

Global Environment Facility

GEF-6 China Sustainable Cities Integrated Approach Pilot Project Quarterly Newsletter

Issue 18 | December 2022



Project Progress (As of December 1, 2022)

MOHURD

■ **GEMH-01A:** *“Development and Application of TOD Policies, Technical Standards, and Management Tools in Chinese Cities”* — The research team optimized and perfected the six functional modules and its background system in accordance with task progress, drove the trial operation on the intranet, organized the point-by-point trial of the platform by seven pilot cities, and adjusted the platform content in accordance with feedback.

Beijing

■ **GEBJ-1A:** *“Preparation and Implementation of City-Level Transit-Oriented Development (TOD) Strategy and Project Management Support”* — Annual work acceptance was completed for Tasks 1-4 and 5-6 in December 2020 and December 2021 respectively, with 3 papers published relating to Task 8. The Task 7 general report is being prepared, while the main content of Tasks 3-6 has been included. Relevant data is being updated. The first draft of the Task 9 environmental safety report has been prepared. The basic framework for Task 10 project completion report has been prepared. As a result of the pandemic, a portion of the work is being completed. Task completion, inspection, and acceptance is expected to be completed in February 2023. The final 20% of the contract amount is also expected to be paid in February 2023, for the completion of all contract tasks.

■ **GEBJ-2:** *“Corridor-Level and Station-Level Application of TOD Strategy: Research on Optimization of Rail Transit Lines and Land-Use Based on TOD Principles”* — Tasks 2 and 3 have been accepted and submitted. The Task

4 integrated design standards and guidelines for areas surrounding rail lines and stations and the general report for the project have been completed. Expert review and acceptance was completed on November 29, and the final 30% of the contract amount is expected to be paid in early December, which will make the completion of all contract tasks.

■ **GEBJ-3:** *“Demonstration Project of Integrated Planning and Construction of Urban Renewal Areas Based on TOD Principles”* — Results of Task 3 “Environmental and Social Safeguards Assessment on Urban Renewal Areas around Rail Transit Stations” were submitted in May 2022. The final payment was made in June for the completion of all contract tasks.

Tianjin

■ **GEFTJ-1:** *“Preparation and Implementation of City-Level Transit-Oriented Development (TOD) Strategy and Project Management Support for Tianjin”* — The PMO and the consulting partner have signed a supplemental agreement on environmental and social safeguard work, which is currently underway. The Task 9 environmental safety report and Task 10 project completion report are being prepared. An annual task acceptance is planned for completion in December 2022. The final 15% of the contract amount and the newly added amount for the supplemental agreement will be paid at the beginning of 2023. Other tasks in the contract have been completed and passed expert review.

■ **GEFTJ-2:** *“Research on Financing a Tianjin Urban Rail Transit Project Applying TOD Principles”* — The PMO and the consulting

company have signed a supplemental agreement on the “economic benefit evaluation of carbon emissions reductions around rail transit corridors under TOD”. Works related to this task is currently being carried out. Payment for the final 10% of the contract and the newly added amount for the supplemental agreement is projected to be issued early next year.

■ **GEFTJ-3:** *“Demonstration project for Integrated Planning and Construction of Urban Renewal Areas Based on TOD Principles”* —

At present, all work outlined under the contract has been completed and passed expert review. All revised and optimized Chinese and English versions of the research results have been submitted. Payment for the project has been issued in full.

Shijiazhuang

■ **GESJ-1-2:** *“Preparation and Implementation of City-Level Transit-Oriented Development (TOD) Strategy and Project Management Support for Shijiazhuang”*—

In the first half of 2022, the TOD strategy along rail lines and connecting traffic analysis for Task 5-1, the study of slow traffic quality improvement for Task 5-2, the TOD action plan and operational manual for Task 6, and the post-review revision of the TOD general report for Task 7 were completed. At the present, the environmental and social security report and the borrower’s Implementation Completion Results Report (ICR) are being prepared. The environmental and social security report has been drafted and submitted to the World Bank for review and revision.

■ **GESJ-2-2:** *“Land Adjustment Plan for Shijiazhuang Urban Rail Transit Line 4”*— On November 18, 2022, the Task 4 research on the

integrated transit system of areas and stations along rail lines, Task 5 research on the quality enhancement of public and green spaces, and Task 6 review of the “TOD Short-Term Action Plan and Safeguard Measures Report” were completed.

Nanchang

■ **GENC-2A:** *“Study of TOD Planning and Design for Rail Transit”* — The preparation of the corridor-level borrower’s ICR has been completed.

■ **GENC-3B:** *“Study of TOD-Based Regional Planning around Rail Transit Stations”* — The first draft of the results of Tasks 8-9 was submitted in October, while the results of Tasks 7-9 were reviewed by experts on November 1. The report is currently being revised.

■ **GENC-4A:** *“TOD Concept Promotion and Knowledge Dissemination”* — “TOD Concept Promotion and Knowledge Dissemination” — The filming of the promotional video for Task 1 has started. 70% of the work has been completed. The project documentary is being shot. The first draft of a series of video scripts for Task 2 has been completed, while the sample of the first episode of the video series has been completed. The Task 3 WeChat Official Account has released posts covering eight modules, including science popularization, key project updates, TOD policy information, PMO news, and conference reports. As of November 23, a total of 101 posts have been made. The Task 4 image IP patent application has been accepted and is expected to be certified in December. Two offline activities were carried out for Task 5 in September and November. The preliminary online and offline media plan for Task 6 has been determined, and materials are being prepared.

Guiyang

■ **GEGY-1:** *“Preparation and Implementation of City-Level Transit-Oriented Development (TOD) Strategy and Project Management Support for Guiyang”* — Phase 4 of the main contract has been completed, and the completion report and supplemental agreement of Phase 5 are being implemented. The supplemental agreement was signed on June 28, 2022. At present, the first draft of the results of Phase 2, including integrated TOD planning and design technical guidelines (general principles and urban rail) for Gui’an rail transit, urban express rail stations, and the surrounding lands; integrated development guidelines for Gui’an rail stations; and integrated TOD management guidelines (general principles and urban rail) for Gui’an rail transit, urban express rail stations, and surrounding land, have been completed. The abovementioned reports received opinions from the Guiyang Development and Reform Commission, Guiyang Bureau of Natural Resources and Planning, Guiyang Bureau of Housing and Urban-Rural Development, and other departments. The first draft of the research has been submitted after revision.

■ **GEFGY-3:** *“Study on the TOD Comprehensive Development Planning for Areas along the Ring High-Speed Railway in Guiyang City”* — The final outputs have been completed and received opinions from relevant departments. The report has been submitted to the PMO. A preliminary draft of the supplemental agreement is being prepared.

■ **GEFGY-4:** *“Strategic Environmental and Social Safeguards Assessment for TOD Planning and Research”* — On October 13, 2022, the Guiyang GEF PMO organized an expert review meeting for the “Report on Strategic Environmental and Social Safeguards Assessment for TOD Planning and Research.” The report passed the expert review. The report has been revised and

completed in accordance with the meeting minutes. The outputs of Phase 2 and 3 have been reported to the World Bank. After the completion of the research report in December 2022, Phase 4 will be completed.

Ningbo

■ **GENB-1:** *“Study on TOD Strategies in Ningbo”* — Tasks 5-6 passed the expert review on September 28. After the review meeting, revision and translation work was completed, and the Chinese and English result reports have been submitted. The first draft of the general report has been formulated. The data management system has entered the testing and deployment stage. A general report review meeting and the delivery of data management system will be held in December 2022. Task 11 has been created to carry out research on low-carbon TOD cities in the Ningbo West Hub. The supplemental agreement has been signed after negotiation, and 3 seminars have been hosted. The formulation of initial results and its expert review meeting will be held in December 2022.

