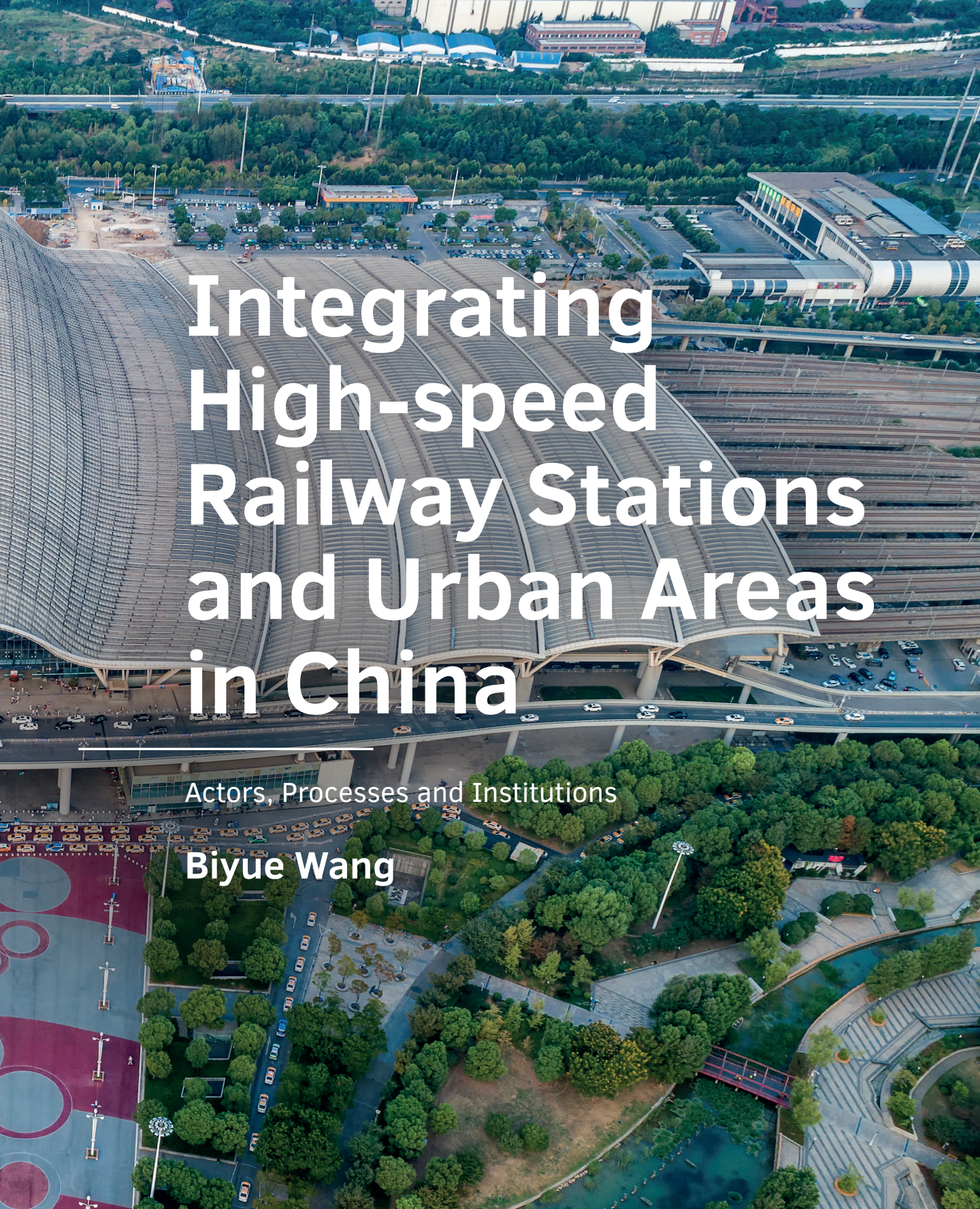

Integrating High-speed Railway Stations and Urban Areas in China

Actors, Processes and Institutions

Biyue Wang

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TOC

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Integrating High-speed Railway Stations and Urban Areas in China

Actors, Processes and Institutions

Dissertation

for the purpose of obtaining the degree of doctor
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chair of the Board for Doctorates
to be defended publicly on
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by

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This dissertation is dedicated to the memory of my grandmother,
who give me unconditional love.

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Summary

In 2004, the State Council of China officially approved the construction of high-speed railways (HSR). Since then, China's HSR network has entered a period of rapid development, and in 2008, the first HSR began operation. The total length of Chinese HSR network has reached 38,000 km in 2020, far exceeding the total length of all HSR in other countries. By the end of 2030, this HSR network will connect 34 provincial capitals and more than 80% of major cities in China with 1,000 HSR stations. Along with the rapid urbanization, 139 Chinese cities have planned or built at least one HSR new town by 2019. Chinese governments and people expect that HSR can catalyze economic and urban development. However, the planning and development of Chinese HSR station areas have been criticized by the public, media, and scholars because they do not follow the laws of urban development and have even been called by some scholars "the Great Leap Forward" in the new era.

There are four main problems with Chinese HSR station areas: unsustainable development patterns, station areas far from urban areas, oversized HSR station areas and new towns, and difficulties in transferring and urban development after operation. First, although Chinese local governments claim that HSR station areas are planned according to the concept of transit-oriented development (TOD), scholars argue that the planning of these station areas actually violates the sustainable development principles of TOD, resulting in unsustainable development. Second, unlike in Europe and Japan, where HSR stations are used to promote urban renewal, most Chinese HSR station areas are newly built. These HSR station areas are located far from the built-up areas of cities, about 10 km from the city center. The locations of these HSR stations not only make it difficult to transfer to urban transport methods, but also make it difficult to attract economic and urban development. Third, these HSR station areas are fairly large, in some cases more than half the size of the city. A large amount of agricultural land has been converted into construction land, which has caused urban sprawl. Due to land speculation, most of these HSR station areas develop only real estate functions, leading to the fragmentation of the station areas from the surrounding areas. Finally, weak connections between these HSR station areas and urban transport methods make it challenging for passengers to reach their destinations. Meanwhile, the development of urban functions in these HSR station areas lags far behind the plan, making it difficult to attract investment and talent.

Most studies of HSR in China have focused on the impact of HSR on accessibility, the economy, and housing prices after its opening. However, there is a lack of study to investigate the institutional conditions and decision-making processes that contribute to these development problems. The actors involved in the decision-making process of Chinese HSR station areas, their resources, interdependencies, and interactions have not been fully revealed. Furthermore, most studies focus only on the urban effects associated with the development of HSR in China, and there is a lack of discussion on how to improve cooperation among decision makers and provide policy support for the integration of transportation and land use in station areas. Therefore, the main aim of this study is to fill this research gap. By gaining insight into the actors, decision-making process, and institutional context, it explores the reasons for the difficulties in developing Chinese HSR station areas and provides policy strategies for actor cooperation and station area development to promote the integration of transport and land use in HSR station areas.

The research aims were translated into four research questions: (1) Why do HSR stations in China, planned according to the TOD concept, result in unsustainable development? (2) Why are Chinese HSR station areas far from the city centers? (3) Why are Chinese HSR station areas so large? (4) Why does the development of Chinese HSR station areas lag behind planning from a governance perspective?

In order to answer these research questions, a three-dimensional framework was established to analyze the HSR station areas in China. The first dimension is based on TOD and Node-Place theories to dissect the transport and urban functions of Chinese HSR station areas. The second dimension is based on Policy Network Theory (PNT) and the Institutional Analysis and Development (IAD) framework to reconstruct the decision-making process of Chinese HSR station areas. The third dimension aims to analyze the impact of institutional context on the planning of Chinese HSR station areas based on state entrepreneurialism. This thesis focuses on case studies, using context analysis and interviews as the main research methods. It compares the planning of HSR station areas in 15 different cities of different sizes and delves deep into the decision-making processes of three cases, Shenzhen in Guangzhou province, Lanzhou in Gansu province and Yongcheng in Hubei province.

Based on the conceptual framework, this study first focuses on the planning features of HSR station areas in China to discuss which TOD principles should be followed in the planning of HSR stations and which TOD principles are followed or violated in the planning of HSR stations in China. First, the factors of TOD that are suitable for the planning of HSR station areas are summarized from the literature. Then, 15 Chinese HSR station master plans are analyzed using content analysis, with the goal of exploring how these TOD factors are considered in the Chinese HSR station area

plans. The results show that the plans of Chinese HSR station areas violate most of the TOD principles, but different reasons cause the gap between theory and practice. Moreover, TOD in HSR station areas is used as a financing tool to promote state-supported and transit-led suburbanization. It has resulted in arable land loss and social inequity, but plans rarely address how to resettle farmers who have lost their land. Finally, deviations from TOD principles are more severe in small and medium-sized cities, potentially resulting in wasted land and unsustainable development.

This study then explores one of the most salient features of Chinese HSR station areas, namely their remote location. Most HSR stations are located far from city centers in China, which has negative impacts on urban and economic development. The decision-making processes of HSR station location choices in Shenzhen, Lanzhou and Yongcheng are reframed based on the interviews with both railway and urban actors. The results show that railway actors and urban actors control different resources and have to cooperate with each other to select a suitable location. It also shows that the costs and risks of development often create impasses in the process of location choice. Furthermore, three potential locations for an HSR station usually appear in most decision-making processes: city center, new town and urban fringe. Urban fringe locations are usually preferred by both railway and urban actors since they can serve their interests.

This study then investigates another distinctive feature of Chinese HSR station areas, i.e., the large station area and HSR New Town. The part investigates how the Yongcheng local state harnesses the HSR project strategically to develop a new town through the theoretical lens of state entrepreneurialism. Local governments proactively implemented entrepreneurial spatial policies in the HSR new town development to generate land revenue, pursue career advancement and maintain state power. Their behaviors are competing with neighboring cities, using the HSR project as their main strategy for growth and enlarging urban areas through HSR new town. It led to the loss of cultivated land and mounting local debt.

The last part of this study focuses on the difficulties of transferring and the slow development of urban functions in the HSR station area. This part analyzes the interactions of actors in each transport and land use function of the HSR station area and how they have been influenced by the institutional rules. The findings reveal that the current Chinese institutions obstruct the integrated development of HSR station areas and fail to create a common understanding of spatial development and ways to achieve value capture. There is a lack of national guidelines for the planning of HSR station areas and cooperation of actors. The integration of transport and land use also requires a strong governance capacity of local governments to establish cooperative organizations.

This study suggests that Chinese HSR station areas should pay more attention to the integration of transport and land use, balancing transport and urban functions and enabling value capture. The national government should develop specific planning guidelines for HSR station areas for cities of different sizes. Local governments need to establish a cross-sectoral cooperative coalition to plan and manage HSR station areas and create conditions for value capture. For the successful development of HSR station areas, the national government should enact policies that support investments of market actors in railway construction and allow them to participate in the decision-making process. Furthermore, profound reforms in the Chinese institutional system are needed to change the motivations of local governments towards using HSR station areas for land-leasing revenue and as a political achievement for local officials.

Overall, this study explores the characteristics, decision-making processes, and institutional context of the planning and development of HSR station areas in China. Its purpose is not only to reveal the causes of the development dilemmas of these HSR station areas and to understand the drawbacks of the current system, but also to propose a set of problem-solving strategies to promote the integration of transport and land use. By showing the interactions and bargaining between different levels of government, this study provides new insights into the actual functioning of China's massive bureaucracy. Furthermore, this study provides the basis for a comparison of international HSR station area planning. The conceptual framework of this study can also be applied to other national contexts, adding new knowledge to the planning of megaprojects. The social significance of this study is that its identification of the development problems and the proposed strategies for HSR station areas can help to alleviate the growing debt of the China Railway and local governments. The findings are also applicable to other large infrastructure projects in China, especially transport projects.

Samenvatting

In 2004 keurde de Chinese Staatsraad officieel de aanleg van hogesnelheidsspoorwegen goed. Sindsdien is het Chinese HSR-netwerk in een periode van snelle ontwikkeling terechtgekomen, en in 2008 werd de eerste HSR in gebruik genomen. De totale lengte van het Chinese HSR-netwerk bedraagt 38.000 km in 2020, veel meer dan de totale lengte van alle HSR in andere landen. Tegen eind 2030 zal dit HSR-netwerk 34 provinciehoofdsteden en meer dan 80% van de grote steden in China verbinden met 1.000 HSR-stations. Samen met de snelle verstedelijking hebben 139 Chinese steden tegen 2019 minstens één nieuwe HSR-stad gepland of gebouwd. De Chinese regeringen en de Chinese bevolking verwachten dat de HSR een katalysator kan zijn voor de economische en stedelijke ontwikkeling. De planning en ontwikkeling van de Chinese HSR-stationsgebieden zijn echter bekritiseerd door het publiek, de media en geleerden omdat ze de wetten van de stedelijke ontwikkeling niet volgen en zijn door sommige geleerden zelfs “de Grote Sprong Voorwaarts” in het nieuwe tijdperk genoemd.

Er zijn vier belangrijke problemen met de Chinese HSR-stationsgebieden: niet-duurzame ontwikkelingspatronen, stationsgebieden ver van de stedelijke gebieden, te grote HSR-stationsgebieden en nieuwe steden, en problemen met overstappunten en stedelijke ontwikkeling na de exploitatie. Ten eerste, hoewel Chinese lokale overheden beweren dat HSR-stationsgebieden worden gepland volgens het concept van transit-georiënteerde ontwikkeling (TOD), beweren wetenschappers dat de planning van deze stationsgebieden in feite in strijd is met de duurzame ontwikkelingsprincipes van TOD, wat resulteert in een niet-duurzame ontwikkeling. Ten tweede, in tegenstelling tot Europa en Japan, waar HSR stations worden gebruikt om stedelijke vernieuwing te bevorderen, zijn de meeste Chinese HSR stationsgebieden nieuw gebouwd. Deze HSR-stations liggen ver van de bebouwde kom van steden, ongeveer 10 km van het stadscentrum. De ligging van deze HSR-stations maakt het niet alleen moeilijk om over te stappen op stedelijke vervoersmethoden, maar maakt het ook moeilijk om economische en stedelijke ontwikkeling aan te trekken. Ten derde zijn deze HSR-stationsgebieden vrij groot, in sommige gevallen meer dan de helft van de oppervlakte van de stad. Een grote hoeveelheid landbouwgrond is omgezet in bouwgrond, wat heeft geleid tot stedelijke wildgroei. Door grondspeculatie ontwikkelen de meeste van deze HSR-stationsgebieden alleen vastgoedfuncties, wat leidt tot de versnippering van de stationsgebieden van de omliggende gebieden. Ten slotte maken de zwakke

verbindingen tussen deze HSR-stationsgebieden en stedelijke vervoersmethoden het voor passagiers moeilijk om hun bestemmingen te bereiken. Ondertussen blijft de ontwikkeling van stedelijke functies in deze HSR-stationsgebieden ver achter bij het plan, waardoor het moeilijk is om investeringen en talent aan te trekken.

De meeste studies over de HSR in China hebben zich geconcentreerd op het effect van de HSR op de toegankelijkheid, de economie en de huizenprijzen na de opening. Er is echter een gebrek aan studie die de institutionele condities en besluitvormingsprocessen onderzoekt die bijdragen aan deze ontwikkelingsproblemen. De actoren die betrokken zijn bij het besluitvormingsproces van Chinese HSR stationsgebieden, hun middelen, onderlinge afhankelijkheden en interacties zijn niet volledig blootgelegd. Bovendien richten de meeste studies zich alleen op de stedelijke effecten die samenhangen met de ontwikkeling van de HSR in China, en er is een gebrek aan discussie over hoe de samenwerking tussen beleidsmakers te verbeteren en beleidsondersteuning te bieden voor de integratie van vervoer en landgebruik in stationsgebieden. Daarom is het hoofddoel van deze studie om deze leemte in het onderzoek op te vullen. Door inzicht te verwerven in de actoren, het besluitvormingsproces en de institutionele context, worden de redenen voor de problemen bij de ontwikkeling van Chinese HSR-stationsgebieden onderzocht en beleidsstrategieën aangereikt voor de samenwerking tussen actoren en de ontwikkeling van stationsgebieden om de integratie van vervoer en landgebruik in HSR-stationsgebieden te bevorderen.

De onderzoeksdoelen werden vertaald in vier onderzoeksvragen: (1) Waarom resulteren HSR stations in China, gepland volgens het TOD concept, in een niet-duurzame ontwikkeling? (2) Waarom liggen de Chinese HSR stations ver van de stadscentra? (3) Waarom zijn de Chinese HSR-stationsgebieden zo groot? (4) Waarom blijft de ontwikkeling van Chinese HSR-stationsgebieden achter bij de planning vanuit een bestuurlijk perspectief?

Om deze onderzoeksvragen te beantwoorden, werd een driedimensionaal raamwerk opgezet om de HSR stationsgebieden in China te analyseren. De eerste dimensie is gebaseerd op TOD en Node-Place theorieën om de transport en stedelijke functies van Chinese HSR stationsgebieden te ontleden. De tweede dimensie is gebaseerd op de Policy Network Theory (PNT) en het Institutional Analysis and Development (IAD) raamwerk om het besluitvormingsproces van Chinese HSR stationsgebieden te reconstrueren. De derde dimensie is gericht op het analyseren van de invloed van de institutionele context op de planning van Chinese HSR stationsgebieden op basis van staatsondernemerschap. Deze dissertatie richt zich op case studies, waarbij context analyse en interviews als belangrijkste onderzoeksmethoden worden gebruikt. Het vergelijkt de planning van HSR stationsgebieden in 15 verschillende steden van

verschillende grootte en gaat diep in op de besluitvormingsprocessen van drie cases, Shenzhen in de provincie Guangzhou, Lanzhou in de provincie Gansu en Yongcheng in de provincie Hubei.

Gebaseerd op het conceptuele kader, richt deze studie zich eerst op de planningskenmerken van HSR stationsgebieden in China om te bespreken welke TOD principes gevolgd zouden moeten worden bij de planning van HSR stations en welke TOD principes worden gevolgd of geschonden bij de planning van HSR stations in China. Eerst worden de factoren van TOD die geschikt zijn voor de planning van HSR stationsgebieden samengevat uit de literatuur. Vervolgens worden 15 Chinese masterplannen voor HSR stations geanalyseerd met behulp van inhoudsanalyse, met als doel te onderzoeken hoe deze TOD factoren worden overwogen in de Chinese plannen voor HSR stationsgebieden. De resultaten laten zien dat de plannen van Chinese HSR stationsgebieden de meeste TOD principes schenden, maar verschillende redenen veroorzaken de kloof tussen theorie en praktijk. Bovendien wordt TOD in HSR-stationsgebieden gebruikt als een financieringsinstrument om door de staat gesteunde en transit-geleide suburbanisatie te bevorderen. Dit heeft geleid tot verlies van landbouwgrond en sociale ongelijkheid, maar in de plannen wordt zelden aandacht besteed aan de hervestiging van boeren die hun land zijn kwijtgeraakt. Ten slotte zijn de afwijkingen van de TOD-principes ernstiger in kleine en middelgrote steden, wat kan leiden tot verspilling van land en niet-duurzame ontwikkeling.

Deze studie onderzoekt vervolgens een van de meest in het oog springende kenmerken van Chinese HSR-stationsgebieden, namelijk hun afgelegen ligging. De meeste HSR stations liggen ver van de stadscentra in China, wat negatieve gevolgen heeft voor de stedelijke en economische ontwikkeling. De besluitvormingsprocessen voor de locatiekeuze van HSR stations in Shenzhen, Lanzhou en Yongcheng worden opnieuw bekeken op basis van interviews met zowel spoorweg- als stedelijke actoren. De resultaten tonen aan dat spoorwegactoren en stedelijke actoren verschillende middelen beheren en met elkaar moeten samenwerken om een geschikte locatie te kiezen. Ook blijkt dat de kosten en risico's van ontwikkeling vaak impasses veroorzaken in het locatiekeuzeproces. Bovendien komen in de meeste besluitvormingsprocessen drie potentiële locaties voor een HSR-station naar voren: stadscentrum, nieuwe stad en stadsrand. Stadsrandlocaties genieten gewoonlijk de voorkeur van zowel de spoorwegen als de stedelijke actoren omdat zij hun belangen kunnen dienen.

Deze studie onderzoekt vervolgens een ander onderscheidend kenmerk van Chinese HSR stationsgebieden, namelijk het grote stationsgebied en de HSR New Town. In dit deel wordt onderzocht hoe de lokale overheid van Yongcheng het HSR project

strategisch inzette om een nieuwe stad te ontwikkelen door de theoretische lens van staatsondernemerschap. Lokale overheden implementeerden proactief ruimtelijk beleid in de ontwikkeling van de HSR nieuwe stad om landinkomsten te genereren, carrière te maken en de macht van de staat te behouden. Ze concurreren met naburige steden, gebruiken het HSR project als hun belangrijkste strategie voor groei en uitbreiding van stedelijke gebieden door middel van de HSR new town. Dit heeft geleid tot het verlies van landbouwgrond en een oplopende lokale schuld.

Het laatste deel van deze studie richt zich op de problemen van uitwisseling en de trage ontwikkeling van stedelijke functies in het HSR-stationsgebied. Dit deel analyseert de interacties van actoren in elke transport- en landgebruikfunctie van het HSR-stationsgebied en hoe zij beïnvloed zijn door de institutionele regels. De bevindingen laten zien dat de huidige Chinese instellingen de geïntegreerde ontwikkeling van HSR-stationsgebieden belemmeren en er niet in slagen een gemeenschappelijk begrip te creëren van ruimtelijke ontwikkeling en manieren om waarde te creëren. Er is een gebrek aan nationale richtsnoeren voor de planning van HSR-stationsgebieden en samenwerking tussen de actoren. De integratie van vervoer en ruimtelijke ordening vereist ook een sterke bestuurlijke capaciteit van lokale overheden om samenwerkingsverbanden op te zetten.

Deze studie suggereert dat Chinese HSR-stationsgebieden meer aandacht moeten besteden aan de integratie van vervoer en landgebruik, het in evenwicht brengen van vervoer en stedelijke functies en het mogelijk maken van waardecaptatie. De nationale overheid zou specifieke planningsrichtlijnen moeten ontwikkelen voor HSR-stationsgebieden voor steden van verschillende omvang. Lokale overheden moeten een sectoroverschrijdende samenwerkingscoalitie opzetten om HSR-stationsgebieden te plannen en te beheren en de voorwaarden te scheppen voor waardecaptatie. Voor een succesvolle ontwikkeling van HSR-stationsgebieden moet de nationale overheid beleid vaststellen dat investeringen van marktpartijen in de aanleg van spoorwegen ondersteunt en hen in staat stelt deel te nemen aan het besluitvormingsproces. Bovendien zijn grondige hervormingen van het Chinese institutionele systeem nodig om de motivatie van lokale overheden te veranderen om HSR-stationsgebieden te gebruiken voor landpachtinkomsten en als een politiek wapenfeit voor lokale ambtenaren.

