas has significantly accelerated urban economic growth, while simultaneously imposing increased burdens on municipal transportation systems and the environment. Currently, Shanghai's urbanization rate has reached 88.7%, making it the city with the highest level of urbanization in China. Consequently, scientific urban planning and design have become particularly crucial. In recent years, the Transit-Oriented Development (TOD) model has emerged as a mainstream paradigm in urban construction. Urban operational plans in major cities across the nation have been formulated with reference to this model, yielding substantial success. However, certain issues persist in the application of the TOD model, leading to suboptimal outcomes in some areas. This paper focuses on case studies of Transit-Oriented Development (TOD) applications in Chinese cities. By integrating domestic and international TOD practices, it analyzes the development strategies and implementation of the TOD model in Shanghai Hongqiao Tiandi. This paper first consolidates the current development status of the TOD model in China, reviews the relevant literature, and clarifies the specific research questions. Subsequently, it identifies existing issues within the current development context and analyzes their underlying causes. Subsequently, the study conducts an analysis of the TOD complex at Shanghai Hongqiao Tiandi, summarizing the experiences gained from its application. Finally, the paper concludes by summarizing the findings and proposing targeted recommendations to serve as a reference for the development of the TOD model in other regions.

Keywords

TOD; Urban Rail Transit; Shanghai

1. Introduction

"Transportation is to a city what blood is to the body." This is the assertion made by the "godmother of urbanism," Jane Jacobs, regarding the value of urban transportation. In China, the scarcity of urban land and the pressing demand for land for eco-

economic development constitute an inevitable contradiction. Practical experience from many cities demonstrates that TOD may serve as a crucial solution to this challenge. Globally, major international metropolises—including New York, London, Tokyo, and Singapore—have leveraged the Transit-Oriented-Development (TOD) model to optimize urban space, shape urban form, enhance urban capacity, and establish exemplary paradigms for urban growth.

With the advancement of economic globalization, exchanges among countries and regions worldwide have become increasingly frequent. Since the inception of reform and opening-up, China's urbanization process has advanced rapidly, with a substantial influx of populations migrating from rural areas, suburbs, and surrounding regions into central cities. While benefiting from the conveniences brought by urban development, these populations also provide continuous impetus for urbanization. For instance, the influx of rural population into urban areas stimulates urban production and boosts consumption, while the concentration of high-quality talent provides a substantial, high-caliber workforce for urban industrial development. According to statistics, China's urbanization level has shown steady growth in recent years, with the urbanization rate increasing from 22% in 1990 to 61.2% in 2019. It is projected that the urbanization rate will rise to approximately 65% by 2025 and further reach about 72% by 2035. As the city with the highest urbanization level in China, Shanghai has reached a remarkable urbanization rate of 88.7%. Under such circumstances, urban areas undoubtedly serve as the primary hubs for population mobility, making regional integrated development a crucial driver for sustainable economic and cultural progress—an issue that demands significant attention.

In recent years, the excessively rapid growth of the urban population has rendered the original infrastructure and services inadequate to meet the needs of residents. This mismatch may lead to a disparity between road expansion and urban management, posing a significant challenge in city governance. To address this issue, it is essential to introduce and adopt the TOD. China introduced the TOD model relatively late. As urbanization in other countries began much earlier, the TOD model has matured more fully abroad.

This paper provides a brief introduction to the TOD model, analyzes its current development status in China, and conducts a case study based on the Shanghai Hongqiao Tiandi complex. The study examines its strengths and shortcomings, analyzes the existing challenges, and offers recommendations for the future advancement of the TOD model.

2. Theoretical Foundation

2.1. The Concept of TOD

The TOD emerged as a product of urbanization in the United States. Following World War II, the industrialization process in the U.S. advanced rapidly, leading a

significant portion of the population to choose suburban living. Population migration has catalyzed the urbanization of suburban areas. Concurrently, the demand for rapid commuting has grown, leading to a sharp increase in automobile sales. This has been accompanied by a significant rise in fossil fuel energy consumption and the gradual emergence of environmental pollution issues. This trend progressively gave rise to the phenomenon of urban hollowing-out. Against this backdrop, various sectors of American society initiated urban renewal movements, integrating the TOD into daily transportation management practices. Through years of exploration, the United States has ultimately developed the Transit-Oriented Development (TOD) model, which has advanced the process of urbanization while promoting coordinated development between the economy and the environment.