■ **GENB-2A:** Due to certain constraints, the pilot project of TOD implementation for Kaiming Street (Yaoting Street-Zhongshan Road), Xinjie Street, and Shuangliang Community went into termination procedures after the review of Task 2 conducted on August 31. After consulting the World Bank team and received confirmation on September 14, the PMO sent a project termination letter to the party responsible for implementation on September 16. On October 10, the project was officially terminated.

■ **GENB-2B:** *“Research on Financing Schemes of TOD Implementation for Kaiming Street (Yaoting Street-Zhongshan Road), Xinjie Street, and Shuangliang Community”* — After the review of Task 1 was completed on August 31, the project resulted in termination procedures due to

constraints. After consulting the World Bank team and received confirmation on September 14, the PMO sent a project termination letter to the party responsible for implementation on September 16. On October 10, the project was officially terminated.

■ **GENB-3:** *“TOD Research on the Improvement of Constructed Rail Stations”* — The compilation of Task 5 the TOD technical guidelines and general report for stations has been completed, and a review meeting is planned for December. Due to the termination of the Kaiming Street pilot project, stations with potential for renovation in Ningbo will be selected for in-depth research. Negotiation and signing of the supplemental contract has been completed for the newly added Task 6, and research has begun.

Shenzhen

■ **GESZ-1:** *“Preparation and Implementation of City-Level Transit-Oriented Development (TOD) Strategy and Project Management Support for Shenzhen”* — Tasks 1-7 have been completed, and Tasks 8-10 is underway. According to the contract, the remaining seminars are being planned and organized. The strategic social and environmental safeguards assessment report is being modified. The drafting of the borrower’s ICR has begun. It is expected that by the end of this year, the first draft of the final outputs will be completed. All seminars will be completed before the end of March 2023, and the final outputs will be submitted. Data Platform Progress: The TOD Data Management Platform has been built. The platform supports the display and query of cities, traffic profiles, rail transit passenger flow, comprehensive TOD evaluation, and TOD information (reports and news) for a variety of user types. A small number of bugs are being fixed as Version 1.0 is deployed. A training session for the Platform is to be held in early December.

■ **GESZ-2A:** *“Research for the Sustainable Development Planning and Construction Management of the Bainikeng Community Based on TOD Principles”* — Tasks 1-10 have been completed. Tasks 11-13 is being implemented. The remaining seminars are being planned and organized. The team will prepare the borrower’s ICR. It is expected that by the end of this year, the first draft of the final outputs will be completed. All seminars will be carried out before the end of March 2023, and the final outputs will be submitted.

Project Implementation Progress (As of December 1, 2022)

PMO	Activity	Draft TOR	Final TOR	Bid Announcement	Shortlist Review	Bid Evaluation	Contract Negotiation	Contract Signing	Inception Report	Intermediate Output	Draft Final Report	Final Report
MOHURD	National TOD Platform											
Beijing	City-Level TOD Strategy											
	Corridor- and Station-Level TOD Application											
	District-Level TOD Application											
Tianjin	City-Level TOD Strategy											
	Research on Private Sector Engagement in TOD Financing											
	District-Level TOD Application											
Shijiazhuang	City-Level TOD Strategy											
	Corridor-Level TOD Application											
	District- and Station-Level TOD Application											
Nanchang	City-Level TOD Strategy											
	Corridor-Level TOD Application											
	Station-Level TOD Application											
Ningbo	City-Level TOD Strategy											
	District-Level TOD Application											
	District-Level TOD Application											
	Station-Level TOD Application											
Guiyang	City-Level TOD Strategy											
	Corridor-Level TOD Application											
	Corridor-Level TOD Application											
	Strategic Environmental Assessment for Corridor-Level TOD Application											
Shenzhen	City-Level TOD Strategy											
	District- and Station-Level TOD Application											

LEGEND

Colored cells indicate the progress of each project. Blue cells indicate progress from September 15, 2022 to December 1, 2022.

Capacity Building and Academic Exchanges

On September 20, 2022, CRRC displayed its latest science and technology achievements such as maglev trains with speeds of 600 km/h, high-speed intelligent multiple-unit trains, and hydrogen energy technology in the International Trade Fair for Transport Technology (InnoTrans). Liu Tiantong, an engineer at CRRC Dalian, introduced that the company aims to provide smart, green and integrated train technology and low-carbon solutions for clients. [\(Relevant Link\)](#)

On October 28, 2022, the “Qingdao Strategic Plan for Integrated Rail TOD” and the “Special Plan for the Development and Utilization of Land Resources for Rail Transit in Qingdao” (hereinafter, the “Strategic Plan” and the “Special Plan”) formulated by the QDMC Real Estate and Qingdao Metro Group passed the final expert review on a meeting jointly organized by the Qingdao Municipal Bureau of Natural Resources and Planning and Qingdao Metro Group. All units and departments were required to raise awareness and accelerate the implementation of the final plans. (1) A TOD concept with Qingdao characteristics shall be proposed in view of the planning and development requirements and the characteristics of regional resources. (2) The implementation of the overall plan shall be strengthened to guide TOD



Source: TOD Committee of the China Society of Territorial Economists

implementation in Qingdao. (3) The planning and promotion of key projects shall be accelerated to lay the groundwork for integrated TOD in Qingdao. [\(Relevant Link\)](#)

On November 4, 2022, the 2022 China Urban Studies Annual Conference with the theme of “Problems in Urban Transit” was held at the Hangzhou International Urbanology Research Center. The forum was guided by the Institute of Intelligent Transportation Systems (IITS) of Zhejiang University and hosted by the Hangzhou International Urbanology Research Center (Zhejiang Urban Governance Research Center). The forum was in a hybrid format. An in-depth discussion was held around the theme of “Smart Digital Transit and Urban Governance”. The forum discussed issues such as optimizing travel in multi-model urban transit systems, and travel for the elderly. Lou Dong, deputy director and chief engineer of the Planning and Construction Department of the Hangzhou Municipal Bureau of Transportation, noted that urban transit construction should be people-oriented. [\(Relevant Link\)](#)



Source: Suzhou Rail Transit

On November 7, 2022, Luo Zengbin, member of the Standing Committee of the CPC Hainan Provincial Committee and Secretary of the Haikou Municipal Party Committee, emphasized the



need to focus on improving the capacity of public transportation services during the urban public transportation development meeting. He further said that cities should place priority on urban public transit development. Stations should be logically placed. Routes should be optimized and extended to create a convenient, efficient, comprehensive, smart, and tourist-friendly public transportation system. ([Relevant Link](#))

On November 7, 2022, the 3rd Capital Advanced Think-Tank Forum on Beijing Transportation Development and the Launching of Beijing Transportation Blue Book was held in Beijing Jiaotong University. The theme of the forum was “building an integrated transit system with high-quality development”. On behalf of the editorial board, Feng Hua, a Professor at the School of Economics and Management of Beijing Jiaotong University, published the Annual Report on Development of Beijing Transportation (2021), which summarizes key achievements in sustainable transport, safe transport, human-oriented transport, and tourist-friendly transport. This book analyzes the development trends of the public transportation system, integrated transit development, and slow traffic; identified the impact of the COVID-19 pandemic on the Beijing transportation sector at the current stage of development, road traffic regulations and policies suitable for autonomous driving, and policies for supporting the construction of new infrastructure; and put forward targeted



Source: Beijing Jiaotong University News Network

countermeasures, suggestions, and specific implementation plans. ([Relevant Link](#))