In het algemeen verkent deze studie de kenmerken, besluitvormingsprocessen en institutionele context van de planning en ontwikkeling van HSR-stationsgebieden in China. Het doel is niet alleen om de oorzaken van de ontwikkelingsdilemma's van deze HSR-stationsgebieden bloot te leggen en de nadelen van het huidige systeem te begrijpen, maar ook om een reeks probleemoplossende strategieën voor te stellen om de integratie van vervoer en ruimtelijke ordening te bevorderen. Door de

interacties en het onderhandelen tussen verschillende overheidsniveaus te laten zien, verschaft deze studie nieuwe inzichten in het feitelijke functioneren van China's enorme bureaucratie. Bovendien biedt deze studie de basis voor een vergelijking van internationale HSR stationsgebied planning. Het conceptuele kader van deze studie kan ook worden toegepast op andere nationale contexten, waardoor nieuwe kennis wordt toegevoegd aan de planning van megaprojecten. De maatschappelijke betekenis van deze studie is dat de identificatie van de ontwikkelingsproblemen en de voorgestelde strategieën voor HSR-stationsgebieden kunnen helpen om de groeiende schuld van de Chinese Spoorwegen en lokale overheden te verlichten. De bevindingen zijn ook van toepassing op andere grote infrastructuurprojecten in China, met name vervoersprojecten.

1 Introduction

FIG. 1.1 Mid- and Long-Term Railway Network Plan 2016–2030 (adapted from CRC, 2016)

The Chinese national government has been considering the construction of high-speed railways (HSR) since 1990. The State Council formally approved the *Medium and Long-term Railway Network Plan* and the construction of HSR in 2004. On the eve of the Beijing Olympics, the first HSR in China, the Beijing-Tianjin HSR, was put into operation in 2008. Since then, the HSR of China has started to enter a rapid construction phase. By the end of 2014, the HSR network had reached 16,000 km in operation, ranking first in the world. The *Medium and Long-term Railway Network Plan (2016-2030)* was once again revised and upgraded in July 2016. The plan proposes that by 2020, the national HSR network would change from "four vertical and four horizontal corridors" to "eight vertical and eight horizontal corridors," with 30,000 km of HSR (Figure 1.1). By the end of 2020, 38,000 km of HSR have been constructed and operated, which is far greater than the total length of HSR in other countries. The number of HSR passengers was 2.36 billion, accounting for 64.4% of all railway passengers.

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Who wouldn't want to experience such a magnificent mega-infrastructure? However, when you arrive at some stations, you will encounter some problems. Imagine arriving at Chongqing West HSR Station, the largest transport hub in southwest China, and trying to change to another mode of transport to get to the city. You will get lost in the station because it is too big and there is a lack of signage, and you have to pay 10 Chinese Yuan (CNY) to have someone take you to the exit. When you find the taxi area, you have to wait in line for an hour or two to get a taxi. Taxi drivers are reluctant to pick up passengers at the station because it is too far from the city and there is traffic congestion around the station. When you try to leave by metro, you will find that the supporting metro station is not yet open. When you finally leave the station, you will find that it is surrounded by wasteland and industrial estates, even though the station area is called a Transit Oriented Development (TOD) development by the local government.

This is not an exceptional situation in Chinese HSR stations but a common one, and the phenomenon in some small and medium-sized cities is even worse. Over the past decade, China's HSR has developed at a rapid pace, making various technological breakthroughs, shortening travel times between cities and having a profound impact on urban development. There has been no end to the controversy over the location of HSR stations, HSR station areas or HSR new towns yet. The HSR station area serves as a place of opportunity and interaction as well as a place for job and business creation (Bertolini & Spit, 1998). Each city expects that the HSR could catalyze economic development, change the spatial structure, and attract new citizens. However, the ways to use the HSR station area to achieve these goals are still under-researched. This PhD study therefore provides an in-depth study of the station area planning process in China from a governance perspective. It draws lessons, identifies problems, and makes recommendations for the planning and improvement of HSR station areas. This chapter sets the direction for this PhD research and presents the research background (section 1.1), the research problems, aims and questions (section 1.2), the conceptual framework (section 1.3), the research approach (section 1.4) and the outline of this thesis (section 1.5).

1.1 Research Background

1.1.1 Integrated Transport and Land Use

Scholars have been interested in the interrelationship between transport patterns and land use for many years (Bertolini et al., 2005). Studies from both historical (Hoyle & Smith, 1998; Muller, 2004) and geographical perspectives (Cervero, 1998; Kenworthy et al., 1999) have demonstrated a strong interdependence between land use and transport. However, it seems to be much more difficult to prove the causal link. Mobility and transportation are not only contributors to socioeconomic activities but also their outcomes (Nijkamp & Kourtit, 2013). The complex relationship between transport and land use has been summarized as a land use transport feedback cycle (Giuliano, 2004; Wegener, 2004). Land use patterns partially determine the location of human activities, for example, work, education, shopping and living. To overcome the distances between these activities, people rely on transport systems to provide travel services. Travel services can be achieved by building new facilities or by improving the efficiency of existing infrastructure. An improvement of transport services in a location means an increase in accessibility, which attracts human activities and investments. It leads to the change of land use and the cycle starts again (Chorus & Bertolini, 2011; Wegener, 2004).

Several studies have shown that integrating transportation infrastructure development with land use planning can improve the social, economic, and environmental benefits of projects (Arts et al., 2016; Bertolini et al., 2005; Givoni & Banister, 2006). Better integration of transport infrastructure and urban dynamics is essential for sustainable urban development (Meyer & Miller, 1984; Priemus, 2008). Although the integration of transport and land use has been a research topic for decades, land use planning and transport planning still tend to be the responsibility of separate sectors (Un-Habitat, 2013; Wegener & Fürst, 2004). Many potential economic, social and environmental benefits are missed (Arts et al., 2016; Heeres et al., 2016). Therefore, scholars have suggested examining how to promote institutional integration and collaborative decision-making processes to ensure successful implementation of transport and land use integration (Cervero, 1998; Curtis & James, 2004; Hull, 2008).

1.1.2 HSR and Urban Development

According to the land use transport feedback cycle, as an important transport infrastructure, HSR is often considered a catalyst for regional development, urban revitalization, and economic growth (Brunello, 2018). HSR stations improve the accessibility of cities, which is thought to increase their attractiveness to companies and talent. As a result, urban decision makers may change land use and develop new urban projects around HSR stations (Facchinetti-Mannone, 2019).The impact of HSR on spatial development and economic development has been a major area of interest to researchers, but the conclusive evidence of the impact or the best way to achieve success is less clear (Chen et al., 2019). Many studies have concluded that it is impossible to fully distinguish the role of HSR from other factors involving space and the economy (Mohino et al., 2014; Sanchez-Mateos & Givoni, 2012).

The influences of HSR have been discussed at different spatial scales, from impact on the national level to station areas (Chen & Hall, 2015; Ureña et al., 2009; Yin et al., 2015). At the national level and the regional level, HSR is regarded as a transport network or a corridor that shapes regional and urban systems (Vickerman, 2015). The operation of HSR may change the relationships between different cities and their roles in the region (Blum et al., 1997; Chen et al., 2019). At the city level and the station area level, HSR is both a node of the transport network and a place in the city (Bertolini & Spit, 1998). Transportation factors, such as the frequency of HSR service and the efficiency of interchange between transport modes(Mohino et al., 2014; Tapiador et al., 2009; Willigers & Van Wee, 2011), and urban factors, such as the location of HSR stations and the size of the city (Givoni, 2006; Hall, 2009; Sanchez-Mateos & Givoni, 2012), interact to change urban form and create a new urban image and, in particular, to change the land use around the stations (Ureña et al., 2009).

National and Regional Scale

At the national level, studies have found that HSR can bring distant regions closer together, promoting benefits and growth (Spiekermann & Wegener, 2008). Studies of European networks have shown the positive influence of HSR on average accessibility, substantially increasing the accessibility of urban agglomerations with HSR stations (Gutiérrez, 2001). However, it has also been pointed out that urban agglomerations connected by HSR are already highly accessible internationally or nationally. In the same country, urban agglomerations without HSR services have little improved accessibility. Thus, HSR exacerbates the inequity of accessibility among different regions (Rietveld & Bruinsma, 2012).

At the regional level, scholars have focused on the different impacts of HSR on metropolises, large and small cities. HSR is one of the main forces reshaping the city-system and spatial structure in Europe (Hall, 2009). It improves inter-regional connectivity and thus promotes balanced and coordinated regional development (Chen & Haynes, 2017). HSR links a chain of cities together and may lead to the diffusion of market elements, such as labor and information, thus contributing to the creation of an "integrated corridor economy" (Yin et al., 2015). HSR and metropolitan areas have been studied by scholars in the United Kingdom (Chen & Hall, 2011), France (Chen & Hall, 2012; Garcia-López et al., 2017), Spain (Garmendia et al., 2012) and China (Chen, 2019; Xu et al., 2019). Their findings suggest that HSR may integrate small and medium-sized cities within a one-hour travel time of a metropolis, thereby accelerating the integration of these small and medium-sized cities into metropolitan areas. However, scholars have also observed a divergence in growth, arguing that HSR exacerbates imbalances between cities in the region and worsens the situation of poorly connected cities (Li et al., 2016; Sanchez-Mateos & Givoni, 2012; Vickerman, 2015). They argue that HSR services favor large cities at the expense of smaller intermediate cities (Ureña et al., 2009; Vickerman, 1997; Zhang et al., 2020).

City and Station Area Level

At the city level, studies have found that in some cities, new HSR stations have served as catalysts for urban renewal (Hall, 2009). In other cities, HSR, which has connected to conventional train stations, has stimulated development in their neighborhoods (Bellet et al., 2012). However, in some cities, HSR did not promote any revitalization or new development in the areas surrounding the stations (Peters, 2009). These studies show that new HSR infrastructure and improved accessibility only bring development opportunities, which are not enough to produce broader socioeconomic benefits (Brunello, 2018; Facchinetti-Mannone, 2019). The impact of HSR also depends on other urban factors, which consist of the location of HSR stations in the city, local economic foundation and land use diversity, place quality and interchange efficiency, and supporting planning policies (Yin et al., 2015).

Based on the location of HSR stations in cities in Europe and Japan, scholars have distinguished three categories of HSR stations, i.e., expansion of existing urban centers, creation of new urban centers in cities, and creation of new towns in urban fringe or suburban areas (Hall, 2009; Nikken Sekkei LTD, 2014). HSR stations in the first category are located near or within existing urban centers and can attract business and investment for urban renewal. For instance, the Lille station

in France has transformed the city from a decaying industrial center to a regional service center by central location, planning of multiple urban functions, seamless transfers, and modern design (Trip, 2008; Yin et al., 2015). The second type of HSR station in urban areas is usually used to develop new commercial sub-centers, transforming the urban form from a mono-center to a multi-center. For example, the Amsterdam Zuidas station is located at the junction of Schiphol Airport, the built-up area and the residential new town. The new station area attracts business, commercial, and cultural activities, and the existing city center benefits from the revitalization of tourism and small-scale businesses, which also strengthens the international business role of Amsterdam (Bruinsma, 2009). The HSR stations in the third category are planned for industrial parks, edge-cities and new towns, such as Ebbsfleet on the new Eurostar line and the new Avignon station on the LGV Méditerranée.

According to reports on these cases, scholars agree that the location of the station in the city determines the development potential of the station area (Chen et al., 2019; Kim et al., 2018). Wenner & Thierstein (2021) analyzed 232 stations in 11 European countries and found that more than 50% of HSR stations are located in existing centers. They also found that suburban stations far from urban areas tend to fail to attract significant urban development. Kim et al. (2018) studied Korean HSR station areas and found that stations close to existing urban centers outperformed suburban stations in terms of promoting economic activity and attracting passengers. Thus, the first category of HSR stations located in city centers often promotes urban renewal (Bellet et al., 2012). The second category of stations located in sub-centers may lead to new development, while the third category of HSR new towns tends to be less successful (Facchinetti-Mannone, 2019; Garmendia et al., 2012).

In addition, several studies have specifically examined changes in economic activity and land prices around HSR stations, and their empirical findings are mixed (Wenner & Thierstein, 2021). HSR project actors and the media tend to promote the idea that HSR contributes to urban vitality, mixed land use and higher real estate prices (Chen et al., 2019). Some scholars argue that HSR, as a transport interchange hub, can provide locational advantages and improve land use efficiency for surrounding households and businesses, especially knowledge-intensive businesses (Cui et al., 2019; Kloosterman & Trip, 2011; Ureña et al., 2009; Wenner & Thierstein, 2021). However, Willigers & Van Wee (2011) argued that there is little evidence that businesses change locations only because of HSR. Beckerich et al. (2019) found that the types of businesses around each station were different. Furthermore, some studies have shown that commercial development and residential development around HSR stations are unsuccessful. For example, in small and medium-sized cities along the first HSR line in France, the development of business parks around stations

remained underperforming with the strong support of local actors (Beckerich et al., 2019; Facchinetti-Mannone, 2019; Vickerman, 2015). The mixed land-use new town project "Valdeluz" next to the Guadalajara-Yebes HSR station has been described as one of the biggest real estate failures in Spain (Bellet et al., 2012). Thus, scholars argue that the impact of HSR stations on cities also depends on the local context and economy (Coronado et al., 2019; Pol, 2008).

HSR projects in Hong Kong have resulted in a sharp increase in land value (Bao & Mok, 2020; Cervero & Murakami, 2009). However, evidence from European research suggests that HSR has long-term effects on land prices in some small cities but not in larger cities (Mohíno et al., 2019). Garmendia et al. (2008) also found that housing prices increased more significantly in small cities than in large cities after the opening of HSR in Spain. In China, HSR also caused more significant real estate appreciation in small and medium-sized cities (Chen & Haynes, 2017). Furthermore, both Chinese and European studies confirm that HSR stations built in existing urban areas are more likely to lead to property value increases than those built in suburban areas (Diao et al., 2017). New HSR stations that are not located in urban areas may experience negative real estate growth in their vicinity due to inadequate transport services. Over 55 years, the Shinkansen did not bring faster economic growth to the prefectures in which it operated, but it promoted the expansion of Japanese cities, eased land costs, and generally lowered real estate prices in cities (Nickelsburg et al., 2020).

At the station level, research has found that HSR transport and land use integration, place quality and image, mixed use, and good connections to local public transport are critical to station area success (Loukaitou-Sideris et al., 2012; Yin et al., 2015). The "node-place" model, proposed by Bertolini (1996), is widely used to assess the level of transport and land use integration and to classify station areas. This model assumes that balanced transport functions and urban functions in station areas are essential for long-term vitality (Bellet et al., 2012). In addition, the concept of TOD is also widely used worldwide in the planning and evaluation of station areas (Singh et al., 2017). TOD focuses on the integration of transport and urban projects in order to guide residents in the area to use public transportation and promote sustainable development. Furthermore, the mixed functions and spatial diversity around stations, public spaces, and architectural aesthetics influence the quality of place in station areas (Kloosterman & Trip, 2011; Trip, 2008; Willigers & Van Wee, 2011). Mixed land use around stations can support high-end office development and attract international companies and users (Bertolini & Salet, 2003). These companies are increasingly interested in high-quality urban locations rather than traditional office areas, and the architectural and aesthetic image around stations can influence the positioning decisions of these companies (Rodenburg, 2006; Willigers &

Van Wee, 2011). In addition, more scholars have emphasized the positive impact of well-connected stations with other urban transport methods on increasing ridership and station area development (Cascetta et al., 2011; Cervero, 1996; Kim et al., 2018; Loukaitou-Sideris & Peters, 2020; Tapiador et al., 2009).

In addition to these spatial and economic studies, a few scholars have examined HSR and urban development from a governance standpoint (Dai, 2015a; Duan et al., 2020; Rérat & Lees, 2011). In the neoliberal context, transport infrastructure projects are often imagined as urban "growth dynamos" and placed on the political agenda of urban development and economic growth (Olesen, 2020). Based on several studies that found a positive relationship between HSR accessibility and urban development, many city governments regard HSR stations as an urban planning "tool" and a major instrument for urban renewal (Peters, 2009; Ureña et al., 2009). The development of HSR station areas requires significant public sector intervention as well as supportive planning policy (Cervero, 1996; Facchinetti-Mannone, 2019; Preston & Wall, 2008). Research on French (Loukaitou-Sideris & Peters, 2017) and Spanish (Ribalaygua & Perez-Del-Caño, 2019) HSR station areas has found that various interventions by local governments have contributed to the urban development of station areas. Meanwhile, some studies have discussed the negative social effects of HSR station areas, such as gentrification and displacement of low-income people (Chapple & Loukaitou-Sideris, 2019; Chen & Wei, 2013; Ribalaygua & Perez-Del-Caño, 2019). Improving the situation of vulnerable groups and achieving transport equity requires the mediation of appropriate institutions (Martens, 2012). Understanding institutional settings, decision-making processes, actors, and local planning documents can be decisive in providing strategies and supportive policies for the coordinated development of station areas and achieving social equity (Gong & Li, 2022; Wenner & Thierstein, 2021; Zhang & Zhao, 2021). However, academic literature analyzing the relationship between HSR and urban development from institutional and governance perspectives is still very rare (Rérat & Lees, 2011), especially in China (Yin et al., 2015).

1.2 Problem Formulation

1.2.1 HSR and Urban Development in China

The context of HSR development in Western Europe and Japan is the de-industrialization during the post-modern era, which is intimately linked to the development of knowledge economy (Kloosterman & Trip, 2011; Miwa et al., 2022). Differently, the context of HSR development in China is the explosive urbanization (Chen et al., 2019). From 1990 to 2019, the urban population in China has risen from 302 million to 848 million, which means 546 million people moved from rural areas to urban areas in 30 years (National Bureau of Statistics of China, 2020). Furthermore, the development of HSR in China is closely related to national strategies. The 2008 global financial crisis severely weakened the structured coherence of China's development model (Wu, 2017). In response, the national government launched a four trillion CNY stimulus package to promote urbanization and infrastructure development, with 700 billion dollars invested in HSR in 2010 (Lu, 2012).

Therefore, as demonstrated at the beginning of this chapter, the HSR network in China has expanded to become the largest in the world within a decade and has doubled in size in the following six years. This network will connect all 34 provincial capitals, 210 cities with populations of over 500,000, and over 80% of the major cities in China by 2030 (China Railway, 2016). There will be around 1,000 HSR stations by 2030 (China Railway, 2020). Along with this, 139 Chinese cities have planned and built at least one HSR new town by 2019 (Chen et al., 2019).

The rapid development of HSR in China is due to the fact that multi-level governments and the public are all supportive of its construction and expect it to transform cities and drive economic development (Chen, 2020; Yin et al., 2015). At the national and regional levels, HSR is considered a major economic engine because it can restructure urban systems, improve linkages between cities and towns, facilitate the formation of urban agglomerations, and bring economic dynamism to the entire region (Mu et al., 2015; Zhang & Nie, 2010). At the city level, local governments expect to change the spatial and economic structure of cities through HSR (Tang et al., 2011; Wang & Lin, 2011). HSR is used to promote the transformation of cities from monocentric to polycentric urban forms to solve problems such as traffic congestion. It also promotes industrial upgrading and urban

transformation (Yin et al., 2015). Local governments can also gain revenue from land leasing of areas around the HSR station while promoting urbanization (Dai, 2015b; Wang et al., 2021). Local residents expect that HSR can promote industries such as tourism and bring employment opportunities (Cao et al., 2013).

Scholars have been studying whether these expectations can be met over the past decade. Some scholars have studied at the national and regional levels and hold a positive view about the rapid HSR development since they found that HSR has largely improved the overall connectivity of Chinese cities and has had a positive regional economic impact (Chen et al., 2019; Jiao et al., 2014). They argue that the development of HSR in China can accelerate urbanization, help industrial upgrading and attract real estate investment (Wang et al., 2019; Yao et al., 2019). Large cities with more developed economies benefit more from HSR, and the centrality of these cities is elevated more than others (Jiao et al., 2014; Ke et al., 2017; Qin, 2017). On the contrary, other studies take on a city and station area level. Scholars worry about such rapid construction rates because these developments do not follow the laws of urban development (Lu, 2012; Zhao et al., 2015). They refer to the rapid development of HSR and HSR new towns as the "Great Leap Forward" of the new era (Chen & Wei, 2013; Chuang & Johnson, 2011; Dai, 2015a). The development problems can be summarized into four main categories, namely unsustainable development patterns, station areas far from the built-up areas, oversized station areas and HSR new towns, and difficulties in interchanges and urban development after operation.

1.2.2 Problem Statement

The first issue is that Chinese HSR station areas have been developed in an unsustainable manner from environmental, economic, and social perspectives. Environmental unsustainability is mainly due to the unsustainable use of land resources. Although local governments in China have proposed the HSR-TOD concept, claiming that HSR station areas in China are planned according to TOD principles (Dai et al., 2011; Li, 2012). The aims of the TOD are to discourage car use, curb urban sprawl, and promote sustainable development. However, the planning of Chinese HSR station areas actually violates the basic principles of TOD, especially in terms of compact development, walkability, and diversity (Chen, 2020; Dai, 2015a; Song et al., 2021). These HSR station area projects are planned with huge station plazas, the same ambitious high-end business, commercial and real estate development, while neglecting resilience and long-term strategic development (Duan, 2009; Ye & Tang, 2010). As a result, HSR station area development has

led to rapid urban sprawl in China, with a large amount of agricultural land being converted into construction land, especially in small and medium-sized cities (Deng & Wang, 2018; Wu et al., 2022; Zhu et al., 2020). Scarce land resources are about to be exhausted (Lu, 2012). Economic unsustainable refers to the sharply increased debt of the Ministry of Railways (MOR)[1] because of the HSR construction and operation (Zhao, 2019). Simultaneously, local governments' debts have also skyrocketed as a result of the construction of HSR new towns and supporting infrastructures (Pan et al., 2017). Furthermore, a large number of farmers have lost their agricultural land and economic resources due to the development of HSR station areas, which caused the social unsustainable (Chen & Wei, 2013; Gong & Li, 2022).