The conceptual debate surrounding the TOD model has consistently remained a topic of significant interest. Currently, the TOD model is described using various terms such as "transit community," "transit-supported development," and "transit-friendly design," each carrying distinct connotations and emphases. However, there is a broad consensus that Transit-Oriented Development (TOD) is a planning model centered around urban transportation systems, designed to organically integrate surrounding residential, commercial, and office districts. The concept of this model focuses on constructing high-density, multi-functional urban spaces around transit hubs. Its primary objectives are to maximize the utility of public transportation, alleviate urban traffic congestion, and promote the rational utilization of urban resources. By concentrating diverse functional zones in proximity to transit hubs, the TOD complex creates a convenient, energy-efficient, and environmentally friendly living and working environment for residents and employees.

2.2. Advantages of TOD

The TOD complex offers six key advantages: (1) Alleviating Current Land Shortages: Centered on public transportation, the TOD complex connects various urban functional zones, helping cities overcome geographical constraints and expand outward. (2) Enhancing Asset Value in Adjacent Areas: Scholarly research indicates a significant positive correlation between the TOD model and the appreciation of asset values in nearby regions. Specifically, it can increase the total land development capacity by 10.1% and elevate land asset prices by approximately 200%. Furthermore, the development under the TOD model has a notable impact on population density. Areas in proximity to TOD developments experience a population approximately 13.4% higher compared to areas without such developments. (3) Promoting Urban Energy Efficiency: By linking residential areas, offices, schools, and hospitals via metro systems, the TOD complex enables residents to travel across the city without driving. This reduces automobile use, optimizes the urban environment, advances energy conservation, and alleviates traffic congestion. Moreover, high-density urban functions free up land for greening and landscape enhancement. (4) Elevating In-

dustrial Capacity: Compared to traditional business districts, TOD hubs typically target higher-end positioning, attracting new enterprises—particularly high-end firms—to cluster around high-speed rail integrated hubs. (5) Improving Capital Flow Efficiency: By engaging developers in comprehensive land utilization, revenue from land transfers and sales can significantly ease infrastructure financing challenges, becoming a “profit model” for an increasing number of metro cities. (6) Serving as a New Cultural Landmark: The TOD complex integrates urban landscapes with residential and industrial functions, spatially weaving together the cultural fabric of the city to preserve and transmit urban heritage to the greatest extent possible.

3. Literature Review

The concept of TOD began to take shape as early as the 19th century. At that time, automobiles were not yet widespread, and intra-city travel primarily relied on horse-drawn carriages. Influenced by the Industrial Revolution, Europe and Japan embarked on processes of urbanization. During the construction of new cities, the development models in some regions began to exhibit embryonic forms of what would later be termed TOD. Kobayashi articulated the principle of “trains generating passenger flow” as early as the 1930s.

In 1993, American urban and architectural designer Peter Calthorpe first introduced the concept of TOD, defining it as “a mode of urban development oriented around public transportation.” Concurrently, he proposed enhancing the scientific rigor of urban road planning, which would help reduce the complexity of government management and improve administrative efficiency. He summarized this approach as the “node + corridor” model. In 1997, building upon the research of earlier scholars, Michael Bernick and Robert Cervero further advanced the “3D” principles: Density, Diversity, and Design. Subsequent scholars further expanded this framework by adding Distance to Transit, Destination Accessibility, and public transportation Frequency, thereby more fully capturing the interactive relationship between transportation and land use, ultimately forming the “5D+F” principles. In 2004, Bernstein provided a more concrete definition of TOD, characterizing it as a government-led process of land planning and development centered around transportation nodes. This approach emphasizes the integration of land use and transportation, as well as the coordination of interests among multiple professional stakeholders required to achieve this objective.