On November 14, 2022, Chengdu TOD Center (CDTOD) signed a cooperation framework agreement with Cushman & Wakefield, Nikken Sekkei, China Railway Eryuan Engineering Group, and Chengdu Rail Transit Group. In the future, they will together carry out in-depth research in the fields of transportation, planning, construction, development, and operation. The implementation and application of relevant research results will advance TOD projects in Chengdu. The center was established by Southwest Jiaotong University with the aim of integrating TOD theories with urban rail development and constructing an industry-university-research ecosystem on rail TOD. ([Relevant Link](#))



Source: Southwest Jiaotong University News Site

On November 15-16, 2022, the Smart City Expo World Congress was held in Chengdu, where the city of Guangzhou was awarded the “2022 Smart City Expo World Congress - China Mobility Award”. ([Relevant Link](#))



Source: Dayoo

Industry News

Planning and Construction of Rail Lines

On September 21, 2022, the “Optimization of Detailed Regulatory Planning of Guangzhou–Foshan West Ring Intercity Railway Station (Tanbu Railway Station) and the Land use of its Surrounding Land” was released for public comments on the website of the Guangzhou Municipal Bureau of Natural Resources and Planning. In the announcement, integrated TOD in Tanbu Railway Station, optimization of the land layout around the station, and the additional 37 supporting public service facilities were proposed. ([Relevant Link](#))

On September 28, 2022, Caihongqiao Station on Guangzhou Metro Line 8 officially began operations. Caihongqiao Station built a new and upgraded smart customer service center in accordance with the current standards of the new Guangzhou Metro lines. Caihongqiao Station is located on the south side of the intersection of Liwan Road and Dongfeng West Road, and serves as an interchange station for Lines 8, 11 and 13 (both under construction). ([Relevant Link](#))

On October 27, 2022, with the formal opening of the Huzhou–Hangzhou high-speed railway, Hangzhou West Railway Station, China’s first “station-city integration” modern railway station welcomed passengers. The station was developed by China Railway Siyuan Survey and Design Group. The station is a large-scale integrated transit hub that integrates transportation modes such as railway, rail transit, long-distance bus, subway, city bus, taxi, and private vehicles. Hangzhou West Railway Station is the first railway station structure in China to adopt the “expanded railyard and entry

in the center” model. ([Relevant Link](#))

On October 28, 2022, Shenzhen Rail Transit Line 14, Fugang Section of Line 11, and Gangxiabei, Huangmugang, and Universiade Hub Stations (the “two lines and three hubs”) jointly constructed by China Railway Group and Shenzhen Metro Group came into operation together after a construction period of five years. As key transit lines connecting the east of Shenzhen, the “two lines and three hubs” is the largest urban rail project in China, featuring long travel distance, convenient transfers, and wide geographic coverage. ([Relevant Link](#))

On November 9, 2022, China Railway and the Beijing Municipal People’s Government jointly approved the feasibility study report for the comprehensive upgrade project of the Beijing Municipal Administrative Center (BMC) Line of Beijing Suburban Railway (the section from Beijing West to Liangxiang), creating conditions for the construction of the rail line to start before the end of the year. The comprehensive upgrade project of the western part of the BMC Line is a key project identified in the Line-City Strategic Cooperation Framework Agreement. It is the first suburban railway project approved by China Railway and the Beijing Municipal Government in accordance with the “joint planning, review, and approval” model, and has been included in the “Beijing 2022 Key Project Plan”. The project play a significant role in furthering the integrated development of the Beijing-Tianjin-Hebei region. ([Relevant Link](#))

On November 11, 2022, the concrete pouring of the 100,000 m² foundation of the core area on B3 floor of the station building in the 02 section of the BMC Station Integrated Transit

Hub Project was completed. This marks the basic completion of the main structure of the area. The BMC Station Integrated Transit Hub Project is the largest TOD project in Asia and a key component of the construction of the “Beijing-Tianjin-Hebei region on the rail”. The BMC Station will start its operation by the end of 2024. ([Relevant Link](#))

On November 12, 2022, the Shanghai Xinzhuang Integrated Transit Hub Project officially began. The large rail platform is expected to take three and a half years to complete. The construction plan for the large platform above Metro Lines 1/5 is currently in the research stage. The overall completion of the platform will open up the north-south transit artery of Xinzhuang. At the same time, a 24-hour passage will be established on the west side of the platform for pedestrians to walk through the north-south square. After transformation, Xinzhuang Station will serve as a city-level integrated transit hub connecting Rail Transit Line 1 and Line 5, Jinshan Branch Rail Line, Shanghai-Hangzhou Dedicated Rail Passenger Line, and two bus hubs in Xinzhuang north-south square. ([Relevant Link](#))

On November 21, 2022, the Beijing Municipal Development and Reform Commission approved the project proposal for the Lize Integrated Transit Hub Project (hereinafter the “Lize Hub”). The project is planned for completion in 2025. After its completion, the project will integrate five rail transit lines (Daxing Airport Line, Line 11, 14, 16, and Lijin Line) to serve as the only five-line rail transit transfer node in Beijing, capable of reaching various key functional areas in the city within 30 minutes. ([Relevant Link](#))

On November 22, 2022, the Guangzhou Baiyun Railway Station Integrated Transit Hub Construction Project (hereinafter “Guangzhou

Baiyun Railway Station”) undertaken by Guangzhou Metro Group was successfully topped out. The Guangzhou Baiyun Railway Station Integrated Transit Hub is one of the primary passenger stations in Guangzhou. It is the first ultra-large hub project built in accordance with the modern integrated transit hub planning and construction concept in Guangzhou. In the future, the Beijing–Guangzhou high-speed railway, Beijing–Guangzhou railway, and Guangzhou-Zhanjiang high-speed railway will be included in the Station. Six new metro lines, long-distance depots, and bus depots as well as public spaces will be constructed. The project will service all standard-speed trains at Guangzhou Station and Guangzhou East Station, laying the foundation for high-speed urban rail in Guangzhou. ([Relevant Link](#))

On November 28, 2022, the feasibility study report of Shijiazhuang Rail Transit Line 4 Phase I project was approved by the Hebei Provincial Development and Reform Commission. Shijiazhuang Rail Transit Line 4 Phase I has a total of 22.43 km, fully underground, and includes a total of 19 stations. It will fill the vacancy of the rail transit network in the southwest and eastern areas, and improve the overall level of the rail network. ([Relevant Link](#))

TOD Investment and Cooperation

On September 30, 2022, Beijing Regional Railway Integration Development Group Co., Ltd. was officially established. It is the first company in the country to be jointly established by the provincial people’s government and China Railway to focus on (sub)urban railways and the development of railway-city integration. The new company will also help advance the construction of

major suburban railway projects in Beijing. ([Relevant Link](#))

On September 30, 2022, the National Development and Reform Commission agreed to allow China Railway to issue China Railway Construction Bonds of CNY 300 billion. The bonds would raise CNY 100.26 billion for railway construction projects, CNY 25 billion for equipment procurement, and CNY 174.74 billion for debt restructuring. Railway construction projects that meet the scope of support outlined in the Green Bond Endorsed Projects Catalogue (2021 Edition) may also issue green bonds. Bond registration is valid for 24 months, and the first issue will be completed within 12 months. ([Relevant Link](#))

On October 30, 2022, China Railway Construction Corporation established China Railway Construction Transportation Operation Group Co., Ltd., a wholly owned subsidiary with a registered capital of CNY 2 billion in Tianjin. The company is responsible for developing professional transportation operations and coordinating, operating, and managing transportation operations within the Group. Its core business is urban rail transit operations. ([Relevant Link](#))