The second problem with HSR station areas in China is that most of the HSR stations are built in suburban or even rural areas. Unlike most European and Japanese HSR stations that are connected to conventional train stations in urban centers to drive urban regeneration, most of the HSR stations in China are newly built and located about 10 km from the city center (Chen & Wei, 2013). The average distance of the 24 stations on the Beijing-Shanghai line from the city center is 14.67 km, with the shortest distance being 3.3 km in Langfang and the longest distance being 24 km in Suzhou. The average distance of the 18 stations on the Wuhan-Guangzhou line is 13.29 km. There are 32 HSR stations in 16 cities in the Yangtze River Delta, 29 of which are located in urban peripheries or rural areas. As discussed in Section 1.1, the location of the HSR stations in the city determines the development potential of the station area. Such distant HSR station areas will not only cause difficulties in interchanging in the short term, but also make it difficult to attract urban and economic development in the long term.

Third, HSR station areas in China are extremely large and the planning of HSR new towns is widespread. For example, just the station itself and the surrounding squares of Hongqiao occupied 27 km^2. The Guangzhou South HSR station area covers 11.4 km^2, which is 30 times the size of Tiananmen Square. The Wuhan HSR station area is also 11 km^2. This is only the area of the stations and squares, the area of the HSR new towns or new districts is even larger. These HSR new towns are not the privilege of megacities, small and medium-sized cities have even planned bigger HSR new towns. For example, 19 of the 24 cities along the Beijing-Shanghai

1 The Ministry of Railways was dismantled at the 1st Plenary Session of the 12th National People's Congress (14 March 2013). Its administrative duties have been transferred to the National Railway Authority, resorting under the Ministry of Transport (MoT), while the enterprise function has been assigned to the China Railway (CR).

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HSR have planned HSR new towns or new districts. 14 of the 21 cities along the Nanjing–Shanghai HSR and 16 of the 23 cities along the Harbin–Dalian HSR have devised HSR new towns or new districts. Some of these new towns are even larger than half of the built-up area of the city (Shi, 2015). Due to land speculation, most of these new towns have only been developed with a real estate function, resulting in a fragmentation of the HSR station area and the surrounding urban environment (Chen, 2020; Dai, 2015a; Yin et al., 2015).

The influences of HSR new towns on urban expansion have been revealed in recent studies. Zhou et al.(2017) reported that HSR connections stimulated a rise in land transactions. Deng and Wang (2018) found that HSR stations built on the urban fringes of large cities greatly contribute to low-density urban sprawl. In counties, the frequency of HSR service and the volume of commercial land transactions were also positively correlated (Wang et al., 2018). Long et al. (2018) demonstrated a 12% increase in urban expansion due to HSR connections by using nighttime light satellite data. Each newly constructed HSR station increases the urban expansion rate by 2.4% (Zhu et al., 2020). Wu et al. (2022) showed that HSR promotes faster urban expansion in the developing central and western parts of China than in the economically developed eastern part of the country. Moreover, urban sprawl in more economically backward cities is faster than in economically developed cities when connected to HSR. These economically backward cities are eager to improve their status by promoting HSR new towns (Chen et al., 2021). As discussed in Section 1.1, the success of HSR station areas depends on the economic conditions of the regions and cities. The development of these large HSR new towns in small and medium-sized Chinese cities faces numerous challenges and appears to be morphing into urban sprawl.

Fourth, some scholars argue that the state-controlled economy and public sector ownership of land in China lead the government to dictate the pace of development around stations (Wenner & Thierstein, 2021). However, this is not the case, as most of the HSR station areas have faced interchange difficulties and significant delays in urban development (Chen, 2020; Dai, 2015a). The transport methods are managed by independent and poorly coordinated governmental organizations. Many HSR services and subway systems are not well integrated, and public transport is not well supported. For example, there are two separate security checks for interchanges between HSR and the subway at the same station. In some stations, the subway stops earlier than the last HSR train. Furthermore, because these stations are far away from the city, metro connections and road networks need to be built and often lag behind the opening of HSR. As a result, there are severe traffic jams around the stations. Taxi drivers are reluctant to pick up passengers at the stations, and passengers are unable to leave the station area. Congestion in the urban area

also makes it difficult for passengers to easily access the city center. In addition, many stations have seamless interchanges as a planning principle. Because of problems such as oversized stations, interchanges in many HSR stations take at least 10 minutes to walk (Yin et al., 2015).

Poor transport also creates significant difficulties for the development of urban functions. The construction and development of many HSR station areas are far behind schedule, and the development prospects are not promising, especially in small and medium-sized cities (Shi, 2015; Jing Zhao & Chen, 2015). Many HSR station area projects lack the vitality and spatial quality needed for urban development (Dai & de Vries, 2018). Some media and scholars have warned that these HSR new towns may become "ghost towns" (Dong et al., 2021; Woodworth & Wallace, 2017). The study of Chang et al. (2022) points out that people have moved from suburban counties to urban areas because of the opening of HSR, and unattractive HSR station areas in the suburbs have become ghost towns.

1.2.3 Research Gaps, Aims and Questions

Based on the above discussion in sections 1.1 and 1.2, it can be observed that the planning of HSR station areas in China is very different from that of Western Europe and Japan, and seems to have chosen a model that is difficult to develop successfully. The majority of Chinese HSR development studies are ex-post and focus on the impact of HSR on other modes of transportation, accessibility, urban and regional economies, land use and housing prices (Chen, 2020; Chen et al., 2019; Dai, 2015a). Ex-ante research on institutional conditions and decision-making processes is lacking, thus, the reasons behind difficulties in developing Chinese HSR station areas are not well understood (Yin et al., 2015). The planning of HSR station areas is a collective result of constant tough negotiations between different interests and motivations of actors (Trip, 2008). The actors of HSR station areas, their interests and goals, and their interactions have not been fully revealed in the Chinese governance context. Moreover, institutional integration and cooperation must be promoted to ensure that cities can enjoy the benefits of transportation and land integration (Curtis & James, 2004). HSR brings only development opportunities, and successful development relies on public-sector intervention and supporting planning policies (Facchinetti-Mannone, 2019). However, most studies only show the effects of the HSR development in China, and there is a lack of reflection on how to improve the cooperation of actors in the decision-making processes and provide useful supporting policies for station areas.

The specific gaps are as follows: (1) The HSR-TOD concept is advocated for Chinese HSR station areas, but the TOD concept was created for urban transport systems like the metro. The applicability of TOD in HSR station areas and specific planning principles have not been carefully studied (Chen, 2020). (2) The decision-making process for the HSR station location has not been revealed. Some studies based on the literature have argued that the HSR stations far from cities in China are determined by the MOR because of its monopoly position (Chen & Wei, 2013; Yin et al., 2015). However, this argument lacks support from empirical studies, and the actors involved in the decision-making process of HSR station areas and the interactions between them are not clear in previous studies. (3) In China, local governments have actively planned new towns alongside HSR construction (Chen et al., 2019). An investigation of local governments' motivations and spatial policies, especially from a land perspective, is still missing (Chen et al., 2019). (4) There is a lack of coordination between actors in the management and development of HSR station areas in China. The integration of transportation and land use has not been achieved, which leads to difficulties in interchange and urban development. Researchers and policy-makers should pay attention to how to address the interchange inefficiencies and slow development in HSR station areas (Chen, 2020). (5) Furthermore, some scholars have investigated the decision-making process of HSR station areas in China, focusing on megacities such as Shanghai and Wuhan (cf. Dai, 2015b; Dai & de Vries, 2018; Yang & Han, 2020). Little attention has been paid to the numerous and problematic HSR station areas in economically backward cities.

Therefore, the purpose of this PhD study is to fill in these gaps. The main aim of this research is:

To understand the causes of difficulties in developing Chinese HSR station areas through gaining insights into the actors, decision-making processes and institutional context, and to provide strategies for cooperation of actors and supporting policies to achieve integration of transport and land use in Chinese HSR station areas.

The main aim has been translated into four research questions according to the specific gaps and addressed in the following chapters respectively:

1 **Why do HSR stations in China, planned according to the TOD concept, result in unsustainable development?**

Chapter 2 answers this question with two sub-questions:

- What success factors should be included in a TOD plan for HSR station areas?
- To what extent are these factors indeed considered in the plans for Chinese HSR station areas?

2 **Why are Chinese HSR station areas far from the city centers?**

Two sub-questions are raised in Chapter 3:

- How are location choices for HSR stations in China made?
- How are they influenced by institutional settings, power positions and interdependencies between urban and railway actors?

3 **Why are Chinese HSR station areas so large?**

Chapter 4 addresses this question in two sub-questions:

- How does the institutional context in China influence the governance behavior of local governments?
- How does state entrepreneurialism play out in the decision-making and planning of HSR new towns?

4 **Why does the development of Chinese HSR station areas lag behind planning from a governance perspective?**

This question is broken down into two sub-questions and tackled in Chapter 5:

- How do institutions shape the interactions of actors?
- How do institutions influence the integration of transport and land use in Chinese HSR station areas?

Furthermore, to enhance the representativeness of the study and to fill in the fifth specific research gap, the case studies of this PhD thesis cover HSR station areas in megacities, large cities, and small and medium-sized cities in China.

International experience cannot fully explain and predict the development of HSR station areas in China due to the institutional context of economic decentralization and political centralization. This PhD study applies new theories and methods to explore and understand the complexities of the planning and development process of HSR station areas in China. This type of research can provide a new foundation for international comparison while also providing the Chinese government with sustainable strategies and policies for developing mega infrastructure that may alleviate the growing HSR and local debt (Chen, 2020).

1.3 Framing a Conceptual Framework

From a theoretical perspective, a three-dimensional conceptual framework is put forward in this section to explore the above research questions. The first dimension focuses on the transport functions and urban functions of HSR station areas. For the second dimension, a process perspective is taken to understand the integrated planning and results of the HSR station areas. The third dimension takes that a step further by investigating the planning and development of HSR station areas in the Chinese institutional context.

1.3.1 Integrated Transport and Land Use Functions in Station Areas

As discussed in 1.1, there are two main strands of theories, TOD and Node-Place, that are often used to discuss the transport planning and spatial planning of station areas. The TOD concept was first developed by American scholars (Calthorpe, 1993; Cervero, 1998; Dittmar & Ohland, 2004). TOD is defined as integrated transport and land use planning that promotes mobility, accessibility, and pedestrian friendliness, as well as maximizing the efficiency of public transport systems by enhancing urban quality around public transit stations (Curtis et al., 2009). The eight fundamental principles of TOD are: developing walking-friendly neighborhoods, prioritizing non-motorized transport networks, constructing dense networks of streets and paths, locating development near high-quality public transport, planning for mixed land use, enhancing transit capacity and density, creating regions with short commutes, and increasing mobility by regulating road use and parking (ITDP, 2017). A successful TOD can increase human interactions, enhance urban vitality and improve sustainability (Thomas & Bertolini, 2017). As a result, TOD is popularly applied worldwide to address the challenges of car-oriented urban sprawl and achieve sustainable development goals (Hickman et al., 2015). There are successful planning practices with different emphases in various cities, such as San Francisco in the United States, Stockholm and Copenhagen in Europe, and China and Singapore in Asia (Cervero & Kockelman, 1997; Cervero & Murakami, 2009; Curtis et al., 2009).

Furthermore, the node-place model is used to investigate the transport functions and urban functions of railway station areas (Bertolini, 1996; Chorus & Bertolini, 2011; Peek & Louw, 2008; Reusser et al., 2008). The station area is a vital “node” in the transport network and other networks such as consumption and business. At the same time, it is a “place” in cities, which is a diverse and dense area in the city

(Peek et al., 2006). The level of access provided by the node should match the accessibility demands of the activities located in the place. Conversely, the demand for travel generated by the activities located at the place should equal the transport capacity provided by the node. To achieve a better balance between node and place functions is vital to the development of good station areas (Reusser et al., 2008). By assessing the relationship between the level of transit service and surrounding land use development, this framework can demonstrate the potential for station area development, point the way to station improvements, and can also be applied to the sustainable positioning of new stations (Bertolini & Spit, 1998; Reusser et al., 2008). Based on this model and the perspectives of different stakeholders, scholars delineate the functions of station areas more specifically (Peek & Louw, 2008; Zemp et al., 2011). They argue that attention should be paid not only to the integration of functions but also to the interaction between these functions. The functions of station area might be complementary and reinforcing, but they might also be competing and even conflicting.

The HSR station area is a node on the HSR network, influenced by the planning of HSR, and the station area is also a place, influenced by land use planning. According to TOD and the node-place model, a successful HSR station area should combine both planning to achieve a balance of transport functions and land use functions. Figure 1.2 visualizes the integrated transport and land use planning of HSR station areas. Chapter 2 focuses on this theoretical part.

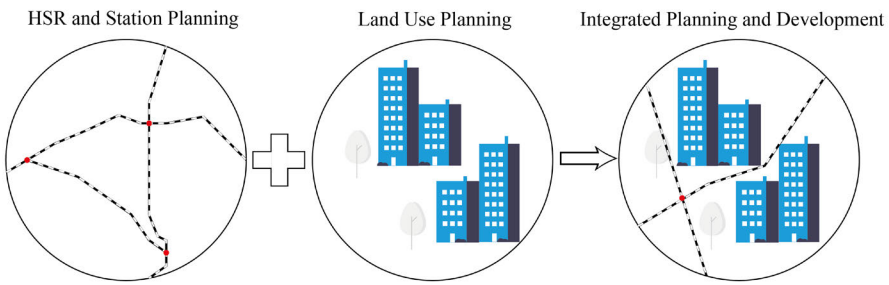

FIG. 1.2 Integrated transport and land use planning of HSR station areas

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1.3.2 Decision-Making Process

It is important to focus not only on the spatial outcome of the HSR station area but also to analyze how integration can be achieved from a decision-making process perspective (Reusser et al., 2008). Chapter 3 used Policy Network Theory (PNT) to analyze actors and their interdependence in the location choice of the Chinese HSR station areas. Chapter 5 examined the actors' interactions and rules in the planning and development process of the Chinese HSR station areas.

"Policy network" is a term that covers a series of relatively stabilized formal and informal relationships and institutional linkages among several actors who share interests in policy-making and implementation within a particular policy area, domain or issue (Klijn, 1997, Rhodes, 2007). In other words, a policy network is a web of networked relationships characterized by horizontal and vertical interdependencies between these actors. Vertical interdependencies are relationships between actors that are based on a hierarchy, like legal authority or organizational rules. Horizontal interdependencies, on the other hand, are interdependencies between actors that are not based on a hierarchy, like economic or geographical.

An actor is an organization, person, or social entity that has the ability to assert influence or act on a decision (Enserink et al., 2010). The actors in policy networks have traditionally included government, professional groups, big business and trade unions, but in recent decades, non-governmental and civic organizations have become more active players in decision-making processes. These actors usually have different perceptions of the policy issue they address. The perceptions are the understandings that actors have of the substantive features of a problem (cognitive understanding), of the institutional setting in which they operate (the other actors, the networks of which they are part and the rules that guide the behavior of the actors in these networks), and of their strategic opportunities to influence the decisions taken by the actors in the networks involved (Bots et al., 2000; Scharpf, 2018). The objectives and strategies of actors stem from and represent their perceptions (de Bruijn & ten Heuvelhof, 1991; Koppenjan & Klijn, 2004).

Actors are postulated to have objectives that they aim to achieve in a network setting, in which they recognize that the course and outcome of decision-making are the somewhat unpredictable results of interactions among interdependent, networked actors (van Bueren et al., 2003). The resources to solve the problem are scattered across these actors, so the actors are interdependent (Klijn & Koppenjan, 2000; Marsh & Smith, 2000). Resources are the "things over which they have control and in which they have some interest" (Coleman, 1990: 28), which include legal, political, physical, organizational and informational tools or instruments (de Bruijn & ten Heuvelhof, 1991).

Actors with resources can impact other actors, relationships and rules in a network (Enserink et al., 2010). Networks are formed by stable patterns of social relationships that emerge around problems and issues among interdependent actors (Klijn, 1997).

“Dealing with complex policy problems is-to a large extent-a problem of interaction” (van Bueren et al., 2003, p. 194) since actors have no shared perception of the problem and it is difficult to predict the strategies of other actors. Interactions between actors take place in so-called “arenas.” Arenas are places and activated parts of networks where specific groups of actors interact on a topic and make decisions on specific aspects of the topic (Cohen et al., 1972; van Bueren et al., 2003). Resources and strategic behaviors of actors determine their position in arenas (Klijn & Koppenjan, 2000). In order to reach an agreement in an arena, actors have to exchange their resources. This often strategic process of interaction and negotiation is guided by the "rules of game", or the formal and informal institutions that guide and influence actor behavior (Koppenjan & Klijn, 2004; Ostrom, 2011). Decision-making processes in networks are highly dynamic, with actors entering and exiting policy arenas, and decision-making being influenced by external factors as well, such as political and economic events at a macro-level. As places of interaction and decision-making, arenas are thus less stable than the policy networks from which actors participate in one or often multiple arenas. Actors from a variety of networks can participate in an arena if they think that they can serve their goals in a particular arena. In arenas, this may lead to conflicts between actors, not just because they disagree on the issue at stake, but also because actors from different networks adhere to different rule systems, which may lead to misunderstandings and conflicts. Figure 1.3 shows that actors, their interdependencies, and interactions in the decision-making process result in the spatial outcomes of the station areas.

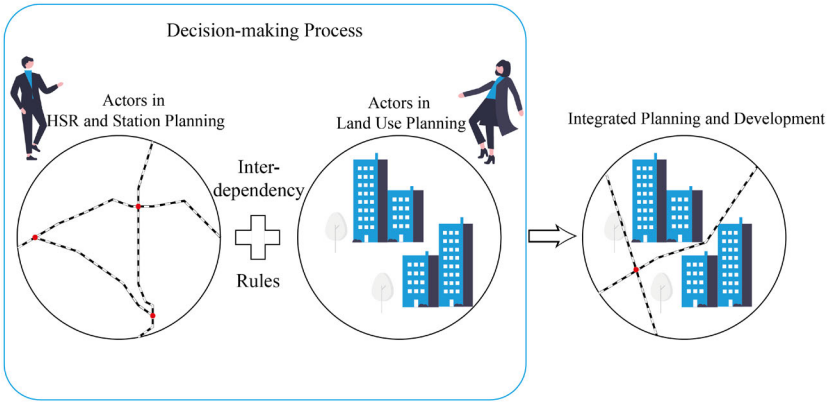

FIG. 1.3 Decision-making process of integrated HSR station areas

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1.3.3 Institutional Context

The interaction and cooperation between actors in the decision-making process is influenced and limited by the institutional context (Klijn & Koppenjan, 2000; Ostrom et al., 1994). In order to understand the motivations and behaviors of actors, we need to examine the institutional context in China. As mentioned in Section 1.2, the context of HSR development in China is rapid urbanization. Rapid urban expansion and the development of new towns have been the main characteristics of urban transformation in China since the economic reform in 1978 (Hsing, 2010; Shen & Wu, 2013). Because after the economic reform, the Chinese central government decentralized economic decision-making power and local governments changed from being passive regulators in the planned economy to being the main actors in planning local infrastructure, encouraging local enterprises, attracting foreign investment, and promoting urban development (He et al., 2016; Wu & Zhang, 2007). In addition, the tax reform in 1994 gave subnational governments the autonomy and incentive to promote economic growth and urban development but also turned them into tax collectors for the central government (Zhang, 1999; Zhu, 2004). This led to local governments needing to provide the financial support for urban development themselves (Lin, 2014). Many cities incurred fiscal deficits and had to rely on land revenues for off-budget funding (Xue et al., 2013). Moreover, the commodification of land and housing has further stimulated local governments to convert agricultural land into construction land to obtain land revenues (de Jong, 2019; Lin, 2007; Xu & Yeh, 2005).

Another feature of the Chinese institutional context that corresponds to the economic decentralization is the political centralization and upward accountability system. Local officials are appointed cadres whose success in achieving growth targets is more important than other indicators (Wu & Zhang, 2007). This phenomenon is known by scholars as GDP-ism, in which local officials compete with each other for career advancement to meet growth targets set by the central government (Li & Zhou, 2005). These targets are most easily achieved through infrastructure projects, leading to a surge in the development of infrastructure projects and new towns in China over the past three decades (Jiang et al., 2016).

However, Wu (2017, 2018) suggested that GDP-ism and land revenue studies ignore the political nature of local government behavior, i.e., the need for local governments to align with the strategies of the central government and maintain state power. He contended that the Chinese state creates a market-like environment and uses market instruments to achieve its strategic objectives, such as boosting economic growth to legitimize its power. At the local level in a given region, the state gives its officials the authority and capacity to manage economic development

activities. For local government officials, the career development associated with economic prosperity is not simply a matter of gaining profit but a major incentive. The state is thus transformed into an entrepreneurial market agency—referred to as “state entrepreneurialism” (Wu, 2020). According to state entrepreneurialism, Chapter 4 uncovers the motivations and behaviors of the central government and the local government in the planning process of HSR new town.

Based on the theories in this section, Figure 1.4 demonstrates the theoretical framework of this PhD thesis. This framework emphasizes that achieving a balance between transport and urban functions in the HSR station area requires integration of transport planning and land use planning (Loukaitou-Sideris & Peters, 2020; Wang et al., 2022; Yang & Han, 2020). In the current context, transport planning and land use planning are still the responsibility of different governmental sectors and actors and require effective interaction and cooperation in their decision-making processes. These interactions are in turn influenced and driven by the institutional context in China. These dimensions should be considered in order to gain a deeper understanding of the development problems of HSR station areas in China and to provide practical policy recommendations.