Current research on TOD development in China remains relatively limited and is primarily concentrated on practical applications, with a well-established theoretical system yet to be formed. This is mainly due to the relatively short period since the introduction and application of the TOD model in China, coupled with limited experience, which has hindered the formation of a distinct indigenous framework. Consequently, much of the existing research still relies on referencing practices from

abroad. Scholar Chen Sha (2008), by comparing the TOD models in China and abroad, highlighted the theoretical differences between domestic and international approaches. Based on China's actual circumstances, she provided recommendations regarding government planning, administrative management, and a series of related supporting policies. Scholars Wang Youwei and Zhou Qiao, among others, reviewed relevant theories and practical materials on the TOD model, proposed a TOD development framework suitable for urban development in China, and identified a series of existing challenges. They further suggested the need to innovate and refine the domestic TOD model.

4. Case Study

4.1. Location Advantages of Hongqiao Tiandi

Hongqiao Tiandi is situated within the core business district of Hongqiao, adjacent to the transportation hub, with direct underground access to Metro Lines 2, 10, and 17. The project is positioned as an integrated commercial complex combining exhibition offices, shopping, dining, entertainment, and performances, providing the public with a new platform for business and leisure. Hongqiao Tiandi is the first micro-travel social destination in China located next to the Hongqiao transportation hub. It covers an area of 62,000 square meters, with a total construction area of approximately 380,000 square meters. Hongqiao Tiandi features over 80 world cuisines, a 10,000-square-meter dedicated parent-child experience zone, and an IMAX giant-screen theater. With comprehensive one-stop amenities for dining, shopping, and entertainment, as well as innovative themed activities in the mall, it creates a holistic new experience in food, shopping, leisure, and entertainment. The northern part of Hongqiao Tiandi comprises three Grade-5A office towers, the Cordis Hotel, and a commercial leisure and entertainment complex. The southern part includes a Grade-5A exhibition office tower, a department store, and an entertainment center, with an airport check-in system located on the ground floor. Hongqiao Tiandi boasts comprehensive architectural functions and ample supporting facilities, enabling it to fully realize its intended role. The complex includes Grade A, 5A-rated office buildings, commercial plazas, and entertainment centers, which cater to the diverse needs of various groups and integrate functions such as office work, leisure, and entertainment.

Furthermore, Hongqiao Tiandi enjoys a prominent locational advantage due to its close proximity to Hongqiao Railway Station and Hongqiao Airport. This allows it to fully leverage its position within the transportation hub, attracting substantial passenger flow and generating considerable economic benefits. It benefits from convenient air, rail, highway, and waterway transportation, forming a self-contained TOD complex. The decision to locate the project here stemmed from the site's prior use as an old industrial facility. Through redevelopment, a large-scale mixed-use property was designed and planned, integrating diverse functions such as com-

merce, offices, residences, and hotels. By leveraging the advantages of land value and strategic location, the project has become a benchmark development in Shanghai.

Hongqiao Tiandi is positioned to serve Minhang District, radiate across the Yangtze River Delta, extend its reach nationwide, and connect with the global market. The development of Hongqiao Tiandi yields multifaceted benefits. Through investment attraction, it has promoted the construction of the local commercial district, stimulated resident consumption, rationally adjusted and optimized land use patterns, and facilitated consumption upgrading. These factors collectively drive regional economic growth, achieving a win-win scenario for multiple stakeholders. The project continually fosters a commercial ecosystem that is rationally planned, vibrant, high-end in quality, functionally complementary, and distinctive in character. It guides commercial complexes to engage in continuous optimization and adjustment by introducing more dynamic industries and brands. This process drives their own transformation, upgrading, and innovation, fosters complementary and differentiated industrial development, and ultimately contributes to the formation of a healthy and vibrant development landscape. The project equally emphasizes activating and expanding local consumption while attracting external consumption, thereby meeting diverse consumer demands and supporting Shanghai's development as an international consumption center city.