TOD Integrated Development

On September 15, 2022, the Yunnan Public Resources Trading Platform released the “Urban Renewal + TOD” Project: KCGD2022-18 Plot Design and EPC Bid for Fude Village, Kunming. The project has a planned gross floor area of 222,100 m² and a total investment of CNY 570.49 million. The integrated development project is located in Fude Village on the South Second Ring Road, next to Kunming Railway Station. The project is the core component and the starting point of the integrated planning and development of the entire area. It also represents the first time

that China Railway Group and Kunming Rail Transit Group Co., Ltd. integrate the TOD model into urban renewal and resettlement housing construction in Kunming. ([Relevant Link](#))

On October 9, 2022, as the first TOD demonstration project in Jinjiang District, the TOD project of Sichuan Normal University was launched, covering an area of 33.77 acres. The opening of the landscape demonstration area of the project also means that the first batch of 14 TOD demonstration projects in Chengdu are all unveiled. Positioned as “Chengdong Cultural and Creative Economy, Business, and Commercial Service Center”, the Sichuan Normal University TOD project will serve as Chengdu’s first regional-level shopping center with cultural and creative experience as the highlight. ([Relevant Link](#))

On October 11, 2022, the Shiwan Subway Station Transit Hub Integration Project (hereinafter the Shiwan Square TOD Project) was officially commissioned. It is the first government-invested rail transit integrated TOD project in Chancheng District being completed and commissioned. The Shiwan Square TOD Project has a total land area of 27,153.91 m². The project is a large-scale comprehensive transportation service facility with a focus on using underground spaces to develop multiple types of spatial functions. It includes bus hubs, underground parking lots, sunken courtyards, underground businesses, and green park spaces. ([Relevant Link](#))



Source: Guangdong Urban Public Transport Network

On October 14, 2022, the land use adjustment proposal for the Nantong Xingfu Depot station-city integrated development project was included in the Jiangsu’s “Three Districts and Three Lines” Plan. On October 14, the General Office of the Ministry of Natural Resources issued the above document as the basis for the approval of land and sea use for construction projects. Representing the first station-city integration TOD project in Nantong, Xingfu Depot is a key urban construction project and the first depot project in Nantong that adopted a “railway + real estate” development model. ([Relevant Link](#))

Government and Policy Trends

Green and Low-Carbon Transit

In September 2022, guided by the “1-6-6-1-N” green urban rail development blueprint of the “Action Plan for Sustainable Urban Rail Development in China” and Shenzhen’s situation, Shenzhen Metro Group researched and compiled the “Sustainable Development White Paper (2022).” The White Paper focuses on aspects that drive its green and low-carbon development, such as sustainable buildings, sustainable construction, and sustainable operations. The document also lists specific methods including sustainable operations, sponge depots, and clean energy. The white paper outlined sustainable development goals from 2022 to 2060. ([Relevant Link](#))

On November 14, 2022, the United Nations Climate Change Conference (COP27) China Pavilion side event, Climate Investment and Finance Forum, was held in Sharm El-Sheikh, Egypt. Head of the Climate Change Department of the Ecology and Environment Bureau of Shenzhen

Municipality participated in the roundtable discussion, introduced Shenzhen’s climate investment and financing experience, and noted that the adoption of electric transports, shared mobility, and smart transportation could help achieve the climate target. ([Relevant Link](#))

Regional Integrated Development Planning and Integrated Transit Planning

On September 24, 2022, the “Fuzhou Urban Integrated Transit Plan (2020-2035)” was approved by the municipal people’s government (Rong Zheng Zong [2022] No. 208). The urban transit development goal is to build an urban road network density of no less than 8km per km², and an artery road operating speed of 25 km/h and above. More than 55% of population and jobs in the central urban area shall be within an 800 meters coverage of rail stations, the 500 meters coverage of bus stations. ([Relevant Link](#))

On October 31, 2022, the General Office of the Shenzhen Municipal People’s Government issued the “*Three-Year Action Plan (2022-2024) for the In-Depth Implementation of the Strategy of Constructing a Nation with Strong Transportation System and the Construction of a Higher-Quality National Public Transit Metropolitan Demonstration City*” (hereinafter the “Plan”). The Plan outlines that the proportion of green transport should be improved to over 78%. Furthermore, all urban rail transit stations should have bus stops within their 100-meter radius and bicycle parking facilities within their 50-meter radius. The Action Plan also emphasizes that urban public transit should be 10% accessible for the disabled. ([Relevant Link](#))

On November 3, 2022, the General Office of the Shandong Provincial People’s Government issued the “Guiding Opinions on Further Driving

the Priority Development of Urban Public Transit” (hereinafter the “Guiding Opinions”). The Guiding Opinions outlines that the effective connection between urban public transit planning and national economic and social development planning, territorial spatial planning, and urban integrated transit planning should be strengthened. They also outlined that urban public transit planning should be included in the territorial spatial planning system in the form of special spatial planning. The innovation and development of public transit enterprises shall be supported. The capital source of public transit enterprises should be diversified and their business expansion should be market-oriented. The Guiding Opinions aims to promote the sustainable development of the public transit enterprises in Shandong Province. ([Relevant Link](#))

Special Discussion

TOD Research and Practice in China from a Multi-Dimensional Perspective¹



¹This article was rewritten by Liang Xiaona based on the speech titled “Multi-Dimensional and Multi-Scale Rail Transit Leads Urban Development” by Professor Zhang Chun of Beijing Jiaotong University at the Beijing Annual Workshop of the GEF6 China Sustainable Cities Integrated Approach Pilot Project in July 2022.

Editor's Words

GEF-6 China Sustainable Cities Integrated Approach Pilot Project (GEF6 China SCIAP) has funded nearly 30 studies in the MOHURD and seven cities. These studies cover levels of city, corridor, and station as well as a variety of special topics. In addition to providing strategic development ideas for pilot cities to better apply TOD strategies, they also drive the MOHURD and city PMOs to consider the broader and far-reaching impacts of the implementation of TOD strategies on urban development. This discussion explored the impacts of TOD from economic, social, and environmental perspectives, with the hope that it will continue to provide valuable thoughts for city managers as the project draws to a close, or even after it is completed.

The Growing Importance of TOD Practice and Research

At present, cities have become the main force that drive high-quality development. As of 2021, more than 57% of the global population lives in cities. In China, this figure has reached 63%.² The dense population and high mobility of cities require that urban planning, as a means of public policy and technology, must be closely tied to the development of urban transit. **Transit-oriented development** (TOD) has become a key strategy to meet this requirement. Cities in developed countries have accumulated a large amount of practical experience and academic achievements in the field of TOD. These knowledge and experience are urgently needed by cities in developing countries that are in the middle and early stages of urban construction. In addition to its well-studied benefits to accessibility, TOD subjects and research such as affordable housing, urban regeneration, land value capture, and investment and financing tools has great implications for future urban and transit development in developing countries.

TOD is an Interdisciplinary Theoretical Framework

At present, domestic TOD research in China is still primarily concentrated in the fields of urban planning and transportation planning, with a focus on the effectiveness of physical spatial construction, especially about urban design. Looking at the number of published academic papers, majority of them are about applying TOD concepts in designing urban transit hubs and

² Data provided by the World Bank. Refer to <https://data.worldbank.org.cn/indicator/SP.URB.TOTL.IN.ZS>.

station spaces, which reflect the current development stage of most cities in China. In comparison, international TOD research concepts and academic progress differs significantly. Specifically, this theoretical research focuses more on studying the social and environmental impact of TOD. In 2019, the Journal of Planning Education and Research published an article titled A Twenty-Five-Year Biography of the TOD Concept: From Design to Policy, Planning, and Implementation, which called for TOD research to focus more on developing inclusive, sustainable, walkable, and affordable communities.