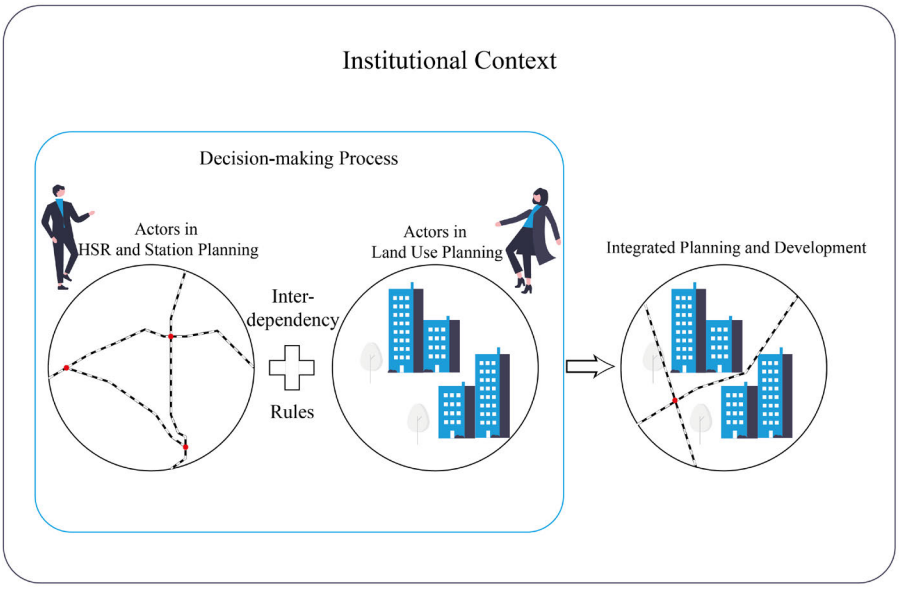

FIG. 1.4 Conceptual framework of integrated transport and land use planning in Chinese HSR station areas

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1.4 Research Approach: Methods and Data Collection

The choice of the research strategy should fit the research question and objectives (Drongelen, 2001; Johnson & Onwuegbuzie, 2004). In order to answer the research questions, this research adopts case study as the main research strategy. Case study are used to answer "how" and "why" type research questions (Stake, 2005; Yin, 2009). Case study is suitable for generalizing theory and it illustrates both an in-depth understanding of the particular problem or place being explored and a broad understanding of relevant context and issues (Seawright & Gerring, 2008; Yin, 2009). Therefore, qualitative case studies can provide insight into the complex decision-making process of HSR station areas in China and answer questions such as why HSR station areas are located far from cities and are large in size.

The first research question aims to sketch a big picture of Chinese HSR station areas and identify the planning characteristics of these areas. Master plans for 15 cases are selected and compared to cover all types of HSR stations and cities in China. Five national hubs are Hangzhou East Station, Nanjing South Station, Shanghai Hongqiao Station, Guangzhou South Station, and Shenzhen North Station. Five regional interchange stations are Luoyang Longmen Station, Foshan West Station, Changzhou North Station, Huzhou Station, and Bengbu North Station. Five medium-sized and small stations are Jinjiang Station, Xinyu North Station, Fuyang Station, Tonglu Station, and Haining West Station (see Figure 1.5). Content analysis is the main research method in Chapter 2. When examining documents and graphs, content analysis has the advantage of efficiently organizing the materials in a systematic manner, highlighting the similarities, differences, and connections between a variety of materials (Hsieh & Shannon, 2005; Schreier, 2012). A code frame is built on a literature review to explore the gaps between TOD theory and Chinese practices in HSR station areas. Then, the master plans of these HSR stations are coded and compared according to this code frame via the software NVivo 11.

The research questions 2, 3, and 4 need a more in-depth exploration of the actors, decision-making process, and institutional context. These chapters select fewer cases but present more details and in-depth understanding. To answer research question 2, Chapter 3 uses comparative case studies to examine the location-choice processes of HSR stations in three Chinese cities. Three cases are Shenzhen, Lanzhou and Yongcheng, which are a megacity, a large city and a medium-sized city in different regions of China (Figure 1.5). They also vary in the planning time

for HSRs and stations. Different types of cases could increase the generalizability of the conclusions (Patton, 1990). In order to collect interview data, the "snowballing" strategy is used (Goodman, 1961). It starts with a personal academic network and then extends to actors involved in the projects. The 18 semi-structured interviews were conducted in a face-to-face manner. Interviewees are from the CR, China Railway Survey and Design Groups, municipal governments, and urban planning bureaus in China. In addition, other types of data, including planning and design documents and archives, were studied to improve the validity (Yin, 2009).

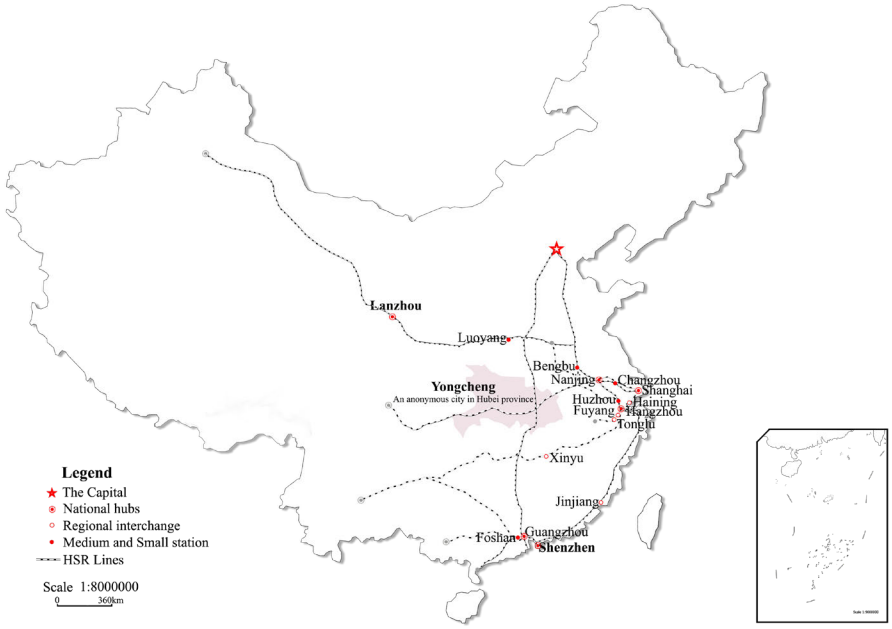

FIG. 1.5 Location of cases in China

Chapter 4 adopts the single case study method to shed light on the motivations and planning process of HSR new town. The case of this chapter is Yongcheng, which is a pseudonym for a prefecture-level city in Hubei Province. The data was collected in the context of a research project between Delft University of Technology and the local government of Yongcheng. I was involved as a consultant for the planning of the Yongcheng HSR station. Thus, this chapter is based on interviews with the local officials, railway planners, urban planners, workshops, and reports to the local government. Chapter 5 also uses a single case study to analyze the planning and development of the Lanzhou West HSR Station. This station plays an important role

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in the northwest China, China railway network and the Belt and Road Initiatives since it is the beginning of the Lanzhou-Xinjiang HSR. 11 semi-structured interviews were conducted in Lanzhou and interviewed actors from the railway system, local governments, planners, developers and landowners. Interview transcripts, planning documents and policies, and archives are coded and analyzed by the software NVivo 11. Further details on the individual cases and data collection are provided in the following chapters.

TABLE 1.1 Methodology of this research

Chapter	Research Question	Theories	Methods	Case	Data
Chapter 2	RQ1: Why do HSR stations in China, planned according to the TOD concept, result in unsustainable development?	TOD and Node-place	Content analysis	5 national hubs, 5 regional interchange stations, and 5 medium-sized and small stations	Master plans, interview transcripts
Chapter 3	RQ2: Why are Chinese HSR station areas far from the city centers?	PNT, Actors and interdependencies	Comparative case study, interview	Shezhen, Lanzhou, Yongcheng	Interview transcripts, planning documents, archives
Chapter 4	RQ3: Why are Chinese HSR station areas so large?	State entrepreneurialism	Single case study, interview	Yongcheng	Interview transcripts, planning documents, archives, work-shops, reports
Chapter 5	RQ4: Why does the development of Chinese HSR station areas lag behind planning from a governance perspective?	Institutional rules for actors' interaction	Single case study, interview	Lanzhou	Interview transcripts, planning documents and policies, archives

1.5 Outline of the Thesis

This thesis consists of six chapters: this introduction chapter, four chapters (Chapters 2, 3, 4 and 5) addressing four research questions respectively, and a conclusion chapter. Chapters 2, 3, 4 and 5 are adapted from four academic papers that have been accepted or reviewed by international peer-reviewed journals.

Chapter 2 discusses which TOD principles should be followed in the planning of HSR stations and which TOD principles are followed or violated in the planning of HSR stations in China. This chapter first summarizes the factors of TOD that are suitable for the planning of HSR station areas from the literature. Second, 15 Chinese HSR station plans are analyzed through content analysis, with the goal of exploring how these TOD factors are considered in the Chinese HSR station area plans. This chapter shows that the plans for China's HSR stations violate most of the TOD principles. The reasons and results of the deviation are further discussed.

From a governance perspective, Chapter 3 attempts to figure out how to explain the location choice of HSR stations in China. This chapter is based on the data from three case studies and interviews. It reframes the decision-making process of HSR station location choices in Shenzhen, Lanzhou and Yongcheng. The types of potential locations, the resources of different actors and their interdependencies, and impasses in the decision-making process are discussed.

Through the theoretical lens of state entrepreneurialism, Chapter 4 investigates how the local state harnesses the HSR project strategically to develop a new town. The planning process of an HSR station in a medium-sized Chinese city is analyzed based on interviews, workshops and reports. This chapter reveals the motivations and behaviors of local governments in planning HSR new towns. It also discusses the consequences of these behaviors and provides policy recommendations.

Chapter 5 aims to gain insights into institutions that shape the planning process and development of the HSR station area through the Institutional Analysis and Development (IAD) framework. This chapter uses the case study and interview methods and focuses on the Lanzhou West HSR station area in northwestern China. It reveals how the decisions on different functions are crucial for an integrated development in an HSR station area and how they have been influenced by the institutional rules.

Chapter 6 summarizes the findings of the preceding chapters and gives answers to the research questions. It provides recommendations for the cooperation of actors and supporting policies to achieve integration of transport and land use in Chinese HSR station areas. It also reflects on the practical and social relevance of this PhD study.

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2 TOD in the Spatial Plans of HSR Station Areas

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ABSTRACT With the rapid development of high-speed railways (HSR) in China, HSR-based transit-oriented development (TOD) has spread around the country. Although local governments claim that the HSR station areas are planned according to TOD principles, scholars argue that these Chinese HSR station areas actually cause unsustainable development. This paper explores (1) what success factors should be included in a TOD plan for HSR station areas, and (2) to what extent are these factors considered in the plans for Chinese HSR station areas? We adopt content analysis as a method to compare the master plans for 15 HSR station areas in China. This study reveals that most of the factors in the plans for HSR station areas deviate from TOD principles, especially in small and medium-sized cities. We argue that TOD in HSR station areas is mainly used by Chinese local governments as a tool to promote expansion in suburban areas.

KEYWORDS TOD; high-speed railway; station area; spatial plan; content analysis

2.1 Introduction

Sustainable development has been adopted by urbanizing cities around the world as a fundamental goal of their planning and governance (Global Platform for Sustainable Cities, 2018). To achieve sustainable development goals and curb car-oriented sprawl, Transit-Oriented Development (TOD) has been proposed as an effective planning strategy (Calthorpe, 1993; Cervero, 1998; Dittmar & Ohland, 2012; Suzuki et al., 2013). TOD could be defined as the integration of transportation and land use planning that maximizes the efficiency of transit services by focusing urban development around exchanges, stations and stops, while also improving mobility, accessibility, and pedestrian and cycling friendliness (Bertolini, 2012; Curtis et al., 2009; Thomas & Bertolini, 2017). In recent decades, TOD planning practices and academic discussion have emerged around the world, especially in North America, Europe, Australia and Asia (Cervero, 1996; Cervero & Murakami, 2009; Curtis, 2012; Hickman et al., 2015; Kumar et al., 2020; Tan et al., 2014; Thomas et al., 2018).

The TOD concept has been widely used in Chinese cities to develop communities around mass rapid transit, including heavy rail, light rail, and bus rapid transit (BRT), and prevent car-driven suburbanization and urban sprawl (Pan et al., 2009). Local governments (e.g., Guangzhou, Shenzhen, Shanghai, Hangzhou, Wuhan and Nanjing) have realized that integrated transport and land use development could help them reach sustainable urbanization objectives (Mu & de Jong, 2012). China's national government has also promoted the development of TOD. For example, the *Transit Metropolis Programme (gongjiao dushi)* was launched by the Ministry of Transport to develop low-carbon rail-based transport systems (Jiang et al., 2013). The Ministry of Housing and Urban Construction released *Planning and Design Guidelines for Areas Along Urban Rail Lines* in 2015, with the goal of boosting transit efficiency and fostering integrated railway and land development.

Scholars regard TOD as an effective strategy to tackle the challenges faced by Chinese cities, and they also believe the Chinese context has provided a unique testing ground for examining the policy transfer and application of the TOD concept (Cervero & Day, 2008; Doulet et al., 2017; Suzuki et al., 2013; Yang et al., 2020). The first reason is that, in contrast to Western Europe and North America, China is still experiencing fast urbanization and the level of car use is relatively low (Chen et al., 2019; Mu & de Jong, 2012). Second, the national policy has changed to promote and invest in public transport and focus on the environmental impacts of projects (Ma et al., 2018). Moreover, the rapid development of high-speed railways (HSR) in China provides opportunities for the application of TOD (Zhang, 2020).

However, scholars have found that Chinese local governments and their planners revise TOD principles to fit their context and depart from the TOD concept. (Cervero & Day, 2008; Cervero & Murakami, 2009; Doulet et al., 2017; Yang et al., 2016). TOD planning practices in China have become Transit Adjacent Development (TAD), which is geographically close to transport nodes but fails to leverage this closeness to encourage transit ridership (Cervero et al., 2002). Especially in the development of HSR station areas, most local governments and planners have promoted their programs as supporting and following TOD principles, but their plans actually contradict the core concepts of TOD in terms of functional mix, vitality, diversity, livability and walkability (Dai & de Vries, 2018; Song et al., 2021). In contrast to the regeneration around existing stations in Europe and Japan, most Chinese HSR station areas are located in suburban regions and occupy large areas of land (Chen & Wei, 2013; Wang et al., 2021). These HSR new towns are planned to catalyze urbanization and transform the economic structure, which has been criticized by scholars for causing urban sprawl (Chen et al., 2019; Dai, 2015b; Lu, 2012).

Spatial plans are crucial for the successful implementation of TOD since they underpin the whole project (Thomas et al., 2018). Despite the fact that plans regarding Chinese HSR station areas have been criticized, little is known about the content of these plans and how they take the prerequisites and characteristics of successful TOD into consideration. Therefore, this study addresses two questions:

1 **What success factors should be included in a TOD plan for HSR station areas?**

2 **To what extent are these factors indeed considered in the plans for Chinese HSR station areas?**

A comprehensive examination of station area plans can provide insight into the aims and strategies of local actors in spurring urban growth and their understanding of TOD (Wenner & Thierstein, 2021). It could also explain the underperformance of Chinese HSR station areas since the master plans prescribe all subsequent programmes (Fu & Zhang, 2017). The comparative analysis between cities could shed light on the gaps between Chinese planning practices and TOD theoretical principles (Su et al., 2021).

In the following sections, we review the literature on the factors that contribute to effective TOD plans and propose a framework for coding the plans of Chinese HSR station areas. 15 master plans for station areas were analyzed and coded through content and discourse analysis methods. To cover all types of Chinese HSR stations, we selected plans for five national hubs, five regional interchange stations, and five medium-sized and small stations. The results are demonstrated in tables and figures to show the TOD factors in different levels of Chinese HSR station areas.

2.2 Success Factors in a TOD Plan for the HSR Station Area

We have mainly reviewed two strands of literature, the research on success factors in TOD plans and the studies on good HSR station area planning. The conditions of cities and their governance are the foundation for the planning and development of TOD in HSR station areas (Cervero, 1998; Geerlings & Stead, 2003; Loukaitou-Sideris & Peters, 2017; Stead, 2008). The planning of TOD was known to be based on three main concepts known as the "3 Ds" (density, diversity, and design), which were subsequently updated to the "5 Ds" with the inclusion of distance to transit and destination accessibility (Cervero et al., 2009; Cervero & Kockelman, 1997; Ewing & Cervero, 2010). The station area is a node in the transport network and a place in the city (Bertolini & Spit, 1998). The new "2 Ds" focus on transport planning, while the "3 Ds" emphasize land development. Therefore, we divide the factors in the literature into three categories: urban context and governance, transport and interchange, and land use planning.

2.2.1 Urban Context and Governance

Mega infrastructures, especially HSR, have been used by cities to show their urban modernity and accessibility, and are aimed at attracting investment and encouraging regeneration or new development around station areas (Harvey et al., 2014; Olesen, 2020; Vickerman, 1997). However, for the infrastructure and new accessibility to really bring developmental opportunities, public actors need to grasp them by devising supplementary and effective strategies (Facchinetti-Mannone, 2019).

One of the most important preconditions for station area development is a clearly publicized, understood, and systematized long-term vision (Loukaitou-Sideris & Peters, 2017). A smart and strong vision could help actors achieve good governance for TOD (Geerlings & Stead, 2003; Hull, 2008; Mu & de Jong, 2012; Thomas & Bertolini, 2017). Scholars have argued that the identification of a clear vision and measures to deliver the vision led to the successful development of European stations, such as Lille station and Rotterdam central station (Bruinsma et al., 2008; Flyvbjerg et al., 2003). The lack of a long-term vision in plans resulted in few Chinese cities achieving "true transit-oriented" rather than "transit-adjacent" development

(Xu et al., 2017). Most of the plans aimed to address urgent practical problems with a strong emphasis on market-based development.

Furthermore, the impacts of HSR and the development of TOD differ across cities, so plans should be designed based on the local context (Diao et al., 2017; Ureña et al., 2009). The local context consists of the role a city has within its region, its size and population (Garmendia et al., 2012; Ureña et al., 2009; Yin et al., 2015), the conditions and diversity of economic activities and the real estate market (Giuliano, 2004; Loukaitou-Sideris et al., 2012), policies constraining car purchase and use (Calthrop & Proost, 2006; Seik, 2000), as well as strategies facilitating transport and land use (Bellet et al., 2012; Chen et al., 2019; Stead, 2008).

The development and implementation of master plans for HSR station areas is a complex process that involves various actors with different interests (Dai, 2015b; Peek et al., 2006; Salet et al., 2013). In a decentralized context, the Chinese local governments play a more important role in planning and developing HSR station areas because the land around the station and part of the funds are owned by local governments (Wang et al., 2021). The location of the HSR station is a result of negotiations between China Railway (CR)[2], provincial governments and local governments. The master plan for a station area is mainly drafted by the local government; it is not only responsible for providing public transport connections but also for developing the station area. The master plan is critical to the operation of the project since it serves as the foundation for the rules and regulations that will be implemented throughout the operation stage (Fu & Zhang, 2017). An analysis of the various factors related to TOD in the master plan helps to understand the local government's view of TOD and its "real" development intentions (Wenner & Thierstein, 2021). It also helps to bridge the gap between TOD principles and Chinese planning practices.

2 China Railway (CR) was formerly known as the Ministry of Railways of China, which was dismantled in 2013.

2.2.2 Transport and Interchange

The quality and design of transit services are fundamental to the successful implementation of a TOD plan (Singh et al., 2017). Measuring transportation characteristics has been the focus of many studies (Chorus & Bertolini, 2011; Reusser et al., 2008). The accessibility of the station within national and regional railway networks, as well as the characteristics of HSR services, such as the types of railways, capacity, and frequency, have been used as important indicators, as they determine the passenger numbers in and around the station (Mohino et al., 2014; Willigers & Van Wee, 2011). Furthermore, the location of HSR stations in cities is vital for TOD implementation because it influences the distance to transit and destination accessibility, for example, schools, hospitals and firms (Beckerich et al., 2019; Dittmar & Poticha, 2004; Sánchez-Mateos & Givoni, 2012). Experiences in the UK, France, Spain, Germany and China have shown that, compared to stations in the center, peripheral stations have difficulty succeeding in urban development (Bellet et al., 2012; Facchinetti-Mannone, 2019; Hall, 2009; Wenner & Thierstein, 2021; Zhao & Chen, 2015).

Moreover, other scholars have emphasized the importance of efficient connectivity with other transport modes, which could catalyze the development of surrounding areas (Cascetta et al., 2011; Hickman et al., 2015). A high-frequency, comfortable, and attractive public transport system is another essential factor for TOD since high-quality public transport could compete with private vehicles (Cervero & Dai, 2014; Cervero & Murakami, 2009; Lai & Chen, 2011; Vuchic, 2017). The seamless interchange between public transport methods has also been emphasized since it could increase the efficiency of individual trips and reduce total socio-economic costs (Tapiador et al., 2009). Meanwhile, it is crucial to supply optimum parking areas for cars rather than completely remove them (Calthorpe, 1993; Willson, 2005). Large amounts of surface parking should be avoided since they impede the integration of the station and the surrounding area (Loukaitou-Sideris & Peters, 2020). In addition, access to the station with easy walking and cycling is important for TOD plans (Cervero & Murakami, 2009; Eidlin, 2015; Renne, 2009).

2.2.3 Land Use Planning

Sustainability has been reflected in different planning theories such as New Urbanism, Smart Growth and TOD (ITDP, 2017). The consensus amongst these theories is that land use in the form of high density, diversity, and high-quality design can promote sustainability (Cervero & Kockelman, 1997; Curtis, 2008; Dittmar & Ohland, 2012; Ewing & Cervero, 2010; Lynch, 1960; Renne, 2009). TOD is viewed by planners as a way to accommodate urban growth in a compact area, the competitiveness of which could be improved through good accessibility and mixed-use development (Cervero & Dai, 2014). Urban density could be increased by enhancing employment opportunities and housing around transit stations, which could support the effective use of the transit system and curb urban sprawl (Guerra & Cervero, 2011; Singh et al., 2017). Diversity could be created through a land use mix of retail shops, hospitals, banks, restaurants, public space, and housing within walking distance of stations, which could create sustained and balanced passenger flow (Schuetz, 2015; Singh et al., 2017). In addition, research found that the real estate market should provide diverse types of housing for effective TOD, such as affordable housing, commercial housing, different sizes of houses, and houses for sale and rent (Mu & de Jong, 2012). The high accessibility of the station area could spur the price of housing and land (Cervero & Kang, 2011; Du et al., 2011; Guthrie & Fan, 2016). A large number of Chinese HSR stations are built in suburban or rural areas, where a large number of farmers have lost their land and lack the income to buy new properties (Wang et al., 2021; Yin et al., 2015). Their resettlement should also be considered as an important context for TOD planning.