4.2. Land Use Planning and Layout of Hongqiao Tiandi

Since its opening in December 2015, Hongqiao Tiandi has maintained an average daily footfall of over 80,000 visitors by 2020. In 2019, its shopping center achieved a turnover of RMB 1.14 billion, with total rental income from the complex reaching RMB 464 million. Both foot traffic and rental revenue have shown steady year-on-year growth. During the first four years after the opening of Hongqiao Tiandi, the footfall in the area increased by 255%, while turnover rose by 165%. Hongqiao Tiandi has become a successful and exemplary case of the TOD model's application in China, providing a significant reference for the planning and development of commercial complexes in other regions.

According to the annual reports of Shui On Group, it can be observed that since its opening in mid-December 2015, Hongqiao Tiandi has consistently maintained high occupancy rates for both its commercial and office spaces. During the critical adjustment periods of the third and fifth years—specifically in 2018 and 2020—occupancy rates experienced slight fluctuations. It is noteworthy that a positive correlation exists between the occupancy rate of office spaces and that of commercial properties. An increase in the office occupancy rate can generate a significant pulling effect on the growth of commercial property occupancy.

Compared to previous-generation commercial projects located near older railway stations in urban areas, Hongqiao Tiandi features a more diverse and enriched ten-

ant mix, with an increased proportion of family-friendly, entertainment, and service-oriented offerings. The reason lies in the fact that Hongqiao Tiandi's substantial footfall stems from two primary sources. The first is the sizable and relatively stable office population from nearby commercial buildings, which generates significant and consistent consumption on weekdays. The second source comprises the large volume of passengers from the adjacent railway station and airport. Since the office population is generally inactive on weekends and holidays, the project needs to attract a greater number of passengers for consumption during these periods. The Hongqiao High-Speed Rail Station and Hongqiao Airport handle average daily passenger volumes of approximately 380,000 and 120,000 respectively. Therefore, the key challenge for a TOD-oriented shopping center is how to effectively utilize this passenger flow, attract as many passengers as possible to the mall, and encourage their consumption. In response, Hongqiao Tiandi has conducted in-depth research and formulated corresponding strategies, focusing on developing its own social functions. During holidays, it consistently organizes various activities aligned with passenger profiles, hosting over 55 themed exhibitions and holiday-themed cultural events annually, such as the Art Light Festival series.

During holiday marketing campaigns at Hongqiao Tiandi, daily foot traffic consistently exceeds 100,000 visitors. During the mid-year "Crazy Shopping Festival" and the year-end anniversary promotion events, the mall's turnover increases by an average of over 90%. Throughout the series of holiday activities, foot traffic has grown by more than 30%. Furthermore, the architectural design of Hongqiao Tiandi places significant emphasis on low-carbon and environmentally friendly principles, demonstrating a commitment to the concept of sustainable development. This innovative architectural design philosophy and technology serve as a demonstration for sustainable development in Shanghai.

Since its opening in 2015, Hongqiao Tiandi has maintained a relatively homogeneous mix of business formats and brands, largely adhering to its initial configuration with considerable stability. There has been minimal change in the range of commercial categories offered. The significant shifts observed in the proportions of dining, entertainment, and retail sectors between 2016 and 2017 were essentially driven by a substantial increase in customer traffic, during which the occupancy rate rose from 80.1% to 93.6%. In 2017, new developments emerged as a significant number of entertainment operators entered the complex. The entertainment sector became a new growth driver, while the market share of the original formats, such as dining and retail, experienced a relative decline. By 2020, the tenant mix at Hongqiao Tiandi had become more mature, with the proportion of each sector stabilizing accordingly.

4.3. Performance of Hongqiao Tiandi

By the end of 2020, 64% of the 251 retail units (excluding temporary pop-up spaces) at Shanghai Hongqiao Tiandi had undergone adjustments, with 11% of the units

having been repositioned three times. A total of 208 brands had entered or exited the complex (excluding short-term pop-up stores), while 91 brands and their original store locations had remained unchanged since the initial opening in 2015 and 2016. Concurrently, the total sales revenue of the mall increased nearly threefold over the five-year period. The development of Hongqiao Tiandi has played a significant role in promoting socio-economic progress. It has attracted a substantial number of commercial, cultural, and tourism projects, providing nearby residents with a richer array of material and cultural products, and generating considerable benefits. Consequently, it has become a representative case in China's efforts to create modern, multi-functional complexes. Furthermore, the construction of the Hongqiao Tiandi project has created numerous employment opportunities, demonstrating its substantial commercial value.