Although the TOD as a theory was first summarized from a large number of practices in the mixed development of public transit and land from a community scale, its value and role has been continuously explored after 30 years of theoretical development. At present, the academic community believes that TOD research can start from the perspective of systems science. A comprehensive and systematic exploration of the linked disciplines of urban planning, transportation, environment, society, and applied economics can be used for identifying how TOD coordinates the advantages of these disciplines and better provide cities with high-quality development paradigms, thereby improving the overall quality of life of residents. As urbanization in China enters the next level of development, society as a whole has high expectations on achieving high-quality urbanization. As a widely recognized concept in planning and practice, multi-dimensional TOD from an interdisciplinary perspective will further drive urban development in the future.

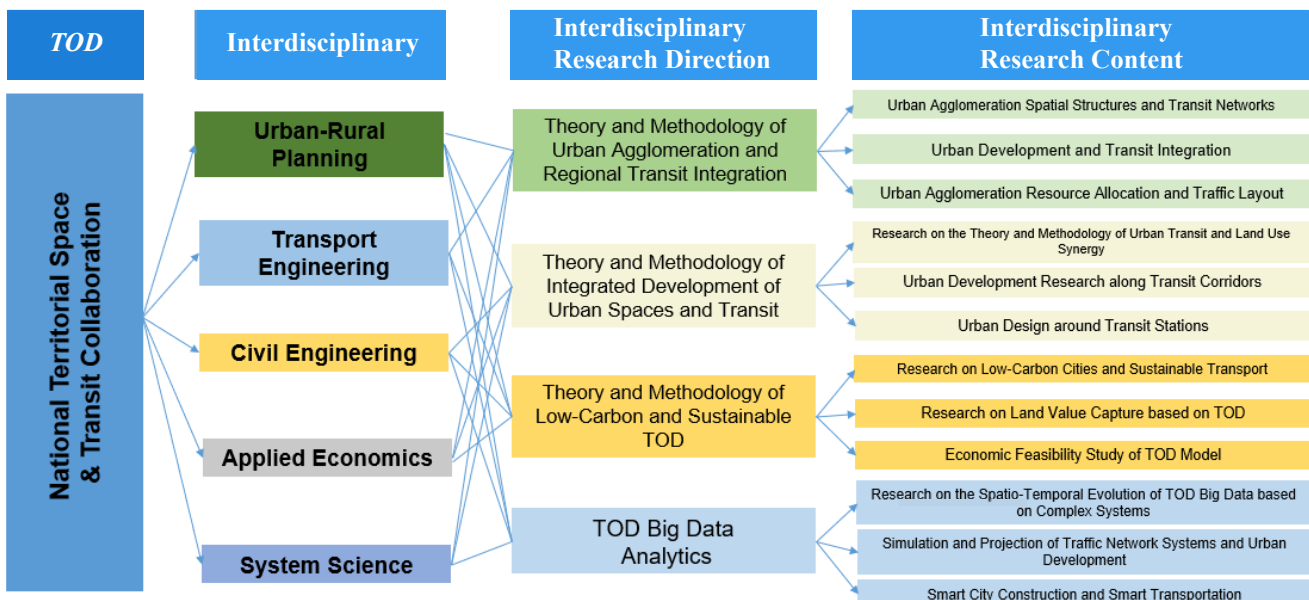


Figure 1: Theoretical research, methods, and technical support required for future TOD
Source: "Multi-Dimensional and Multi-Scale Rail Transit Leads Urban Development" by Professor Zhang Chun.

A Multi-Dimensional and Multi-Scale TOD Theoretical Framework

The ultimate goal of the rich research content based on interdisciplinary fields shown in Fig. 1 is to identify how to better utilize TOD in constructing high-quality cities and improving the quality of life of residents. When divided according to typical TOD cities, corridors, and stations, the ideal transit facilities, urban spatial structures, and the residential transit models based on them can be obtained. **At the city level**, the application of high-density, grouped, and diversified urban spatial structures can realize the balance of work and living spaces and reduce the demand for long-distance commuting. **At the corridor level**, the application of high-intensity and diverse urban construction around public transit routes can formulate value-added housing in the densely developed areas along the corridor. **At the station level**, the application of comprehensive public transit systems based on urban rail transit stations, bus stations, and shared-bike stops connects and guides the short-distance transit needs of areas surrounding stations. On this basis, the introduction of **economic prosperity, social fairness, and environment constraints** as concepts will help evaluate and analyze specific case studies. The result will be a multi-dimensional and multi-scale TOD theoretical research framework, as shown in Fig. 2 below. This paper will apply this theoretical research framework in conjunction with specific case studies.

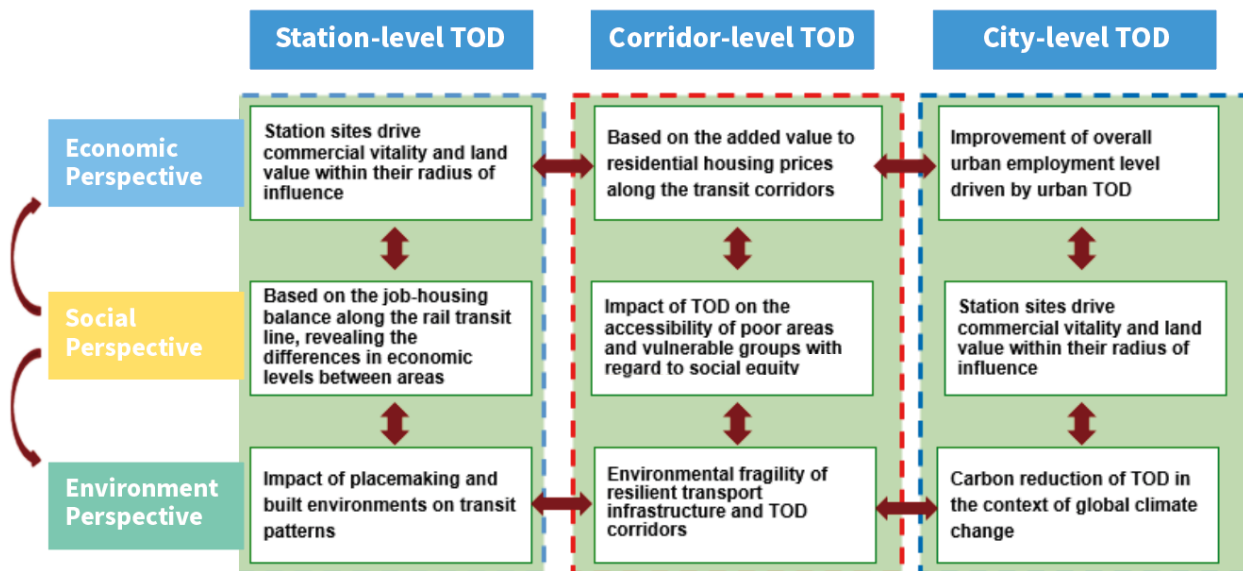


Figure 2: A multi-dimensional and multi-scale TOD theoretical framework

Source: “Multi-Dimensional and Multi-Scale Rail Transit Leads Urban Development” by Professor Zhang Chun.

■ Economy

First, this session will analyze and evaluate the Tianjin West Railway Station TOD case study from an economic perspective. In terms of scale, the Tianjin West Railway Station has driven the development of the “West Railway Station” district and the areas along Tianjin Metro Line 6 as a whole. Due to its position as a high-speed rail hub, Tianjin West Railway Station has a certain degree of influence at the city and even at metropolitan level.