Studies in urban design have considered physical design as critical to successful TOD (Forsyth et al., 2010; Jabareen, 2006; Jacobson & Forsyth, 2008). Urban aesthetics contribute to the identity and image of station areas, therefore, they are consciously used as an economic development tool in a globalized and competitive environment (Douglas, 2010; van Lierop et al., 2017). Especially in HSR station areas, planners usually create an international business image suitable for attracting knowledge economy functions such as finance and creative industries (Kloosterman & Trip, 2011). The elements of urban quality include mixed land use, high-density, safe and convenient walkways and biking facilities, interconnected street patterns, public space and squares for street life and informal meetings, and place-making for urban culture (Jabareen, 2006; Loukaitou-Sideris & Peters, 2017; Stojanovski, 2020; Thomas et al., 2018; Trip, 2008).

According to the review in subsections 2.1 to 2.3, we summarized factors based on the overlaps and common indicators mentioned in the literature of successful TOD factors and good HSR station area planning. Then, we drafted codes for the content analysis of master plans for HSR station areas (Table 2.1).

TABLE 2.1 Critical success factors in the TOD plan for HSR station areas

	Factors in the Literature	Explanation	Codes in Plans
Context and Governance	Local context	Carefully consider the spatial/locational and economic characteristics	City area
			Population of the city
			GDP of the city
	Vision	Clear, smart and strong Long-term, consistent	Visions
Transport and Interchange	Service level of HSR stations	Good level of HSR services	Passenger number
			Station level
			Connected HSR lines
	Destination accessibility	Good accessibility of services in cities	Distance to city center
	Accessibility of the station	Efficient road system Good public transit connections and intermodal choices Avoid barriers such as large parking lots and highways Parking supply	Road system
			Road width
			Planning of local transport methods
			Public transport priority
			Traffic volume of different methods
	Seamless interchange	Convenient transfer between transport methods	Seamless transfer
	Pedestrian-friendly system and bicycle	Good pedestrian and bicycle access to the station Provide pedestrian friendly street networks	Pedestrian priority
			Pedestrian-vehicle separation
Land use Planning	Density	High density urban development Taper densities with distance from a station	Station Area
			Land use percentage
			Floor-area ratio
	Diversity	Mix of land use functions and activities Mix of housing types Design in small blocks	Land use types
			Land use before development
			Housing types
	Design	Public space for people to congregate High-quality architecture	Design of public space
			Architecture aesthetics

2.3 Methodology

2.3.1 Data Collection

Because the planning documents for HSR station areas are non-public information in China, we randomly collected 38 planning documents through our personal network. First, we identified 34 master plans for HSR station areas rather than architecture- or transport-specific plans. Second, we read all the plans carefully and selected 26 plans that explicitly mentioned TOD. Then, for representativeness and comparability, we selected master plans for five national hubs (Hangzhou East Station, Nanjing South Station, Shanghai Hongqiao Station, Guangzhou South Station, Shenzhen North Station), five regional interchange stations (Luoyang Longmen Station, Foshan West Station, Changzhou North Station, Huzhou Station, Bengbu North Station), and five medium-sized and small stations (Jinjiang Station, Xinyu North Station, Fuyang Station, Tonglu Station, Haining West Station) to cover all types of stations (Figure 2.1).

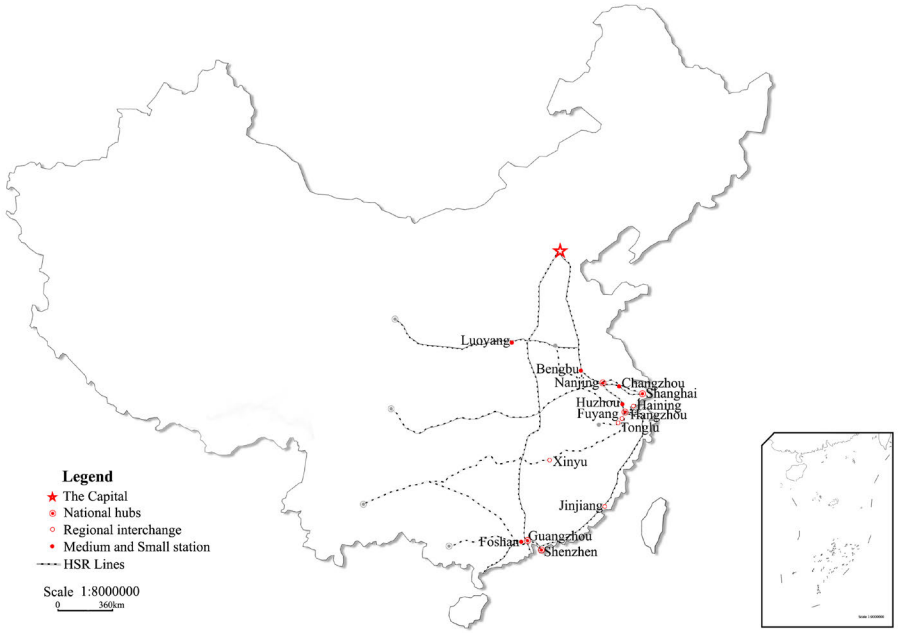

FIG. 2.1 Location of 15 HSR station areas (Source: the authors)

TOC

The examples of each type of HSR station give a better picture of the overall situation in China. CR grades HSR stations based on passenger numbers, technical operations, and their position on the national railway, political and economic networks (Table 2.2). The investment of TOD varies with city size, so the plans should be consistent with the size, population and economic situation of cities for successful TOD (Diao et al., 2017; Ureña et al., 2009). We selected the most representative cases, the five national hubs that are the largest HSR stations in Asia that have received support from the national government. The regional interchange stations play important roles in their regions. Moreover, China started constructing HSR in 2008, so all cases were planned during the decade from 2010 to 2020, and all plans are currently in force, which is also important for the comparative analysis.

2.3.2 Data Analysis

We adopted content analysis as a method to analyze these plans. Content analysis has advantages in analyzing documents and graphs because it efficiently organizes the materials in a systematic manner, highlighting the similarities, differences, and connections across a wide range of aspects (Hsieh & Shannon, 2005; Schreier, 2012). Qualitative content analysis is suitable in this regard because its three characteristics are data reduction, systematicity and flexibility (Flick, 2013). Each master plan for the HSR station area has more than 100 pages. The content analysis helped us focus on the parts relevant to the main research questions. The method also requires coding in a systematic way twice to avoid ambiguity. In addition, the method is flexible because it combines concept-driven and data-driven categories within one coding frame. As Table 2.1 shows, we analyzed both concept-driven texts like visions and data-driven texts like passenger numbers.

The first step in content analysis is to build a coding frame (Schreier, 2012). In the second section, we have illustrated how we built the code frame according to the literature. We defined three main categories and ten main factors. Second, we conducted trial coding on master plans in the software NVivo 11. We evaluated and modified the coding frame, as the third column in Table 2.1 shows. When a text segment was deemed meaningful and relevant, it was coded and compared to the existing codes to determine whether it was new, existed previously, or could be merged with the existing codes. Then, the first author applied the coding frame to all materials twice to improve the reliability. One round was conducted in July 2021, and the other round was completed in October 2021. 24 nodes in three main categories were developed at the top level, and many “child nodes” were created at a lower level. The full table of nodes is presented in Table App.A.1 in Appendix

to Chapter 2 and the detailed coding for each plan is shown in Table App.A.2 in Appendix to Chapter 2. In the next section, we present our results and analysis of the 15 HSR station area master plans.

TABLE 2.2 Stations, cities and documents for analysis

Station	Station Level	City	City Area	City Population	City GDP/CNY (In 2010)	Planning Documents
Hangzhou East Station	National hub	Zhejiang Province Hangzhou City	16,853.5km^2 (City 3068 km^2)	10.36 million (City 5.3 million)	594,582 million	*Hangzhou East Station Concept Planning and Chengdong New Town Core Area Urban Design*
Nanjing South Station	National hub	Jiangsu Province Nanjing City	6,587 km^2	9.31 million	519,820 million	*Nanjing South HSR Station Area Comprehensive Planning*
Shanghai Hongqiao Station	National hub	Shanghai City	6,340.5 km^2	24.87 million	1,687,242 million	*Shanghai Hongqiao Comprehensive Transportation Hub Planning and Design & Hongqiao Business Core Urban Design Design and Control Detailed Planning*
Guangzhou South Station	National hub	Guangdong Province Guangzhou City	7,434.4 km^2	18.68 million	1,060,448 million	*Guangzhou New Passenger Station Area Planning and Design*
Shenzhen North Station	National hub	Guangdong Province Shenzhen City	1,997.5km^2	17.56 million	951,091 million	*New Shenzhen Station Area Urban design*
Luoyang Longmen Station	Regional interchange	Henan Province Luoyang City	15,230km^2	6.92 million	232,120 million	*Luoyang South Station Area Concept Planning and Urban Design*
Foshan West Station	Regional interchange	Guangdong Province Foshan City	3,848 km^2	6 million	565,152 million	*Foshan West Station New Town Planning and Design*
Changzhou North Station	Regional interchange	Jiangsu Province Changzhou City	4,385 km^2	5.27 million	297,670 million	*Beijing-Shanghai HSR Changzhou Station Core Area Constructional Detailed Planning*
Huzhou Station	Regional interchange	Zhejiang Province Huzhou City	5,820 km^2	3.36 million	130,156 million	*Huzhou City Train Station Area Urban Design*

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TABLE 2.2 Stations, cities and documents for analysis

Station	Station Level	City	City Area	City Population	City GDP/CNY (In 2010)	Planning Documents
Bengbu North Station	Regional interchange	Anhui Province Bengbu City	5,951 km^2	3.30 million	63,805 million	*Bengbu HSR Station Area Concept Planning and Urban Design*
Jinjiang Station	Medium station	Fujian Province Quanzhou City Jinjiang County-level city	649 km^2	2.06 million	94, 114 million	*Fuxia HSR Jinjiang Station Comprehensive Economic Zone Control Detailed Planning*
Xinyu North Station	Medium station	Jiangxi Province Xinyu City	3,178 km^2	1.2 million	63,122 million	*Xinyu HSR Station Area Urban Design*
Fuyang Station	Medium station	Zhejiang Province Hangzhou City Fuyang County-level city	1,831 km^2	0.66 million	41,567 million	*Hang-Huang HSR Fuyang Station and Surrounding Area Urban Design*
Tonglu Station	Medium station	Zhejiang Province Hangzhou City Tonglu County-level city	1,829.59 km^2	0.41 million	19,793 million	*Hangzhou Tonglu HSR Station Complex Concept Planning*
Haining West Station	Small station	Zhejiang Province Jiaxing City Haining County-level city	863 km^2	1 million	45,583 million	*Zhejiang Haining West Station Area Planning*

TABLE 2.3 General information of stations and station areas

Station	Open Year	Railway Lines	Passenger Number	Distance to City Center	Station Area	Relative Size (km^2/million population)	Station Floor Area	Station Layers
Hangzhou East Station	2013	Shanghai–Kunming HSR; Hangzhou–Ningbo HSR; Nanjing–Hangzhou HSR	54 million in 2020 (Estimated)	11.6 km	Chengdong New Town 9.3 km^2; Chengdong New Town Core Area 2.7 km^2; Hangzhou East Station Area 0.45 km^2	0.89	1,482,000 m^2	5 Layers
Nanjing South Station	2011	Beijing-Shanghai HSR; Shanghai–Wuhan–Chengdu HSR; Nanjing–Hangzhou HSR; Nanjing–Anqing intercity railway; Hefei-Nanjing HSR	44.13 million in 2020 (Estimated)	12 km	6 km^2 in plan (Extended to 66 km^2 later)	0.64 (7.09)	730,000 m^2	6 Layers
Shanghai Hongqiao Station	2010	Beijing-Shanghai HSR; Shanghai–Wuhan–Chengdu HSR; Shanghai–Kunming HSR;	52.72 million in 2020 (Estimated)	13 km	Core Station Area 4.76 km^2; Business Area 26.26 km^2; (Extended to 86.6 km^2 later)	0.19 (3.48)	440,000 m^2	5 Layers
Guangzhou South Station	2010	Beijing-Guangzhou HSR; Guangzhou-Shenzhen-Hongkong HSR; Guiyang-Guangzhou HSR; Nanning-Guangzhou HSR; Guangzhou-Zhuhai intercity railway; Guangdong West Coastal HSR	163 million in 2018	17 km	2.51 km^2	0.13	615,000 m^2	6 Layers
Shenzhen North Station	2011	Guangzhou-Shenzhen-Hongkong HSR; Hangzhou-Fuzhou-Shenzhen HSR; Ganzhou-Shenzhen HSR	44.50 million in 2020 (Estimated)	9.3 km	Planned Area 6.1 km^2; Station Area 0.83 km^2; Core Station Area 0.47km^2	0.35	182,000 m^2	4 Layers
Luoyang Longmen Station	2010	Xuzhou-Lanzhou HSR	7.28 million in 2020 (Estimated)	2.5 km	Station Area 10 km^2; Core Station Area 5km^2	1.45	24,509 m^2	3 Layers

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TABLE 2.3 General information of stations and station areas

Station	Open Year	Railway Lines	Passenger Number	Distance to City Center	Station Area	Relative Size (km^2/million population)	Station Floor Area	Station Layers
Foshan West Station	2017	Nanning-Guangzhou HSR; Guangzhou-Foshan Intercity Railway	54.7 million in 2020 (Estimated)	7.8 km	8.6 km^2	1.43	68,000 m^2	3 Layers
Changzhou North Station	2011	Beijing-Shanghai HSR	11 million in 2020 (Estimated)	8 km	Planned Area 4.5 km^2; Station Area 0.87 km^2; Core Station Area 0.6km^2 (Extended to 56 km^2 HSR new town)	0.85 (10.63)	39,600 m^2	2 Layers
Huzhou Station	2013	Hefei-Hangzhou HSR	3 million in 2020 (Estimated)	7.5 km	6.9 km^2	2.05	19,920 m^2	3 Layers
Bengbu North Station	2011	Beijing-Shanghai HSR; Hefei-Bengbu HSR	4.9 million in 2020 (Estimated)	7.5 km	21.5 km^2	6.52	20,000 m^2	3 Layers
Jinjiang Station	2010	Fuzhou-Xiamen Railway	4.38 million in 2018	10 km	4.61 km^2	2.23	10,657m^2	2 Layers
Xinyu North Station	2014	Shanghai-Kunming HSR	1.44 million in 2018	10 km	2.22 km^2	1.85	9,995 m^2	2 Layers
Fuyang Station	2018	Hangzhou-Huangshan HSR	1.7 million in 2020 (Estimated)	6 km	2.42 km^2	3.67	12,000 m^2	2 Layers
Tonglu Station	2018	Hangzhou-Huangshan HSR	2.69 million in 2020 (Estimated)	4.5 km	10.06 km^2	24.53	12,000 m^2	3 Layers
Haining West Station	2010	Shanghai-Kunming HSR	7.78 million in 2020 (Estimated)	25 km	3.58 km^2	3.58	17,027 m^2	1 Layers

TABLE 2.4 Land Use and Percentage[1]

Station	Urban Construction Land	Road Area	Square &Parking Area[2]	Railway Area	Residential Area	Commercial Area	Business & Financial Area	Tourism & Entertainment	Green Area
Hangzhou East Station	2.74 km^2	21.1%	6%	22.4%	7.6%	3.8%	15.6%	8.3%	8.8%
Nanjing South Station	5.26 km^2	26.2%		9.1%	25.6%	21.7%			16.9%
Shanghai Hongqiao Station	3.93 km^2	17.61%	2.26%	-	5%	8%	47.5%	2.9%	12.5%
Guangzhou South Station	2.5 km^2	22.8%	4.2%	13.2%	14.8%	9%	9.7%	0.6%	25.7%
Shenzhen North Station	4.68 km^2	28.63%	10.07%	13.96%	21.9%	14.06%	7.68%	-	-
Luoyang Longmen Station	5.3 km^2	24.61%	2.44%	5.52%	5.7%	9.27%	20.61%	2.28%	29.57%
Foshan West Station	8.32 km^2	28.73%	2.3%	5.8%	14.5%	10.51%	13%	6.65%	12%
Changzhou North Station	56 km^2	-	1.6%	1.5%	13.33%	9.35%	24.22%	7.55%	4.1%
Huzhou Station	6.9 km^2	-	-	1.45%	6.66%	2.49%	8.82%	2.57%	-
Bengbu North Station	21.5 km^2	15.75%		2.83%	22.25%	3.56%	2.69%	1.62%	26.96%
Jinjiang Station	4.59 km^2	20.48%	1.23%	3.03%	1.82%	5.6%	28.5%	-	19.22%
Xinyu North Station	2.12 km^2	25.15%	4.57%	4.09%	10.22%	6.03%	20.74%	9.86%	15.11%
Fuyang Station	2.42 km^2	-	-	7.52%	25.6%	15.97%			-
Tonglu Station	8.99 km^2	27.6%	12.23%	4.42%	13.63%	3.94%	13.85%	8.38%	20.69%
Haining West Station	3.58 km^2	25.89%	2.1%	3.29%	4.78%	6.67%	5.21%	6.3%	37.48%

1 *The table does not include water and other non-construction land*

2 *Land use area of parking area only contains the parking area on ground level. Underground parking area in multi-layer stations was not included.*

2.4 Analysis

2.4.1 Context and Governance

Table 2.3 summarizes the general information collected on the stations and station areas. A comparison with the information on local context in Table 2.2 shows that station size is determined by the local context, while the location of the station in the city and station area were not planned for each local context. Station size, which consists of station floor area and station layers, closely correlates with station level, connected railway lines, and passenger numbers because it is mainly decided by CR according to passenger demand. In contrast, as a result of negotiations between railway and urban actors, these HSR station areas are all far removed from city centers. The average distance between these stations and city centers is 10.1km. This average distance is 12.6 km for national hubs, 8.7 km for regional interchanges, and 11.1 km for small and medium-sized cities. The non-central location of HSR stations reduces their accessibility because of longer access times, difficult transfers between transport methods, and a lack of walkability. At the same time, the urban and economic development of station areas is impeded because they are far from the built-up urban areas. Wang et al. (2021) have explained that there was little space left in the built-up areas of megacities and large cities, and demolition costs were unaffordably high for local governments. Railway actors would like to keep railway lines straight, and because stations for small and medium-sized cities are regarded as unimportant nodes, they are usually far away from those cities. Meanwhile, local governments would like to use this opportunity to promote urbanization.

The goals of local governments were also reflected by the size of station areas in Table 2.3, which were all large regardless of the city size, GDP, and population. Whether the HSR station area varies with city size can be directly expressed by dividing the area of the HSR station area by the population of the city. Ribalaygua and Perez-Del-Caño (2019) analyzed 12 Spanish HSR station areas and found their relative size varied from 0.5 to 1.5. In contrast, the relative size of Chinese HSR station areas fluctuates between 0.13 and 24.53. The most striking result is that station areas of national hubs in megacities were planned at a relatively small size at the beginning of projects, which were all below 1, though Nanjing South and Shanghai Hongqiao were extended after a few years. The relative sizes of regional hubs in large cities were comparatively large, around 1.5, except for Bengbu North Station, which was 6.52. The relative size of medium-sized and small station areas

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was disproportionately large, varying from 1.85 to 24.52. This suggests that these local governments in China did not plan their HSR station areas according to the local context, such as population and economic conditions, but rather attempted to maximize their HSR station areas. In Section 4.3, we analyze the reasons for this situation in relation to land use.

The visions of station areas depend on local context, resources, and the aims of local governments (Loukaitou-Sideris & Peters, 2020). After coding the 15 station area plans, we found six types of visions promoted by local governments, namely integrated transportation hub, new city center or sub-center, new town, commercial and business center, tourism and travel-related services center, and city gateway and landmark (Table App.A.1 in Appendix to Chapter 2). Each plan contained two to three of these visions (see Table App.A.2 in Appendix to Chapter 2 for details). The first feature of the visions of these HSR station areas was that most of them have been positioned as integrated transportation hubs, emphasizing the primary function of HSR station areas as the integration of multiple transport modes. Second, Chinese local governments expected that the HSR station areas could change the urban structure from monocentric to polycentric. Megacities, where national hubs are located, mainly planned HSR station areas as new city centers or sub-centers, while large cities, where regional interchanges are located, and medium-sized and small cities mainly planned HSR station areas as new towns. The centers of monocentric cities often face traffic congestion and pollution problems because their business and commercial activities in city centers generate a large amount of traffic demand, which is beyond the capacity of road networks (Mu & de Jong, 2012). Polycentric urban forms can theoretically reduce traffic density around former city centers by spreading out the flow of people to different centers. Local governments in China aspire to use the dense traffic demand in HSR station areas to create new urban centers and alleviate the traffic congestion in their urban areas.

Furthermore, all local governments regard HSR stations as an important opportunity to attract commercial and real estate development. A vision of a successful commercial and business center has been outlined in most plans, though the type of development varies by city. Pol (2002) found that the visions of European HSR station areas could be divided into two categories: international service cities used HSR station areas to attract knowledge economy-related and service industries, such as Amsterdam, Rotterdam, Barcelona and Lyon, whereas cities in transition expected the HSR station areas to bring changes to their economic structure, like Utrecht and Lille. The Chinese HSR station areas also followed this pattern. Station areas in megacities were designated to provide services for entire urban clusters, like the Yangtze River Delta, or even the entire country, and attract international financial and business companies. Large cities sought to transform their economic

structures from primary and secondary industries to service industries, so their HSR station areas were envisaged as urban gateways and new landmarks to enhance their city image, demonstrate modernity and attract urban investment. Small and medium-sized cities have tended to position their HSR station areas as a tourism-related service center. They expected their natural resources to attract tourists and stimulate local service industries.

Although all plans mention that they were planned according to the TOD concept, most of the plans do not clearly reflect a TOD vision, such as environmental sustainability, compact development, and walkability, except for Shanghai Hongqiao Station, which was proposed to be the first low-carbon business community in Shanghai. Similar to Xu et al. (2017), we found that the vision of TOD in the Chinese HSR station area has primarily focused on market-based growth. One of the reasons for this phenomenon is that planners have attempted to transfer successful TOD policies from other countries. They cited station area development in other countries, such as the Yokohama Station and Osaka Station in Japan, Berlin Station in Germany, and Lille Station in France, as "best practices" to demonstrate that the HSR station areas are suitable for financial, business and commercial functions. However, many TOD policy transfer studies have noticed distortions and unintended consequences in both the ways information is "sent" and "received" (Thomas et al., 2018). Chinese planners did not carefully scrutinize the successful development of HSR station areas in Europe and Japan in these plans. They ignored the local context and supportive policies and simply concluded that the HSR station area is suitable for commercial and business development.