In conclusion, Hongqiao Tiandi vividly demonstrates the application of the modern TOD model within a major metropolitan area, offering valuable insights and practical experience for sustainable urban development in Shanghai. It has played a significant role in urban construction, economic growth, and ecological sustainability. Currently, Hongqiao Tiandi has entered a new phase. The primary objective now is to build upon and consolidate the existing achievements while undertaking new expansion and exploration, gradually evolving into a more comprehensive, dynamic, and modern multi-functional commercial complex. While continuing to serve its core customer base—including nearby office workers, transit passengers, and families during holidays—it is also expanding its reach to attract a broader and younger demographic, tapping into new growth markets.

5. Issues and Recommendations Regarding the TOD

As can be seen from the preceding analysis, Shanghai Hongqiao Tiandi can be considered a representative case and an outstanding example of the application of the Transit-Oriented Development (TOD) model in China. However, it is also important to recognize that there are certain challenges associated with the application of the TOD model. These primarily include: (1) Large Capital Requirement: TOD projects are typically located in core urban areas and involve multiple, large-scale plots, leading to generally high land prices. Recent transaction totals are frequently substantial, with some even exceeding ten billion RMB. (2) Specialized Technical Requirements: The key to TOD projects lies in the effective integration of land use and rail transit, demanding high capabilities from developers in design planning, construction management, and other areas. The design and planning of TOD projects must consider both the operational needs of rail transit and the requirements of urban development. During the construction process, it is essential to achieve an integrated approach, considering the realization of multiple objectives and the influence of various factors. This includes ensuring the operational safety of rail transit, maintaining the smooth flow of public transportation, and accounting for the impact

on nearby residential areas. (3) Slow Return on Investment: TOD projects are multifunctional and involve more than simply combining rail construction with property development; they require promoting the coordinated and integrated development of rail transit and surrounding properties. Consequently, the development cycle of TOD projects often spans 4 to 5 years, leading to slower investment returns. (4) Complex Stakeholder Coordination: The fundamental components of TOD projects include land, rail transit, and commercial properties, among others. However, ownership of these components varies, and in some projects, land surrounding rail transit stations may have unclear ownership, making stakeholder coordination particularly complex.

In response to these challenges, the following recommendations are proposed: (1) Clarify Station Positioning: The positioning of rail transit hub stations directly influences the long-term viability of market-oriented TOD operations. This is often manifested in the degree of alignment between urban functions and passenger flow patterns, where a higher degree of alignment is considered more favorable. (2) Seek Government Support: Strengthen communication with government authorities and actively pursue favorable conditions for projects. This includes enhancing horizontal and continuous coordination between rail planning and urban planning during the rail network planning phase, as well as securing policy and financial support at various levels to mitigate project barriers. (3) Optimize Resource Integration: Effectively integrate resources from multiple stakeholders. Guided by planning, land resources around stations should be controlled, reserved, and planned in advance. Coordination among construction, operation, and commercial development phases should be promoted to efficiently integrate industry chain controls. By optimizing the allocation of resources, it is possible to reduce costs and increase efficiency, significantly enhance operational capacity and effectiveness, and achieve the maximization of overall benefits. (4) Strengthen Operational Capabilities: Enhance comprehensive urban development and operational capabilities through collaboration with external organizations or internal incubation. Key areas include international collaboration capacity, regional operational coordination, industrial outreach capabilities, and market competitiveness within the region.

As an international metropolis, Shanghai's urban development must continuously evolve and keep pace with the times. The Shanghai Master Plan (2017–2035) proposes the creation of high-quality urban spaces. In 2025, Hongqiao Tiandi will mark its tenth anniversary. Over this decade, it has achieved leapfrog development in terms of footfall, corporate agglomeration, and brand enhancement, establishing itself as the "Gateway to Shanghai" for the Yangtze River Delta region and a new urban social landmark. Looking ahead, Hongqiao Tiandi will continue to evolve, innovate persistently, and maintain its role in leading new trends in commerce and urban development.

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