► **There is a clear gap between the TOD economic positioning of Tianjin West Railway Station and the current situation: high expectations but great difficulties**

Tianjin is an important fulcrum for the integrated development of the Beijing-Tianjin-Hebei (BTH) region with great development prospects. The Outline Plan of Beijing-Tianjin-Hebei Integrated Development (2015) positions Tianjin as “a national advanced manufacturing research and development base, international shipping core area in north China, innovative financial operation demonstration area, and reform and opening up pioneer area.”³ As a transit hub carrier of these economic development goals, the TOD planning of Tianjin West Railway Station at the site level positions the station as a “Tianjin high-speed rail business office area, multi-functional metropolitan complex business district, and high-end apartment area for business travelers in the BTH region”. However, the gap between these goals and reality is relatively clear. As shown in Fig. 3, the current urban area in which Tianjin West Railway Station is located is not covered by the current vibrant office and commercial areas of Tianjin. From the perspective of material construction, the speed of development around the site is relatively slow and does not meet the actual needs of its planned positioning. The TOD premium of Tianjin West Railway Station has impacted the price of residential properties to a faster extent than office and commercial properties. Another concern is that the generation of greater commercial and business vitality in the surrounding areas of Tianjin West Railway Station over the short term requires the cooperation of multiple stakeholders. The continuous efforts of all stakeholders are still required to achieve economic benefits.

³ The “Outline Plan of Beijing-Tianjin-Hebei Integrated Development (2015)” was approved by the Central Financial and Economic Affairs Commission in April 2015.



Figure 3: Overlay map of spatial distribution of rail transit and hub stations and influence of commercial offices in Tianjin
Source: “Multi-Dimensional and Multi-Scale Rail Transit Leads Urban Development” by Professor Zhang Chun of the Academy of Urban Planning and Design, Beijing Jiaotong University.

► **The TOD of Tianjin West Railway Station has altered the city’s commercial structure: the spatial distribution of rents changed**

Urban management and planning personnel expect that the construction of TOD rail transit hub stations will transform urban commercial spaces and enhance commercial vitality around stations. The TOD of Tianjin West Railway Station shows that the distribution of rents in the surrounding area has changed to a certain extent (see Fig. 4 below). The average rent of commercial stores in Tianjin is 4.4 CNY/m² per day, while the average rent of commercial stores within a 1 km radius of Tianjin West Railway Station is 4.49 CNY/m² per day, only slightly higher than the city average. This indicates that the degree to which the TOD of Tianjin West Railway Station improved surrounding commercial value is not very significant. A horizontal comparison shows that the current average rent of stores in various hub sites of Tianjin is: Tianjin Railway Station (7.02 CNY/m² per day) > Tianjin North Railway Station (5.83 CNY/m² per day) > Tianjin West Railway Station (4.49 CNY/m² per day) > Tianjin South Railway Station (2.98 CNY/m² per day). The average commercial rent within 1km of Tianjin Station, the site with the strongest commercial vitality, is 7.02 CNY/m² per day, partly due to the influence of mature business circles around Tianjin Station (see Fig. 5 below).

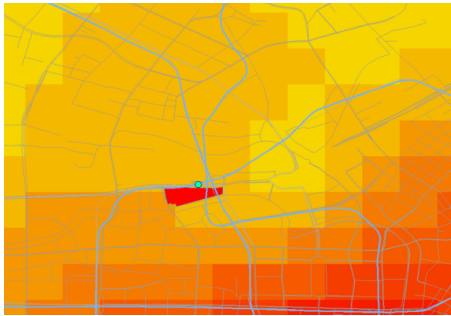


Figure 4: Point of interest (POI) density analysis of Tianjin West Railway Station

Source: “Multi-Dimensional and Multi-Scale Rail Transit Leads Urban Development” by Professor Zhang Chun of the Academy of Urban Planning and Design, Beijing Jiaotong University.

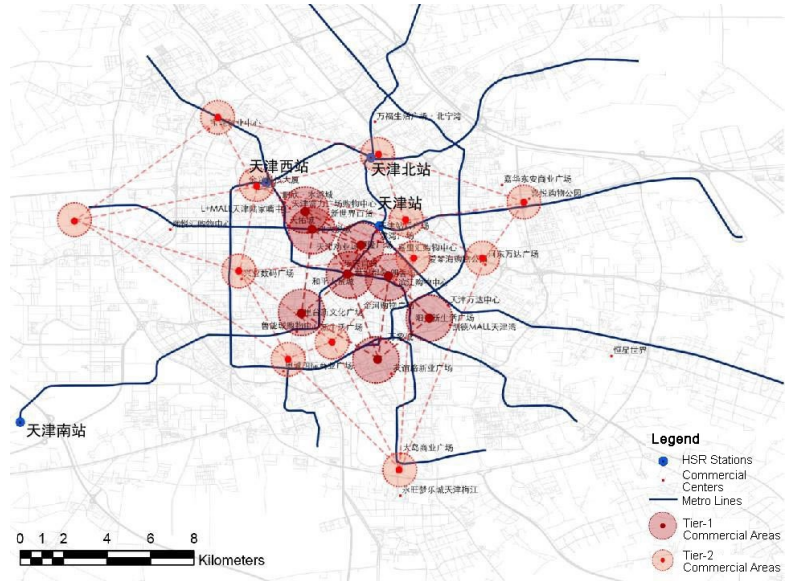


Figure 5: Hierarchical structure of Tianjin’s urban central business districts

Source: “Multi-Dimensional and Multi-Scale Rail Transit Leads Urban Development” by Professor Zhang Chun of the Academy of Urban Planning and Design, Beijing Jiaotong University.

► **The corridor level of Tianjin Metro Line 6 delivers added value to surrounding real estate: value added within a 500-1000 m radius is relatively significant**

The value added to real estate around rail stations is the direct impact of TOD that city governance and residents are most concerned with. The Beijing Jiaotong University team collected real estate data from 2011 to 2019 and analyzed the trend of surrounding housing prices before and after the opening of Tianjin Metro Line 6 (where the Tianjin West Railway Station TOD project is located) with the Hedonic Model⁴. The analysis shows that there is a strong correlation between the trend of housing prices in this period and the start and opening of Line 6⁵ (see Fig. 6 below). As shown in Fig. 7, value added to real estate within a 500-1000m radius of rail stations is significant. But it is not the closer the property is to a rail station, the greater the influence.

⁴ By decomposing the price of real estate properties to identify the implied price of each feature, while keeping the characteristics of the real estate unchanged and decomposing the characteristic factors in the price change, the effect of characteristic changes is removed item by item from the total price change, and the price change caused purely by the relationship between supply and demand is obtained.

⁵ Tianjin Metro Line 6 started construction on March 29, 2011, and started operations on August 1, 2016, December 31, 2016, and April 26, 2018 respectively.