2.4.2 Transport and Interchange

As shown in Table 2.4, the proportion of the railway area in the whole HSR station area is low for each case. Especially in small, medium and large cities, the proportion does not exceed 8%. Some of the experts we interviewed from the CR used this indicator to evaluate the integration of the station and the surrounding area, which is problematic. Ribalaygua and Perez-Del-Caño (2019) found that the proportion of railway areas did not exceed 10% for 12 Spanish HSR stations because the tracks were laid underground to address the barrier effect of the railroad. In the case of China, the railways were laid at ground level. As analyzed earlier, the main reason for the low percentage of railway areas is that the size of the stations was reasonable, while the area around the HSR stations was planned to be huge. These tracks still separated parts of the city and posed obstacles to the integration of the station and the surrounding areas.

In contrast, road areas occupy more than 20% of the HSR station area in most cases. In the TOD standard, it is recommended that the total road area used for vehicle travel should be less than 15% of the station area (ITDP, 2017). However, since Chinese HSR station areas were too far from the urban area, and there were no connecting local public transport networks, many new roads were needed to connect the station to the built-up areas. These road systems can increase the accessibility of the station area because people can have easier access to their destinations in the city center, such as hospitals and schools. In addition, we found that regardless of city size, the main roads in the station area were designed to be 60 meters wide, and one of the main roads in the Fuyang station area was even planned to be 100 meters wide. These roads were designed as six lanes in both directions, with some small cities, such as Jinjiang, planning to expand the roads to eight lanes later. Such wide roads not only waste land and encourage private car travel, but also prevent pedestrians from crossing the road and reduce the walkability of the area.

The planning concept of public transport priority in TOD was clearly stated in nine plans, three megacities, three large cities and three small and medium-sized cities. The most popular public transport method is the bus, and it is worth noting that the bus also includes long-distance buses in China, which can reach other cities that are not accessible by HSR. In most plans, 70% of the total passenger traffic is planned to be carried by public transport modes, including metro, BRT and buses. Most cities consider the metro to carry the most passengers, at around 50%. The share of buses was about 40% in megacities and large cities and decreased to around 20% in small and medium-sized cities. Meanwhile, the share of taxis in the plans rose from 8% to 20%. This indicates that the smaller the city, the lower the proportion of public transportation and the more it relies on taxis and private cars. Megacities and large cities better fulfill the principle of using public transportation advocated by TOD, while small and medium cities deviate from this principle. Moreover, the extent to which public transportation use is carried out as planned is still a question. During our interviews and fieldwork in China, we found that local public transportation often lags behind the opening of HSR in large and medium-sized cities because of institutional and technical complexities. For example, the metro at Luoyang Longmen Station opened ten years after the operation of the HSR, and the time lag for Changzhou North Station was eight years. In the first few years after the opening of the HSR, it was still necessary to rely on taxis and private cars to reach the HSR stations in these cities. It is worth studying whether people's travel behaviors can change after the opening of public transportation.

Experts in transport planning often suggest the integration of different transportation modes (mainly bus, subway and rail) and consider this integration to take precedence over the integration of stations and land use (Peek & Louw, 2008;

Zemp et al., 2011). They argue that providing “seamless transfers” between modes could increase the proportion of trips made by public transport and, therefore, reduce car travel and the pressure on road networks. The importance of seamless transfers is clearly recognized in 11 cases. Nanjing South Station is the first transportation hub in China to achieve a seamless transfer through vertical interchange. Its “vertical interchange” design concept has been promoted and used by the CR nationwide. As shown in Table 2.3, all these stations are multi-layered, with passengers interchanging between different transport modes on different floors via elevators and escalators. One of the advantages of this design is that large parking areas are designed underneath and do not become a barrier to the station and its surroundings. Private car users can also easily transfer to other public transport modes inside the station. However, Chen and Wei (2013) argue that such transfers are not genuinely seamless, as the station itself is so large that passengers need to walk for more than ten minutes to actually make the transfer. During our fieldwork and interviews, we found that a significant obstacle to seamless transfers is security checks. Since the CR is in charge of the HSR services in China and the local governments are in charge of the metros, there is no coordination between these systems.As a result, passengers often have to go through security checks twice, which is inconvenient and time-consuming.

Urban planners often assert that the measure of a successful sustainable transportation policy should be an overall reduction in travel distance, replaced by frequent travel on foot and by bicycle, and long-distance travel by public transportation (Curtis and Mellor 2010). However, only five cases proposed pedestrian priority, and eight plans emphasized pedestrian-vehicle separation in station areas. Although pedestrian routes were planned in 11 stations, most of them focused on the interior of the station, while walking and cycling networks in the station area are rarely mentioned. Three case stations, Hangzhou East Station, Guangzhou South Station and Changzhou Station, have planned complete pedestrian networks, bicycle lanes, and bicycle parking facilities. Complete and safe cycling and walking networks are emphasized in the TOD concept (ITDP, 2017). Most plans for Chinese HSR station areas have ignored this principle.

2.4.3 Land Use Planning

All 15 plans emphasized high-density development of the HSR station areas. The station was surrounded by commercial and business buildings whose floor-area ratio (FAR) was 3.5-4.0. As the distance from the station increases, the FAR decreases to less than 2.0 gradually. The development pattern is in line with the principle of high-density development, but one of the compact principles advocated by TOD is that these developments are planned in vacant urban areas or brownfield sites (ITDP, 2017). According to our interviews, small and medium-sized cities were eager to build several new districts or new towns to convert agricultural land into constructive land. However, a large amount of land in these new towns was left vacant by developers because of the depressed local economy. When the sites for the HSR stations were selected, most local governments in China did not use these vacant lands to build the HSR stations but instead chose to continue to expand the cities and build HSR new towns. In most cases, the land use functions before the development of the 11 station areas were agricultural land, fish-ponds, woodland, and residential land for farmers (Table App.A.1 in Appendix to Chapter 2). Therefore, the planning of these station areas did not follow the principle of compactness in terms of the whole city level, and it also resulted in a loss of farmland.

These HSR station areas are vast, especially in small, medium, and large cities. In addition to the road area and railway area, there are seven types of areas: commercial, business and financial, tourism and entertainment related, residential, squares and parking, and green space. The commercial area is planned for retail, shopping malls and restaurants in station areas, while the business and financial areas include large office areas, exhibition and convention centers, and industrial parks. As shown in Table 2.4, each station area has a large amount of commercial, business and financial, tourism and entertainment land planned, with most station areas accounting for more than 20% of the total. Each city expects the HSR station area to demonstrate a sense of modernity and prosperity. Local governments and planners, especially of small, medium and large cities, believe that the increased accessibility brought by the HSR will generate development opportunities for their cities. Surprisingly, regardless of local conditions in the cities, the economic development plans for the HSR station areas were all designed to attract international company headquarters, financial companies, and high-tech industries, along with large convention and exhibition centers, trade centers, and theme parks. In the plans of the five mega-cities, planners systematically analyzed the economic bases of the whole city, other business centers in the city, and the complementary positioning of the HSR station area and other business centers. However, in practice, the economic development around Guangzhou South Station still lags behind planning expectations, and the level of commercial and business development is

much lower than the targets in the plans (Dai, 2015a). Based on land use change data from 232 European stations, Wenner and Thierstein (2021) conclude that stations on the urban fringe rarely attract any development around them. It is dangerous for small, medium, and large cities to plan large commercial and business areas around HSR stations without clear and tailor-made goals, leading to large amounts of unused land and being criticized in the media as "ghost towns."

In Table 2.4, residential areas account for a large portion of the area, regardless of city size. According to Saunders and Smith (2014), TOD frequently causes a spike in surrounding housing prices, and land developers have recognized its potential. Xu et al. (2016) studied metro stations in Wuhan, China, and reported that the price premium for commercial housing within 100-400 m of the station was about 8% and 16.76% within the buffer zone of 100 meters from the station. Land policy in China has undergone a series of reforms since 1994, turning urban space into a marketable commodity, while urban housing has also been rapidly commoditized. The decentralization of administrative and financial powers allowed local governments to retain the profits from the sale of land use rights. Meanwhile, local governments are responsible for funding local development and local fiscal balance, so they exhibit entrepreneurial behavior (Wu, 2016), following a land-driven, fiscal-driven, and growth-promoting logic (Ye & Wu, 2014). Local governments pursue the maximization of land finance and land speculation and rely on various land-based revenues (Jiang et al., 2016; Pan et al., 2017). The development of mega-projects like HSR provides excellent opportunities for local governments to speculate on surrounding land, develop real estate and gain fiscal revenues (Li & Chiu, 2020; Shen & Wu, 2017). Thus, a large number of residential areas were planned in these HSR station area plans, but in reality, these HSR new towns did not attract a large number of households due to a lack of other infrastructure. This phenomenon has been taken seriously by the Chinese central government, which has introduced policies to limit the scale of development around HSR stations and prevent the debt risk of local governments (Chen et al., 2021).

Furthermore, scholars have suggested that rising housing prices around TODs may exclude low-income groups (who may be more likely to use public transport than higher-income residents) from living in TOD areas (Ibraeva et al., 2020; Mu & de Jong, 2012; Saunders & Smith, 2014). Social diversity and mixed-income should be a fundamental requirement for TOD (Clagett, 2014). However, in these 15 plans, we found that most of the planned residential areas are intended for high-end commercial housing, and there is no mention of affordable housing. Only three HSR stations, Nanjing South Station, Bengbu Station, and Haining West Station, have explicitly mentioned new residential areas in the station area for the farmers who originally lived in the area and those with low income. Almost all new developments

near stations may be unaffordable for low-income households. Local governments should consider mixing housing types and arranging affordable housing while expecting revenue from commercial housing.

Although the plans emphasize mixed-use development, the arrangement of different functions is still structured as mono-functional mega-blocks. A function is concentrated in a large area without mixing with other functions. The TOD standard suggested the length of the longest block should not exceed 110 m, while the smallest blocks in these plans were around 200–300 m. As suggested by Pan et al. (2009), there is an urgent need for China to adjust planning codes to promote small blocks and mixed-use pedestrian-friendly environments.

The design of public space and architectural aesthetics occupy much of the space in each of the 15 plans (Table App.A.1 in Appendix to Chapter 2). The reason is that local governments expect the HSR station area to enhance the image of the city, attract investment, and increase the competitiveness of the city. At the same time, these station areas are located far from the city, so they have better natural resources for tourism, such as the Luoyang Longmen Station, which is adjacent to the Longmen Grottoes, a World Heritage Site. Green space also accounts for a large proportion of the area. Many stations are adjacent to water bodies, so the waterfront conditions were utilized in the design of public spaces. Moreover, these HSR stations attach great importance to the design of the station squares because station squares not only assume part of the interchange function, but also assume the function of accommodating a large number of passengers during special periods, such as the Spring Festival and summer holidays. The squares also connect the station and the city. Conventional railway stations in China were typically separated from cities by large hard-surfaced squares. In the HSR station area plans studied here, planners have taken note of this issue by incorporating soft surfaces such as water bodies and green areas into the station squares. Moreover, in these plans, the main building of each station has a symbolic meaning that reflects the local cultural characteristics. For example, the building of Guangzhou South Station represents the “banana leaf” of its regional culture. However, these symbolic meanings are generally not easily recognized by passengers because of the grand scale of stations.

2.5 Conclusion

A good station area plan underpins the successful operation of a HSR station (Loukaitou-Sideris & Peters, 2020). Chinese local governments claim that HSR station areas are planned according to TOD principles, but scholars, media, and passengers have criticized these station areas since their very opening. They argue that the design of HSR station areas actually violates the basic principles of TOD and even causes urban sprawl. Therefore, this article has focused on what success factors should be included in a good TOD plan for HSR station areas and to what extent these factors are considered in the planning of HSR stations in China. We investigated to what extent the plans adhere to TOD principles as clustered in Table 2.5. The spatial plans of 15 HSR station areas were compared, including national hubs in megacities, regional interchange hubs in large cities, and stations in small and medium-sized cities. We compared the factors in these plans with the success factors of the TOD standard in terms of contexts and governance, transportation and interchange, and land use planning, as well as the characteristics of the station plans of different city sizes.

First, as shown in Table 2.5, choices made in Chinese HSR station areas deviate from TOD principles, but the causes of these deviations vary from one factor to another. Some important factors are ignored in the plans, such as pedestrian priority. Others are recognized and mentioned in the plans as important planning principles by planners, such as diversity and high density. However, the specific design of the land use deviates from these principles. Many actors are involved in the decision-making process, so some factors like the location are not decided by planners, and partly for that reason TOD planning principles are not followed. Furthermore, there are factors such as seamless interchanges that are highlighted in the plans, but hindered in practical implementation by the complexity of the institutions and the fragmentation of land ownership. The divergence between factors in plans and TOD standards has caused the development of HSR station areas to change from the TOD as advertised to the TAD as practiced. Different solutions should be adopted for these different factors, rather than only considering this phenomenon as a planning-level problem.

TABLE 2.5 Summary of TOD factors in the plans of Chinese HSR station areas

	Factors in the Literature	Explanation	Factors in the Plans for HSR Station Areas
Context and Governance	Local context	Carefully consider the spatial/locational and economic characteristics	The size of stations matches local contexts, but the size of station areas and the location of stations are not aligned with local contexts Stations are far from city centers Large station areas, especially in small and medium-sized cities
	Vision	Clear, smart and strong Long-term, consistent	Focus on market-based growth visions rather than TOD visions Unclear business development goals for large, medium and small cities
Transport and Interchange	Service level of HSR station	Good level of HSR service	Railway areas occupy a small proportion of the whole area, while the railways operate at ground level causing a barrier in the city. National hubs and regional hubs have a good level of HSR services, small and medium-sized stations only connect to one HSR line
	Destination accessibility	Good accessibility of services in cities	Poor accessibility of services in cities because of their remote location
	Accessibility of the station	Efficient road system Good public transit connections and intermodal choices Avoid barriers such as large parking lots and highways Parking supply	Many new roads planned; highways and other roads are very wide Public transport priority and many intermodal choices (mega and large cities better than small and medium cities), but in reality, public transport often lags behind the opening of HSR Parking lots are underground, which does not create barriers.
	Seamless interchange	Convenient transfer between transport methods	Promoting seamless transfer and vertical interchange In reality, transfers are impeded by long walking distances and security checks
	Pedestrian-friendly system and bicycle	Good pedestrian and bicycle access to the station Provide pedestrian friendly street networks	Access to the station by cycling and walking is ignored in most plans Most plans lack pedestrian-friendly networks
Land use Planning	Density	High density urban development Taper densities with distance from a station	The HSR station areas are high density and taper densities but not from the perspective of the whole city
	Diversity	Mix of land uses and activities Mix of housing types Design small blocks	Large areas for commercial and business, and real estate Lack of mixed housing types and affordable housing No real mix of functions, mega-blocks
	Design	Public space for people to congregate High-quality architecture	Large parts of the plans Good design of public spaces includes soft surfaces High quality architecture

Second, many cities regard these mega-projects as solutions to their urban development issues (Olesen, 2020). These HSR station area plans are considered to progress "urbanizing the suburbs." Shen and Wu (2020) argue that the so-called TOD is used as a financing instrument to catalyze state-supported, transit-led suburbanization. The most significant characteristic of these station area plans is that they all aim to be areas where the service industry and knowledge economy are booming, with a focus on market-based growth. These huge station areas contain large commercial and business areas as well as residential land. Local governments rely on the revenues generated by the sale of these land use rights, but this is an unsustainable mode of development. Many studies have shown that infrastructure and increased accessibility are development opportunities, and local governments need to grasp the opportunities through appropriate strategies and policies (Facchinetti-Mannone, 2019). However, the commercial planning of the examined station areas is detached from the local economic foundations and lacks supporting policies, resulting in the failure of these HSR station areas to meet the planned goals. Moreover, large areas of agricultural land have been converted into construction land. To date, this is an irreversible process and has had an adverse impact on the environment and the amount of arable land. The social inequities caused by this process were not addressed in the plans either.

Third, the comparison shows that the planning problems of regional interchanges in large cities and stations in small and medium-sized cities are more significant than the national hubs in megacities, which have received more attention from scholars (Dai & de Vries, 2018; Yang & Han, 2020). As shown in Section 4, not only the location and size of these HSR station areas but also the commercial and business areas are not developed in line with their local contexts. Meanwhile, the construction of many wide roads has demonstrated that these plans promote the use of private cars and taxis, which completely departs from the core concept of TOD. Moreover, residential areas predominate in these medium and small station areas, but these cities are in fact losing population (Long & Gao, 2019). In our interviews, local governments of medium and small cities expressed their desire to attract and retain people through the development of HSR and its station areas. However, with the siphoning-off effect HSR is likely to have on them, it will be even more challenging for these cities to retain their population, and a large area of residential land may be wasted (Gong & Li, 2022). TOD promotion in small and medium-sized cities necessitates a different set of policy solutions than in mega cities (Xu et al., 2017). The national government should announce supportive policies for TOD focused on these small and medium-sized cities.

There is a lack of explicit recognition of specific features and performance standards to establish what represents effective TOD in Chinese plans, which has complicated the sharing of experiences between cities and monitoring TOD progress (Ibraeva et al., 2020; Xu et al., 2017). In this study, we have summarized what we have identified as the standards in the literature to compare TOD plans for different HSR station areas. We recommend that national planners devise national standards to ensure that national policies for TOD planning are reflected in local planning schemes. These national TOD standards should differ for cities of different sizes, and they should include the percentage of public transport in the modal split, complete pedestrian and bicycle networks, and dramatically reduced block size. In addition, successful TOD implementation must be based on the specific political and economic circumstances and urban form of the city (Thomas et al., 2018). Local planners should design TOD solutions in conformity with specific local conditions, including funding potential and supplementary policies.

Furthermore, in order to further the integration of transport with land use, both national and local governments should consider institutional reform and promote cooperation between railway and urban actors. At the present stage, the cooperation could be the mutual recognition of security checks between railway and subway actors, which would already simplify one procedure for passengers. In the long term, actors should establish a collaborative at the early planning stages to share responsibility for the design and operation of the HSR station area to facilitate the implementation of TOD. Finally, a major shortcoming of this study is that it does not discuss the decision-making process behind these plans or how interaction processes affect the implementation of TOD principles. We suggest that subsequent studies focus on these issues, especially in small and medium-sized cities.

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3 Decision-making Process on Location Choices for HSR Station Areas

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ABSTRACT Most High-Speed Railway (HSR) station areas in China can be found on the urban periphery or in suburban areas, a phenomenon that has often been criticized. While debate about the influence these location choices have on the economic and sustainable development of cities rages on, little attention has been paid to the decision-making processes leading to these locations. This paper investigates these processes by comparing HSR stations in three cities: Shenzhen, Lanzhou and Yongcheng. Our findings can help actors involved in making location choices develop awareness of different interests and create the conditions for successful development of HSR station areas.

KEYWORDS HSR station areas; decision-making process; transport planning; urban development; policy networks; China

3.1 Introduction

Over the last four decades, Chinese urban governance has changed fundamentally. Since the economic reforms began in 1978, traditional central government intervention, typical of planned economies, has been replaced by marketization and decentralization (Hsing, 2010; Wu, 2003). The central government has devolved many responsibilities in governance and economic decision-making power to local governments (Chien, 2010), giving them a dominant role in Chinese urban development (He & Wu, 2009; Li et al., 2019). Chinese local governments have engaged in market-like entrepreneurial activities, with significant impacts on the speed and shape of the urbanization process (Wu, 2018). The locational and industrial readjustment of urban activities has been highly influenced by local governments (Han, 2000). Local states have adopted the development of mega projects as one of the main strategies for urbanization to generate revenues, enlarge urban areas, and improve the competitiveness of cities (Hsing, 2010; Qian, 2011).

The rapid development of High-Speed Railways (HSR) is expected to further accelerate urbanization and industrialization and reshape China's economic geography (Chen et al., 2019). It is estimated that by 2030, all 34 provincial capitals will be served by HSR stations, and 245 cities with a population of over 500,000 people will be connected (China Railway Corporation (CRC), 2016). However, unlike HSR stations in Europe and Japan, the majority of new Chinese HSR stations are located in the urban periphery or suburban areas. New urban areas, namely "HSR new towns", are created around the HSR stations to provide business and commercial functions, entertainment, and residential functions.

The particular location chosen for an HSR station determines the developmental potential of the station area around it, since it operates both as a node in the transport network and a place in the city (Bertolini & Spit, 1998; Kim et al., 2018). Scholars have argued that HSR stations in China tend to be located too far from the city to allow for optimal functioning (Yin et al., 2015). As transport nodes, non-central locations are problematic due to poor accessibility (Chen, 2012; Salzberg et al., 2013). As future projections for urban places, ambitious master plans for building HSR New Towns have been criticized for causing unsustainable urban expansion (Chen & Wei, 2013; Dai, 2015). Large tracts of agricultural land have been converted to construction land for the benefit of future station areas without being eventually developed (Lu, 2012). The service functions of many station areas are occupied by low-quality businesses, offices, hotels, and residential areas (Zhao & Chen, 2015). Especially for medium-sized and small cities, station areas show

slow spatial and commercial development since they are located far away from city centers, which could help them thrive (Deng et al., 2019; Yu et al., 2012; Zhao & Chen, 2015).

A lot has been said and written about the transport and land use characteristics of locations for HSR station areas, but there is remarkably little research conducted on the decision-making processes leading to those location choices. In two studies, the interaction across governmental tiers in the decision-making process regarding the location of Wuhan's HSR station was examined (cf. Dai, 2015; Yang & Han, 2020). However, it remains unclear which resources were controlled by which actors, and what their interdependencies looked like. This study aims to map actor interdependencies and explore governance across various government tiers within the setting of local state-market dynamics. We believe it is essential to examine the institutional settings and planning cultures surrounding such large-scale development projects (Tornberg, 2012). These projects are the result of complex spatial, financial and political decision-making processes in which multiple actors are involved (Majoor, 2011). The actors may have differential access to resources needed in infrastructural mega-projects such as power, funding, land and knowledge. Different interests and objectives of these actors have to be balanced against each other and put to use in a complex and changing context (Salet et al., 2013).