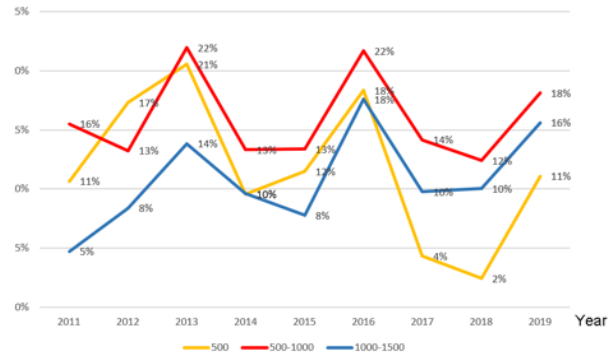
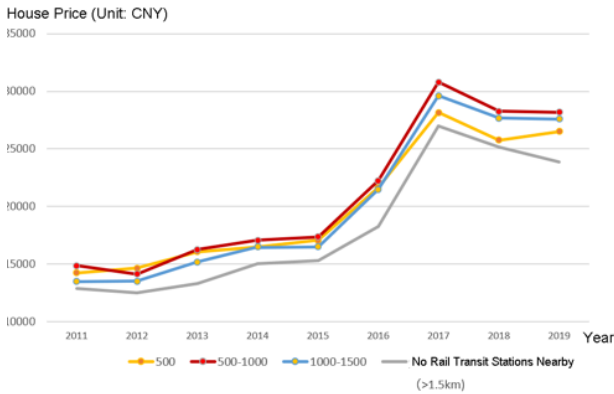


Figure 6: Comparison of price trends in different distances from the stations of Rail Transit Line 6

Figure 7: Comparison of regional premiums at different distances from the stations of Rail Transit Line 6

Source: Cui Nana et al. Research on the Spatiotemporal Premium Effects of Urban Rail Transit Based on Network Big Data [J]. Geography and Geo-Information Science, 2022,38(01):133-137.

This economic analysis and research on the Tianjin West Railway Station TOD project from the site, corridor, and city level shows the impact of the hub site. Urban development decision-makers should consider that the effects on spatial distribution, commercial vitality, and real estate value are vary. Moreover, it is likely that the expected goals of the plan have not been achieved. What could be the reason for these results? Decision makers may face problems that have many potential solutions. Under the premise that the expectations of various indicators are different, which economic indicators should be selected for development ?

Social

This session will use Beijing as an example to discuss TOD from a societal perspective and introduce the relationship between the development of rail transit TOD at the city level and the balance between employment and housing. As the capital of China and a megacity with a permanent population of over 21.88 million, the planning and construction of rail transit in Beijing has a significant impact on the layout of citizen’s employment and residents.⁶

► The construction of urban rail transit in Beijing has trended towards homogenization, polarization, decentralization, and centralization over time

⁶ “China Statistical Yearbook 2021”, National Bureau of Statistics of China, September 2021.

From 2000 to 2010, the construction of rail transit has made great progress in terms of rail lines and processes, and the distribution of employment spaces in Beijing has continued to expand with urban sprawl. However, the expansion of employment spaces has two sides. On the one hand, with the construction of suburban rail lines, a portion of the employed population has been relocated to areas such as Tongzhou, Changping, and Daxing, which are far from the central urban area, and have become local commercial and community service centers (see Fig. 8 below). On the other hand, the employment density and agglomeration effect in the central urban area have become more significant (see Fig. 9 below). Judging from the comparison of these two aspects, the power of agglomeration has clearly exceeded the power of dispersal and has played a leading role. This reflects that with the continuous advancement of rail transit and TOD construction, the location differences of cities have become more prominent, and the living and employment spaces of cities have become no longer homogeneous⁷.

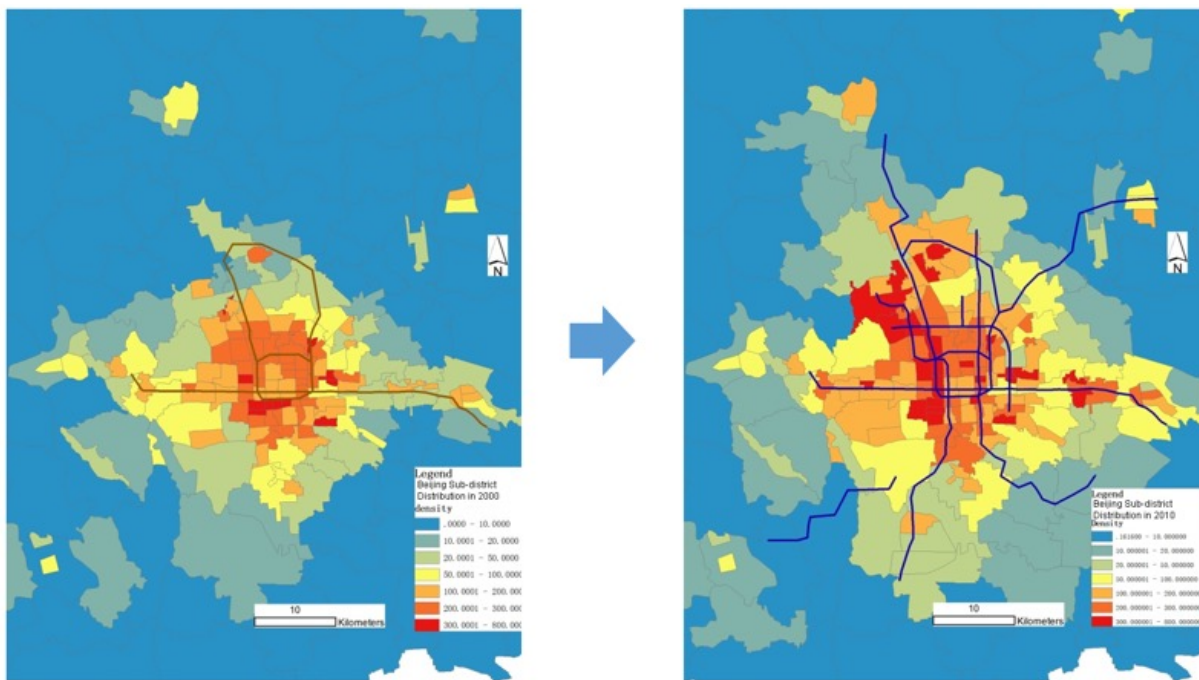


Figure 8: Employment changes of Beijing sub-districts from 2000 (left) to 2010 (right) overlaid on the progress of rail transit construction.

Source: Zhang Chun et al. Research on the Characteristics and Changes of the Spatial Relationship Between Employment and Housing in Beijing — Based on the Empirical Analysis of the 5th and 6th Population Censuses and the 2001 and 2008 Economic Censuses [J]. Urban Planning. 2016,40(10):59-64.

⁷ The 17th issue of the Quarterly Newsletter of GEF-6 China Sustainable Cities Integrated Approach Pilot Project published in September 2022 introduced the trend and trajectory of “decentralization” in Tokyo, which differs from the aforementioned conclusions, primarily due to the impact of pandemic responses by rail transit operators.



Figure 9: Spatial renderings of employment changes of Beijing sub-districts from 2000 (left) to 2010 (right).

Source: Zhang Chun et al. Rail Transportation Lead Urban Form Change: A Case Study of Beijing. *Urban Rail Transit*, 2017, 3(01):15-22.

► **The spatial and functional effects of job-housing imbalance in Beijing: long-distance commuting and a worrying quality of life of disadvantaged groups**

The high concentration of employment spaces and the dispersal of living spaces as outlined above will result in a serious job-housing imbalance. In terms of space, this is reflected in the fact that a large number of suburban commuters have to embark on taxing long-distance commutes. Using the Tongzhou sub-center as an example, can a dual-center or multi-center urban form naturally solve the problem of job-housing imbalance? Research (Fig. 10) shows that during the peak morning period, numerous employed residents will travel from the Tongzhou sub-center to various office locations in Beijing urban areas through the rail transit system at high temporal and economic cost.