This contribution aims to examine how location choices for HSR stations in China are made and how they are influenced by institutional settings, power positions, and interdependencies between urban and railway actors. We explore what different goals and resources central and local governments bring to bear in the new decentralized context and how these are intertwined in decision-making processes leading to the selection of certain locations. We borrow ideas from Policy Network Theory (PNT) to identify the perceptions, resources, and interdependencies among actors, as well as rounds, impasses, and breakthroughs that occur during decision-making processes. Since our study is of an exploratory nature, we adopt case study research for our data collection. Three cases are analyzed: HSR station location choices in Shenzhen (Guangdong), Lanzhou (Gansu) and Yongcheng (Hubei). Based on the results, we discuss how interdependencies among actors influence the course of decision-making processes and, ultimately, the location choice. In the conclusion, we will offer recommendations for policymakers aiming for better outcomes.

3.2 Understanding Decision-Making Processes by Focusing on Actors and Their Interdependencies

One could say that economic decentralization and political centralization have been the drivers for the rise of the entrepreneurial state in China, and consequently the major institutional conditions in which urban projects are undertaken (Wu, 2018; Zhang, 2002). To empower local governments and encourage them to become more economically self-sufficient entities, the central government set in motion a process of far-reaching deregulation (Xu, 2011). This enhanced economic policy discretion is, however, restricted by political accountability principles imposed from above (Chien, 2010) and through performance evaluation procedures based on designated economic and social objectives (Gao, 2015; Wu & Zhang, 2007).

The planning, construction, and operation of mega infrastructures, such as HSR, are still dominated by the central government, which provides large-scale financial support (Dai, 2015; Hu et al., 2018). Due to centralized planning and funding, these HSR projects could be rapidly implemented in China (Takagi, 2011). The objectives underlying HSR development have been to enhance capacity for the overloaded rail network, provide efficient medium-distance transport and improve passenger services. Supporting urbanization and economic development by improving provincial and regional connectivity were also among the aims (China Railway Corporation (CRC), 2016). For local governments, infrastructure projects made their achievements conspicuous and provided evidence of their governance competence and success in meeting developmental targets (Chien, 2013). These projects have become a tactic to improve cities' competitiveness within the region and spur the local economy (Qian, 2011). Furthermore, infrastructure projects, especially HSR projects, usually act as an incentive for large-scale urban regeneration and development (Bruinsma et al., 2008). Land development often generates revenues for Chinese local governments to guarantee adequate funds for offering municipal services (Wu & Zhang, 2007). As a result, local governments use new infrastructures as weapons of advancement, and they are enthusiastic about establishing special development zones, a characteristic of growth-oriented politics in China (Jiang et al., 2016).

Some have argued that the Ministry of Railways (MOR)[3] is to some extent responsible for the current far-out-of-center locations of HSR stations in China and the problematical urban development around these station areas (Chen, 2012; Chen & Zhang, 2010). It would have had the ultimate power to decide on HSR locations without requiring cooperation from local governments. However, the actual picture is more complex since HSR development in China in fact emerges through central-local relations and interactions (Yang & Han, 2020). Disbanding the Ministry of Railways (MOR) and establishing the China Railway Corporation (CRC) created opportunities for more constructive cooperation and competition among actors (Mu et al., 2015). Transforming actor relations changes both power distribution and the interplay among actors (Li et al., 2019). This makes it necessary to analyze interactions and interdependencies among actors in the decision-making process on locations for HSR stations.

It is Policy Network Theory (PNT) that offers the most developed theoretical framework for analyzing the institutional and strategic complexity of problem-solving and decision-making (Koliba et al., 2018; Van Bueren et al., 2003; Van Gils & Klijn, 2007). A policy network perspective has proven to lead to a more profound understanding of policy processes, their dynamics, and their outcomes in China (De Jong et al., 2016; Sun & Cao, 2018; Lu et al., 2018). It is the appropriate tool for understanding formal and informal institutional linkages among governmental and other actors that share a common interest in policy making (Rhodes, 2007).

Actors have been described as social entities, people, or organizations (Enserink et al., 2010). They collaborate with other actors to protect their interests or to fulfill their goals. To understand changing actor behavior, three dimensions have been used: perceptions, values, and resources (Jobert, 1989; Sabatier, 1988; Scharpf, 2018). In summary, perceptions reflect the image that actors have of the world around them. This involves perceptions of other actors and their networked relationships as well as the substantive characteristics of a policy problem (Scharpf, 2018). Values provide a direction in which actors would like to move. They describe the internal motivations of actors (Sabatier, 1988). Resources are the "things over which they [actors] have control and in which they have some interest" (Coleman, 1990, p. 28). Actors can use these resources to influence the world around them, including other actors, relations and rules. The most classic divisions

3 The Ministry of Railways was dismantled at the 1st Plenary Session of 12th National People's Congress (14 March 2013). Its administrative duty has been transferred to the National Railway Authority, resorting under the Ministry of Transport (MoT), while the enterprise function has been assigned to the China Railway Corporation (CRC).

of actors' resources are "nodality" (knowledge/information), "authority" (legal power), "treasure" (funds) and "organization" (goods, staff and services) (Hood & Margetts, 2007). This NATO-scheme is used to examine to what extent and how the need for these resources is recognized, cogitated, and/or compensated for (Vabo & Røiseland, 2012). Actors usually control and own different resources in the decision-making process. They need resources from other actors to reach their objectives, which creates interdependencies among actors (Klijn & Koppenjan, 2000; Marsh & Smith, 2000).

The analysis of a decision-making process is based on the reconstruction of policy rounds by identifying key decisions and the process leading to those decisions (Teisman, 2000). This is followed by an analysis of the processes within each of the rounds, focusing on the actors, their goals, perceptions and resources, and on the actor relationships and interdependencies. Progress in decision-making within these rounds tends to be bumpy, with impasses and breakthroughs. Actors have to search for a shared understanding of the problem and possible actions, providing them with a basis for aligning their resources after an often rather lengthy process. A crucial decision offers an explanation and solution to an issue, which may even have resulted in an impasse, and it sets the circumstances for the next round (Van Bueren et al., 2003). A sequence of interactions and decisions in several rounds results in the outcomes of a process.

Actors involved in HSR projects usually have different perspectives and values (Peek & Louw, 2008; Pol, 2008). The primary value of the Chinese central government is to improve the efficiency and profitability of the whole railway network, whereas the local government regards the HSR station as a useful starting point for urban growth projects (Yang & Han, 2020). In a decentralized context, the location of HSR stations emerges as an outcome of a negotiation between the CRC (MOR) and local governments (Dai, 2015; Yang & Han, 2020). However, it remains unclear which potential locations for an HSR station reflect the actors' perspectives, what resources are owned by which actors, and how they interact with each other in decision-making rounds. In that respect, to be able to understand the interdependency of actors and the decision-making process behind the location choices of HSR stations, it is essential (1) to understand the broader context; (2) to compile an inventory of the key actors, their goals and resources; (3) to map their interdependencies; and (4) to demonstrate how the actor constellations and those interdependencies influence the decision-making process in the various rounds. Figure 3.1 shows the analytical framework of this research.

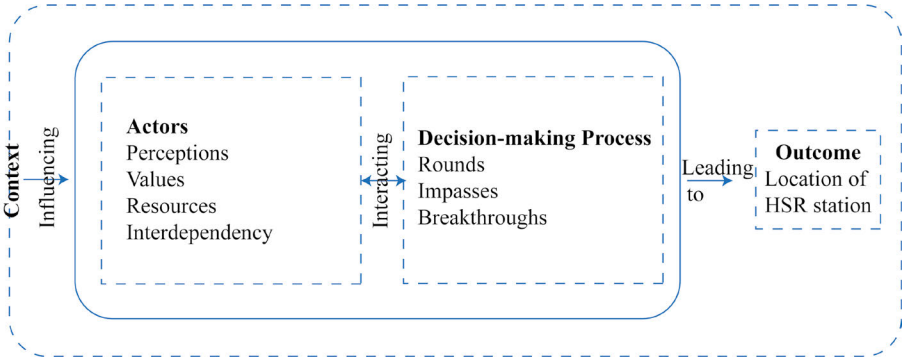

FIG. 3.1 Analytical framework (Source: the authors).

3.3 Methodology

In this paper, we used qualitative case study analysis as a research strategy. It not only allows opportunities for testing a theory (Yin, 2014) but also provides an in-depth understanding of particular problems or places and a broad understanding of relevant context (Seawright & Gerring, 2008), which is also a key part of PNT. To gain an in-depth understanding of the issues involved in answering the research question, we selected three cities in which HSR-station location choices were made: Shenzhen, Lanzhou and Yongcheng. First, these cases present different regions and policy periods in which they have been developed. Shenzhen is located in the Pearl River Delta (PRD) in south-eastern China and is adjacent to Hong Kong. Shenzhen North was one of the first few HSR stations in China. Lanzhou is the provincial capital of Gansu Province and it is economically one of the most critical cities in northwest China. Yongcheng is a prefecture-level city located in the middle of Hubei Province in central China. Construction of that HSR station will start in 2020. Figure 3.2 shows the geographical locations of each HSR location. Second, these cases demonstrate diverse variations in GDP, population, passenger amount and local power which could, besides showing differences, exhibit vital common patterns that cut across variations (Patton, 1990). Table 3.1 summarizes the characteristics of our case studies.

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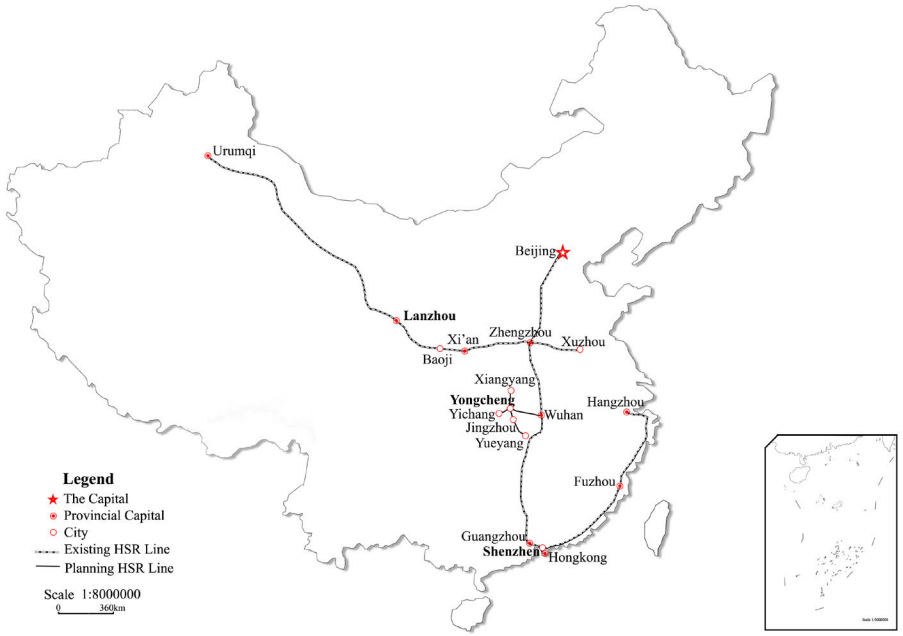

FIG. 3.2 The locations and HSR lines of Shenzhen, Lanzhou and Yongcheng (Source: the authors).

TABLE 3.1 Summary information on three HSR stations

Station	City population in 2018 (million)	City GDP by 2018 (billion)	Annual passengers in 2020 (million)	Opened	HSR railway lines
Shenzhen North	12.52	2249	44	2011	Beijing-Guangzhou-Shenzhen-Hongkong, Hangzhou-Fuzhou-Shenzhen
Lanzhou West	3.28	273	9	2014	Lanzhou-Urumqi, Baoji-Lanzhou, Lanzhou-Zhongchuan (intercity line)
Yongcheng West	2.89	185	3.45 (2025)	Under constructing in 2020	Xiangyang-Yongcheng-Yichang, Yanjiang, Jing-Jing (intercity railway)

Sources: Yongcheng Statistics Bureau, 2019; Lanzhou Statistics Bureau, 2020; Shenzhen Statistics Bureau, 2018

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Our case studies were informed by a series of in-depth interviews, desk research, and observations. The first round of fieldwork and in-depth interviews with actors was conducted from December 2018 to March 2019. The second round of fieldwork and in-depth interviews took place in October 2019. In total, 18 semi-structured interviews were conducted (see Table App.B.1 in Appendix to Chapter 3 for details). The "snowballing" strategy (Goodman, 1961) was applied to obtaining interviews. It started from a personal academic network and was then extended to local practitioners. For the Shenzhen case, we interviewed engineers and planners from the China Railway Fourth Survey and Design Group (CRFourthSDG). The Shenzhen branch of the China Academy of Urban Planning and Design provided planning documents and meeting minutes. We analyzed the case based on interviews and documents including *Urban Design of New Shenzhen Railway Station Zone, Landscape Design for Shenzhen North Railway Station, Longhua New Area Comprehensive Development Master Plan, Design for Plots of Shenzhen North Railway Station, General Layout Planning of Shenzhen Railway Nodes, Plan of Shenzhen Second Passenger Railway Station* and meeting minutes. For the Lanzhou case, we interviewed railway actors from China Railway Lanzhou Branch, Lanzhou West Station manager and China Railway First Survey and Design Group (CRFirstSDG), and urban actors from the Lanzhou Metro Company, Lanzhou Urban-Rural Planning Bureau, and Tongji Architectural Design Co., Ltd. The data for the Yongcheng case were collected thanks to a previous research project and cooperation between the local government of Yongcheng and Delft University of Technology from 2018 to 2019. Yongcheng HSR station was also planned by interviewees from the CRFourthSDG. Here too, they provided information regarding the decision-making process in Yongcheng. To obtain general information, we interviewed a member of senior staffs from CRC, who is responsible for reviewing HSR lines and station development plans.

3.4 Case Analysis

3.4.1 Shenzhen

After becoming China's first Special Economic Zone (SEZ) in 1980, Shenzhen Luohu Station was the only passenger railway station for a long time. Due to fast economic and population growth, the MOR increased the frequency of its train services over time. The station capacity shortage caused problems for passengers, local government and the MOR. The station is located in the densely built city center, leaving no opportunities for enhancement and expansion. Therefore, the idea of constructing a second passenger railway station was put forward at the end of the 1990s. The presence of many hills on the north side of Shenzhen, the rapid urban development and the construction of many industrial parks left almost no location alternatives for the new train station. Longhua district was, geographically and socioeconomically speaking, the most suitable site for the new station (Interviewee 4). Most areas surrounding the planned new station were undeveloped. It was 9.3 km away from Futian city center (Figure 3.3).

As Shenzhen is a crucial railway transport node in south China, the MOR aimed to provide railway services which would conform fully with the projected passenger numbers and demand generated by urban development in Shenzhen. The management and operation of the Shenzhen railway stations were the responsibility of the local branch of MOR, China Railway Guangzhou Branch (CRGB). CRFourthSDG was the research agency providing scientific analysis and advice for the planning and development of railway lines and stations.

The Guangdong provincial government cooperated with the MOR to plan, construct, invest in and approve the development of railway lines and stations located in the province. It was responsible for the planning of the Pearl River Delta Metropolitan Region intercity railways, in which the Shenzhen railway stations played an important role. The objective of the Shenzhen municipal government was to construct a national-level railway transport hub, which could alleviate the transport pressure from the existing station and improve the connection between Shenzhen and Hong Kong. Meanwhile, it was also aimed at minimizing the impact of planned new railway lines on the urban spatial structure and coordinating the station area development with the urban master plan, thus making sure that the city's urban interests were served.

FIG. 3.3 Locations of Shenzhen railway stations (Source: the authors)

At the beginning of the 2000s, the Shenzhen municipal government proposed developing the second passenger railway station on Shenzhen's urban fringe or at a subcenter. It negotiated with the CRGB and entrusted CRFourthSDG with the selection of a location for the new railway station. Most of the land in the Longhua District was owned by the national state or collectively owned. The municipal government was strongly in favor of locating the station in this area to minimize the cost of relocation and the cost of land ownership change (Interviewee 2). In addition, it is planned to shift the focus of development from the city center to the urban fringe. The location of the station could catalyze the Longhua area to be developed into a new city subcenter. Based on the analysis, the CRFourthSDG proposed to build the new Shenzhen railway station in Longhua in the *Plan of Shenzhen Second Passenger Railway Station*, and it was agreed by both the Shenzhen municipal government, CRGB, and MOR in November 2003 (Interviewee 4). They reached an agreement to construct the HSR station, named Shenzhen North Station, on the urban edge.

In 2005, a new round of negotiations was opened by the MOR when it proposed to construct an additional third station in the city center. The *Medium- and Long-Term Railway Network Plan* was issued by the State Council of China. It was approved that the Beijing-Guangzhou-Shenzhen-Hong Kong HSR line and the Hangzhou-Fuzhou-Shenzhen HSR line should intersect with each other in Shenzhen in January 2004.

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MOR drew up the *General Layout Planning of Shenzhen Railway Nodes* in 2005, which was in line with previous research to construct a new Shenzhen railway station in Longhua district (Zong et al., 2011). The Shenzhen North Station is located to the north of Shenzhen city center in the Futian district. The Beijing-Guangzhou-Shenzhen-Hong Kong line would pass through Shenzhen from north to south via tunnels and then would connect with Hong Kong. Therefore, the MOR proposed building another HSR station in Futian district. The Shenzhen municipal government disagreed with building the third station in Futian at first since it would be difficult to arrange traffic flows and the amount of land was limited. The MOR decided to construct the Futian station underground. The MOR convinced the Shenzhen municipal government that building an HSR station in the city center could bring many benefits in terms of urban development, so the Guangdong provincial government and Shenzhen municipal government approved the plan in 2006. Figure 3.4 illustrates the decision-making process regarding Shenzhen HSR North station and Futian station; the outcome was that both stations were built. With the development of the Shenzhen North Station area, the Longhua district was planned by the municipal government as a subcenter that could accommodate those urban functions for which there was no space in Futian.

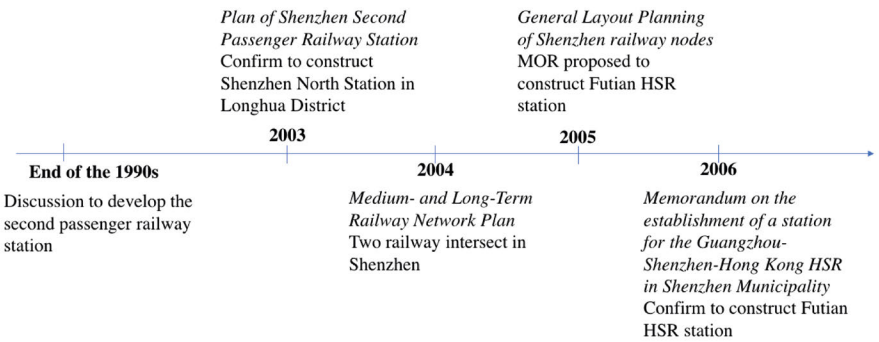

FIG. 3.4 Decision-making process of Shenzhen HSR North Station and Futian Station (Source: the authors).

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3.4.2 Lanzhou

Lanzhou is one of the most important cities and transport nodes in northwest China. The Lanzhou-Urumqi high-speed railway, officially known as the Lanxin Railway Second Double-Tracked Line, is one of the most important projects in the *2004 Medium- and Long-Term Railway Network Plan*. Its construction was approved by China's National Development and Reform Commission (NDRC) in August 2009. The city of Lanzhou has a linear urban form and is constrained by two mountains to the north and south. The distance between east and west Lanzhou is 30 km, while it is only 5–10 km from north to south (Tong & Shi, 2015). The city is carved in two by the Yellow River and land in Lanzhou is scarce, which causes difficulties in selecting a location. Three possible locations were identified for the Lanzhou HSR station during the planning process (Figure 3.5). The first option was to refurbish the existing Lanzhou Railway Station located in the city center, the second was to select an area in a new town, and the third location was an area in a subcenter of the city.

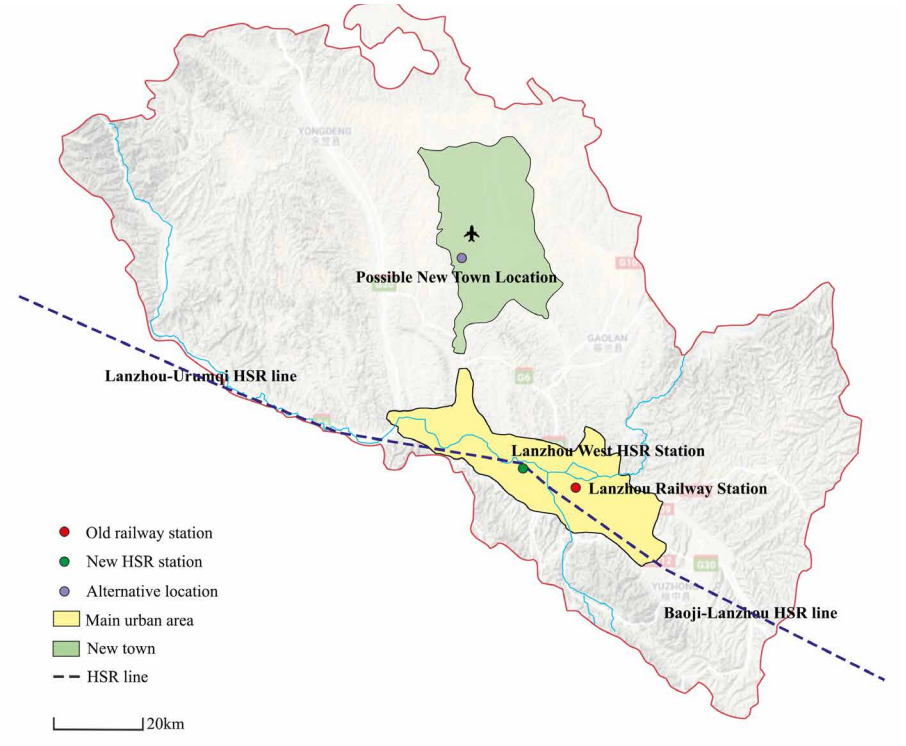

FIG. 3.5 Alternative locations of Lanzhou HSR station (Source: the authors).

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The MOR played a vital role in planning and constructing the Lanzhou-Urumqi HSR line. Lanzhou's HSR station would be the start of this line and figure as an important interchange hub in the Chinese railway network: its location was considered crucial by the MOR (Interviewee 8). The management and operation of the Lanzhou railway stations were the responsibility of China Railway Lanzhou Branch (CRLB). It had land-use rights to the railway station. CRFirstSDG was the research agency providing scientific studies and policy suggestions for railway lines and stations to local governments and MOR.