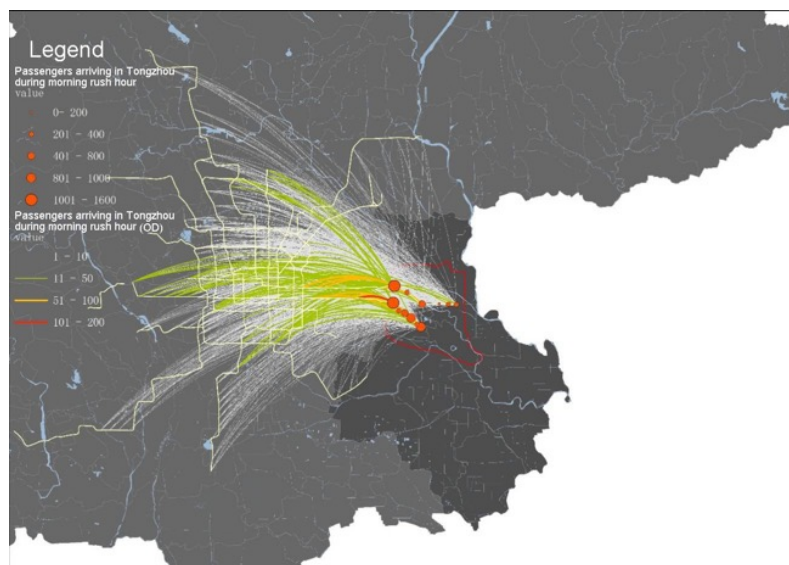


Figure 10: OD connections departing from Tongzhou sub-center in the morning rush hour.

Source: Han Chunjie. Research on the Impact of Urban Rail Transit on the Spatial Relationship Between Employment and Residences [D]. Beijing Jiaotong University, 2020.

Long-distance commuters are often made up of many socially disadvantaged groups, making these problems even more serious. It is precisely lower income and relatively unstable jobs that force disadvantaged groups to choose lower-priced suburban housing. Using Tongzhou Beiyuan Station in Tongzhou sub-center as an example, the subway station has a transfer volume of 5000-8000 passengers during peak periods, but data shows that around 200,000 passengers depart from Yanjiao (east of Beijing) to work in the city center every day. This paints a clear picture of the commuting and transfer experience of the station. Affordable housing around the subway station is located around 800 meters away, meaning that almost all commuters who live nearby have to rely on buses, bicycles, or long-distance walking to reach the rail station. Because commuting takes a long time, commuters have to start their day early, which compresses or even deprives them of breakfast time, which may have hidden negative impacts on their health.

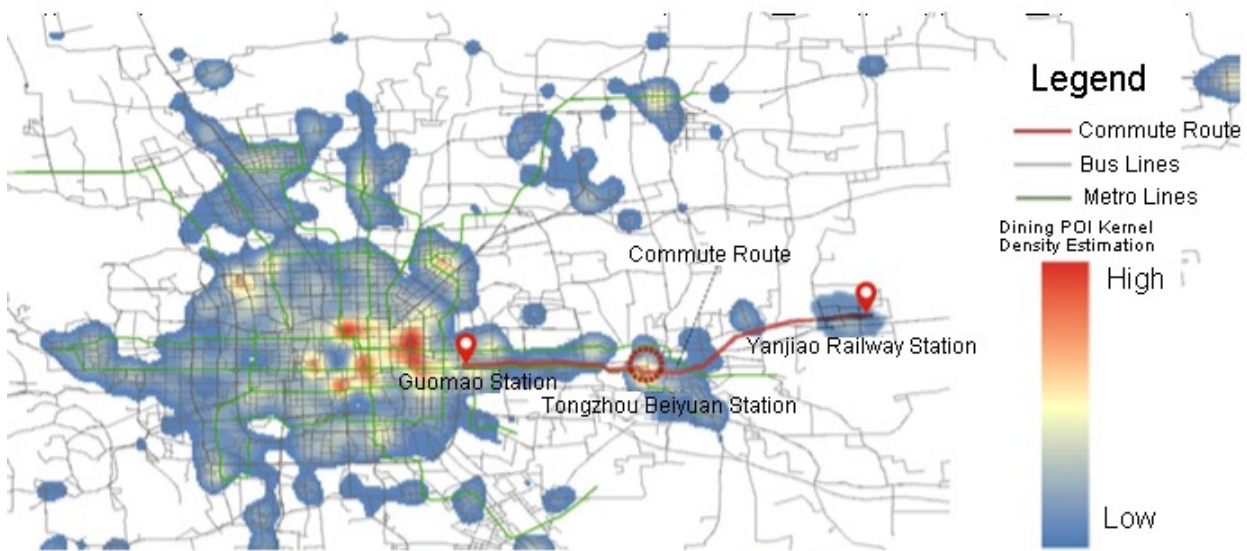


Figure 11: Distribution of dining POI in the Beijing eastern rail transit commuter corridor.

Source: Han Chunjie. Research on the Impact of Urban Rail Transit on the Spatial Relationship Between Employment and Residences [D]. Beijing Jiaotong University, 2020.

The correlation between rail transit TOD and employment and living spaces in megacities is an issue that requires a lot of thoughts from urban governance decision makers. From a societal perspective, urban functions and spatial planning, the construction of affordable housing, and the arrangement of commercial service facilities should fully take into account the real needs of people who live away from their workplaces and those who belong to socially disadvantaged groups. Through this, the social equity and happiness of commuting can be improved through rail transit TOD construction, planning, and policies.

■ Environment

In line with the dual carbon goals proposed by China in 2021, this session will briefly introduce the relationship between TOD and carbon emissions. A literature review shows that at present, the academic community generally believes that transforming and creating a compact urban form through TOD can reduce urban carbon emissions. This is specifically reflected in (1) **Compact development and reduced urban sprawl** — the design and concept of TOD can help mitigate disorderly urban sprawl and reduce the energy consumption caused by cars and similar vehicles. (2) **Low-carbon travel and public transit-oriented development** — encouraging the use of public transit and walking can effectively reduce car use. (3) **Mixed use and close-proximity commuting** — the creation of a mixed-use area that integrates work, commerce, culture, education, and residential functions lowers the distance between residences and workplaces, facilitates close-proximity commuting, and reduces the demand for cars. Although there are no empirical case studies in China, a study in Jakarta shows that according to historical data from 1993 to 2013, after the introduction of TOD planning and strategies, due to highly related changes in urban forms, enhanced connectivity, increased density, and changes to public transit utilization, energy consumption was reduced by roughly 20% at the city level, which was a total reduction of nearly 3.5 million tons of carbon emissions.

Many other cities around the world have found that the urban forms supported by TOD can increase the utilization of public transit through local urban planning controls, thereby reducing carbon emissions⁸.

Editor's Note

Written in the closing stages of the project: futures prospects of TOD practice and research in China

During the four years of this project's implementation, and with the continuous construction and development of urban rail transit in China, the value of the TOD concept has been clearly recognized by the public. Though the project may be coming to an end, advancements in TOD and rail transit will continue. With regard to TOD practice and research in Chinese cities in the future, we look forward to the nearly 30 projects funded by the World Bank GEF6 project to deliver practical benefits and greater inspiration to more cities in China. We also expect that as the construction of urban physical spaces continues, there will be wide discussions on relevant economic, social, and environmental issues to jointly drive the high-quality development of Chinese cities in the future.

⁸ Liu Zhidan, Zhang Chun, Song Yan. A Multi-disciplinary, Multi-scale Agenda of Urban Form Studies Toward Sustainable Development: A Literature Review on Urban Form Studies in the USA and China. *Urban Planning International (UPI)*. 2012, 30 (02):47-53.

Upcoming TOD Related Events

2022 World Transport Convention

November 29 - December 3, 2022, held online

(Relevant Link)

Low Carbon Travel Forum of the 10th International Conference on Transportation and Space-Time Economics (TSTE 2022)

December 7, 2022, held online

(Relevant Link)

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