The Gansu provincial government cooperated with the MOR to plan, construct, and invest in the section of the Lanzhou-Urumqi HSR line that would run through Gansu province (Interviewee 8). The provincial government and MOR established a joint venture company to invest in the railways. In combination with the Belt and Road Initiative and the Grand Western Development Program, the Lanzhou-Urumqi HSR line was crucial for Gansu province's future development. In the *Lanzhou Master Plan (2011–2020)*, the station area was also regarded as the new business center to improve urban competitiveness. The resources of the municipal government are the land-use rights to the surrounding area, funding for the supporting facilities, and its strategic geographic position in north-western China (Interviewee 10).

In the initial city center location round, engineers from MOR and CRFirstSDG suggested renovating and expanding the Lanzhou Railway Station since this seemed the most reasonable option (Interviewee 8, Interviewee 6). The equipment of Lanzhou Railway Station was obsolete and unable to provide efficient services to passengers. However, the station area had already evolved as the city center over time. It was estimated that the renovation and expansion of the station would cost more than 4 billion CNY (Interviewee 6). These costs had to be spent primarily on compensation for the evictions from buildings, and this funding was to be provided by the Lanzhou municipal government. Given that Gansu was one of the five most deprived provinces in China, it was nearly impossible for the local government to provide the funding for these large-scale operations at the Lanzhou Railway Station (Interviewee 6). Actors could not reach an agreement in this round.

In the next round, a location in the Lanzhou New Area was proposed by the Lanzhou municipal government (Interviewee 8, Interviewee 6). The Lanzhou New Area and the HSR station were planned almost in the same period, so the Gansu provincial and Lanzhou municipal governments expected the HSR station to catalyze the development in the New Area (Interviewee 8, Interviewee 11). However, the Lanzhou New Area is 40 km away from the Lanzhou urban area and 74 km away from the Lanzhou Railway Station. MOR strongly disagreed with this option and found the distance unacceptable and inconvenient for passengers (Interviewee 8). The

negotiations resulted in an impasse in this round. Following the dismissal of the new town option, the provincial and municipal governments were reluctant to find new alternative locations since they knew the MOR was not allowed to terminate the plan to build an HSR station in Lanzhou (Interviewee 6).

In the final round, the search for a new HSR station location started again and focused on possibilities in a subcenter or on the urban fringe. The CRLB proposed building the new HSR station in the original Lanzhou west station area, a subcenter in Lanzhou, to break through the impasse (Interviewee 8). The previous Lanzhou West station was a freight and storage railway station. The CRLB controls the land-use rights. The Lanzhou municipal government only needed to remove a state-owned factory from the site of the future station's south square. The cost of land acquisition could thus be minimized (Interviewee 8). CRLB and the Lanzhou municipal government reached an agreement to move the freight station to a western rural area of Lanzhou and construct the Lanzhou West HSR Station. The outcome was the choice of a station located in the subcenter of the city (Figure 3.6). Citizens tend to be satisfied with the location because it is convenient to arrive at the station by public transport. It is also a location desired by developers and investors (Interviewee 7).

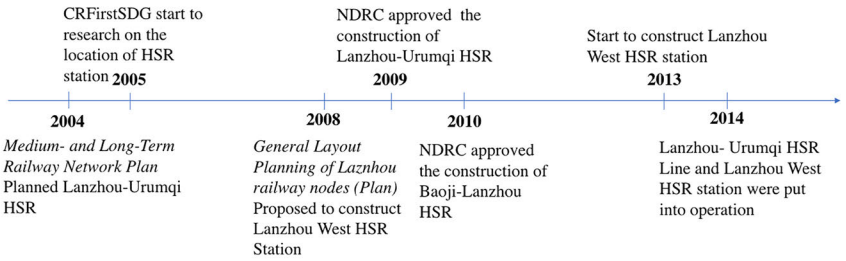

FIG. 3.6 Decision-making process of Lanzhou West HSR Station (Source: the authors).

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3.4.3 Yongcheng

Yongcheng is the only prefecture-level city without an HSR station in Hubei Province (Interviewee 12). In 2014, the *Opinions of the Supreme People's Court on Providing Judicial Services and Safeguards for the Yangtze River Economic Belt Development* put forward the idea of constructing the Yanjiang HSR (Shanghai-Wuhan-Chengdu). More than 10,000 citizens of Yongcheng attended an organized activity to appeal for the Yanjiang HSR to pass through Yongcheng in 2015. During the "*12*th *Five-Year Plan (2011–2015)*" period, the Yongcheng municipal government communicated with the CRC and the China Railway Wuhan Branch (CRWB) and reported back to the Hubei provincial government (Interviewee 13). A draft was proposed during the "*13*th *Five-Year Plan (2016–2020)*" period, which indicated "one vertical and one horizontal" HSR lines intersecting in Yongcheng. The efforts to select a location for the HSR station started in 2015 and continued until 2020 (Interviewee 17). Four possible locations for the HSR station were considered, the existing Yongcheng railway station, Guishan, Zhoujiapo, and Tandian (Figure 3.7).

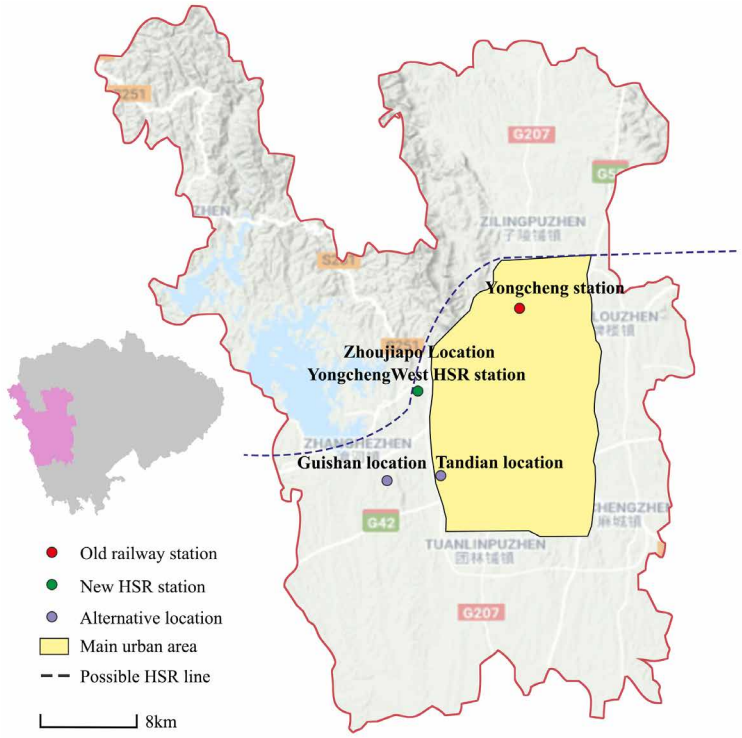

FIG. 3.7 Alternative locations of Yongcheng HSR station (Source: the authors).

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CRC's objectives were to plan and construct the Yanjiang HSR line on time and at a reasonable cost. The management and operation of Yongcheng railway stations were the responsibility of the China Railway Wuhan Branch (CRWB) of CRC. CRFourthSDG was involved as a research agency. One of its concerns was to keep the HSR route as straight as possible while also trying to satisfy the demands of local governments along the line, who were all aiming for a stop in their city, preferably at a location where urban development benefits would be biggest (Interviewee 4).

The Hubei provincial government provided the funds, jointly with CRC, to construct HSR lines within the Hubei province (Interviewee 14). It had to balance the interests of different cities in Hubei province and therefore attempted to have as many cities as possible connected to the HSR routes. The Yongcheng municipal government lobbied the CRC and the Hubei provincial government to choose Yongcheng as a node on the HSR routes. Yongcheng's interest was to take advantage of HSR and its station to develop its local economy, tourist industry, and real estate development (Interviewee 16).

In the first round, the municipal government was against upgrading or renewing the existing railway station to become an HSR station. It argued that connecting the traditional lines to the existing railway stations had already damaged and split the urban areas to the north and east of Yongcheng. If the new HSR lines connected to this station, more than one-third of Yongcheng's urban area would have to be demolished, and the cost would be unaffordable for the municipal government (Interviewee 17). CRC, however, argued that the presence of the mining sites around the existing station made the land unsuitable for HSR line construction and operations. Thus, key actors agreed to look for a new location to build the HSR station.

In the next round, Yongcheng's municipal government proposed constructing an HSR station in Guishan and planning an HSR new town since the local government regarded the station as an important catalyst for future development (Interview 14). The new town was expected to attract service industries, talent, and tourists. It was proposed to build high-rise buildings for headquarters, hotels, high-quality offices and restaurants. Real estate projects were also planned (Interviewee 15). Guishan was located 20 km away from the city center. The station area could be expanded to around 18 km^2, but 60% of this area was basic farmland (Interviewee 18). The technical and geographic conditions in Guishan were the most suitable for HSR construction among the four alternatives, so the CRC agreed (Interviewee 1).

The Hubei provincial government reported the Guishan area as the preferred location to China's Ministry of Land and Resources[4] in 2017. However, the *Opinions on improving the rational development and construction of the areas surrounding HSR Stations* had just been issued by the NDRC, the Ministry of Natural Resources (MoNR), the Ministry of Housing and Urban-Rural Development (MoHURD) and the CRC in April, 2018. This guideline emphasized that the location of HSR stations should be in close proximity to the city's built-up area. It advised small and medium-sized cities not to construct new towns in haphazard ways. Thus, the national government did not approve of the Guishan location.

The guidelines opened up a new round in which actors had to revisit the issue of an appropriate location for the Yongcheng HSR station, either in a subcenter or on the urban fringe. It was expensive to construct the HSR station at Tandian since an additional billion CNY was needed for tracks, and a high-tech industry park would have to be demolished. The distance between the Zhoujiapo location and the city center was 12 km. However, the Yongcheng municipal government found the station area at Zhoujiapo too small for future development (Interviewee 17). CRFourthSDG persuaded the municipal government that the beneficial effects of HSR on the local economy were not evident in small cities like Yongcheng (Interviewee 14). The Yongcheng municipal government accepted this advice, also given the fact that its resources were limited and the costs of constructing the HSR station in Zhoujiapo would be the lowest. The outcome, shown in Figure 3.8, was that the station would eventually be located on the urban fringe of the city at Zhoujiapo.

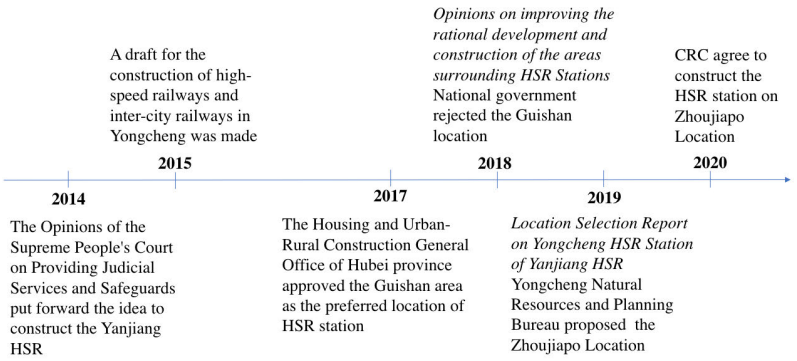

FIG. 3.8 Decision-making process of Yongcheng HSR Station (Source: the authors).

4 The Ministry of Land and Resources was dissolved in March 2018 and its functions were taken up by the Ministry of Natural Resources.

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3.5 Analysis and Discussion

3.5.1 Actors and Their Interdependencies

The CRC inherited its responsibility for drafting policies for Chinese railway development policy from MOR. It draws up the national railway plan and relevant regulations. It supervises, invests, manages and operates the railways and stations. China railway branches are responsible for the management and operation of railways and stations. The most important resource for these local branches is the right to use the land and facilities of the railway stations. The land is owned by the state and allocated to the CRC, where its local branches construct the railway stations. These branches can also represent the CRC through investments in railway projects. Their interests are not only the accomplishment of the national railway plan but also revenues from railway lines and stations. In our cases, it appears that the CRC and its local branches in the process of location choice assess the technical feasibility of projects, strive for high railway operation speed and efficient management of construction time, and maximize the station's accessibility for passengers. The survey and design groups involved in location choices aim to provide professional studies and plans. The plans they draft need approval from both the CRC and provincial governments. The railway construction plans have to be approved by the NDRC (Interviewee 12).

The provincial and municipal governments are other key actors involved in the location choice for the HSR stations. While the provincial governments have access to funding and cooperate with the CRC and other provincial governments to construct major national railways, they aim to maximize the number of connecting stations within their provinces. On the other hand, the municipal governments have the development rights to the land surrounding the station areas and the funds for other transport facilities such as roads and subways. In the context of China's fiscal decentralization and marketization, municipal governments aim to improve their city's accessibility, expand urban space for development, capture the increase in land value, and improve their city's image through the planning of a new HSR station area. As demonstrated in the cases, a commonly used strategy to reach these objectives is to develop a subcenter around the HSR station or to develop a new town around it, expecting the HSR station to catalyze urbanization and economic development, improve the area's spatial structure, and make up for the costs of land acquisition and compensation. Land functions always need to be transferred,

so approval by the MoNR is vital (Interviewee 14). Figure 3.9 illustrates the formal relationships between various actors involved in the decision-making process for HSR stations.

Based on the actor analysis in our cases, Figure 3.10 maps the actor interdependencies in HSR station location choices. The decision-making process for HSR station locations is complex because it consists of two indivisible parts: the station and facilities; and the station area. The resources for the two parts are distributed to different actors in the current Chinese institutional arrangements. *Nodality* is controlled by the actors who are advisors and have knowledge and information about certain issues (Lu et al., 2018). China Railway survey and design groups provide specialized knowledge of the planning and construction of railways. They need to balance the requirements as expressed by railway actors and urban actors. *Authority* especially revolves around legitimate legal power. For the station and facilities, the authority resource is controlled by the NDRC. The NDRC gives an official response to the feasibility study on the railway line, which is proposed by the CRC and the provincial government. As for the station area, any changes in the land use in station areas need to be approved by the MoNR. *Treasure* (see NATO) is related to the economic and financial tools which enable governments to exchange resources with other actors (Vabo & Røiseland, 2012). The funding for constructing the railway line, station and facilities is provided by CRC and the provincial government. For the major national HSR lines, CRC and its local branches usually provide around 60–70% of the investment, while provincial governments contribute 30–40%. For the station area, the compensation for land requisition, the investments in squares, roads, metro and other infrastructure are provided by the local government. *Organization* refers to the physical resources and services that governments can directly provide through agencies. In the case of HSR stations, the land for the station and railway infrastructure is allocated by the national government directly. The land for station areas is controlled by the local government (Yang & Han, 2020). The land to be developed is spatially divided into different parts according to different functions, such as squares and commercial areas. These different parts require different approval procedures. As a result, actors in the decision-making process of HSR station location choice depend on each other. These complex decisions cannot be realized by any unilateral action of dominant actors.

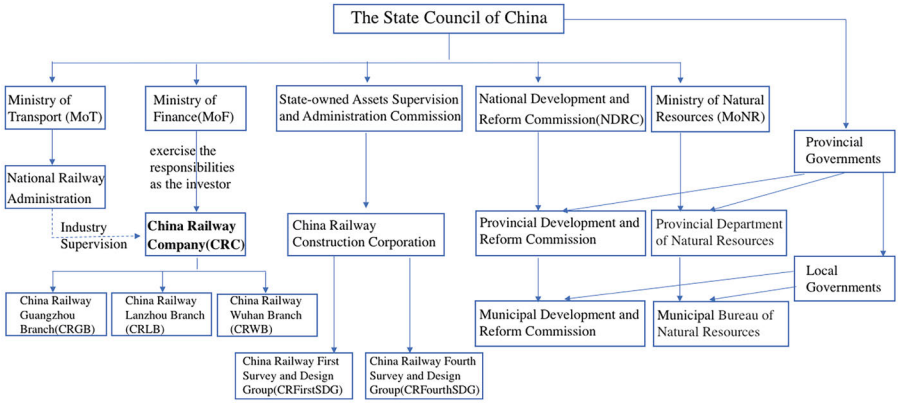

FIG. 3.9 Formal relationships among actors (Source: the authors).

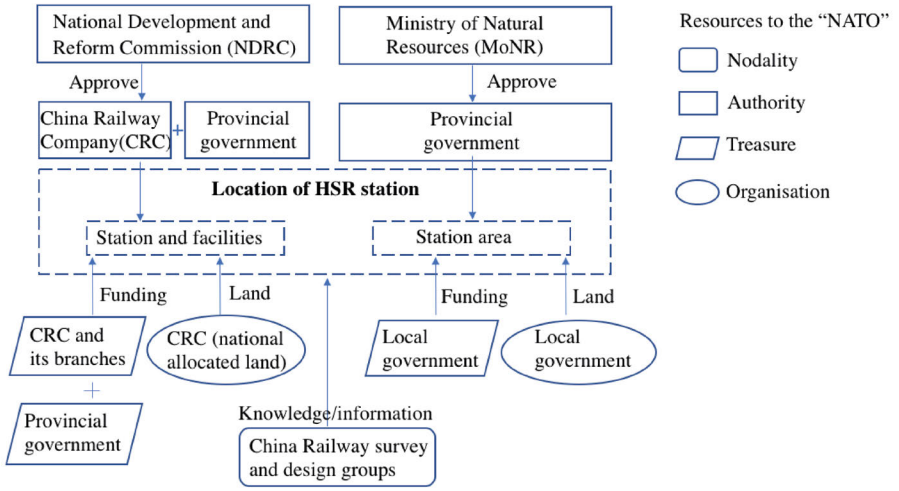

FIG. 3.10 Actor interdependency map of HSR station location choice (Source: the authors).

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3.5.2 Rounds, Impasses and Breakthroughs in the Decision-Making Process

The cases have shown that bringing together transport and urban development generates a complex decision-making process. We generally found three main rounds in the decision-making process, representing a spatial sequence in the search process for a new station area, balancing the node and the place functions. In the first round, actors aim to find a location in the city center, around the existing railway station. In the second round, the search focuses on finding a location in a new town. In the third round, the eyes are turned to finding a location in a subcenter or on the urban fringe. In each round, the railway actors interact with the urban actors to find a location in a certain area. They aim to align resources in each round to meet both transport and urban goals, but when unsuccessful, the location search will be continued in the next round.

The cases show that the search for a location starts with a round to connect the HSR with the conventional railway stations, which are located in the city centers. According to the literature (Hall, 2009; Yin et al., 2015), it is a beneficial choice from a transport and urban development point of view to renovate and upgrade conventional railway stations and regenerate station areas in city centers. The cases demonstrate that this option is difficult to achieve in China, despite its many advantages. For railway actors, the accessibility of a city center location is better, and the interchange between different railways is convenient for passengers (Yang & Han, 2020). The obsolete equipment could also be improved. However, urban actors cannot agree with this location alternative. Not only are the costs of land acquisition unaffordable, but also the damage to the existing urban area and the interruption of the local urban transport system are unacceptable to them. Unless, like in Shenzhen, adequate funding can be provided for underground construction of an HSR line and station, the actors simply cannot reach an agreement on selecting an existing station as the preferred location since the stakes are too high. In order to break through this impasse in decision-making, they need to look for another location.

As an alternative, we found that a faraway new town location tends to be proposed and preferred by local governments in the second round, which is the result of the entrepreneurialism among local governments referred to above. One of the characteristics is that local governments pursue land speculation, rely on land-based alliances, and maximize land financing. Local cadres have incentives to turn agricultural land into urban construction land, promote local economic growth, and favor their own political careers. Lanzhou and Yongcheng are both industrial cities facing the challenges of economic restructuring and urban disinvestment. They regard the advent of a new HSR station as an unparalleled opportunity to boost

large-scale urban development, obtain revenue from the land, improve their urban image, and attract investment. Municipalities, therefore, propose to construct their HSR stations in new town areas. In the Yongcheng case, the impact of a new town location would be questionable from both a transport and urban development point of view. A new national guideline, however, influenced the decision-making process as a result of which Yongcheng had to abandon the plan to develop an HSR new town even though it had already reached an agreement with private real estate developers (Interviewee 17). The Lanzhou case demonstrates that the location in a new town may hamper HSR accessibility. The loss of support among railway actors following the new national policy led to the abandonment of the location selected in this round. Again, a suitable location that can balance the interests of the actors had to be found, which occurs in the third round.

For transport infrastructure, the location should be kept a distance from neighborhoods but not too far to provide service for its users. New large-scale urban projects are increasingly realized in relatively "conflict-free" areas in places of urban decay or on the edges of cities that would welcome any investment (Altshuler & Luberoff, 2004). Compared to the reuse of an existing station in the city center, the construction of a new station always appears as the most efficient and economical option that benefits both the CRC and local governments. Compared to the new town location, where future development is highly uncertain, locations on the urban fringe or in decaying subcenters welcome any investment and will be able to add value while risks are limited. These locations for HSR stations are acceptable to both the CRC and provincial and municipal governments because they are relatively "conflict-free" areas. The station on an urban fringe or at a subcenter can balance the interests of the involved actors. For railway actors, the technical difficulties and construction costs can be kept low, and the accessibility is acceptable. For urban actors, the cost of land acquisition and the damage to existing urban form are limited. There is still enough space for multi-functional development, while the density and connections to other parts of the city are sufficient to ensure a flow of passengers and users of the area. This alternative also meets national policy requirements and is therefore a relatively low-cost and low-risk option; hence, actors eventually agree on this choice in this third and final round.

3.6 Conclusion

This paper has investigated the decision-making process behind the location choice of HSR stations in China and mapped how actor interdependency affects the process. Three cases within Chinese cities of different sizes and levels of GDP were systematically compared to explain how the relevant actors involved in the location choice decision-making processes came to select a location that does not seem to make much sense if one takes its node-place potential and that of its alternatives as a criterion. To increase our insight into how actors from various disciplines embrace different aims in HSR projects (Bertolini & Spit, 1998; Peek & Louw, 2008), this research has shed light on how resource interdependencies between key players influenced the final location choices for HSR stations. It has also confirmed the findings of Dai (2015) and Yang and Han (2020) that location choices for Chinese HSR stations are the result of bargaining processes between railway actors and urban actors in a decentralized context. However, we went beyond their analysis by explicitly looking at the role resources play in structuring the interdependencies between actors, showing systematic patterns in the decision-making processes across three very different cases in China, and thus highlighting how important institutional and network characteristics are as explanatory factors for, at first sight, seemingly irrational location choices.

Our findings suggest that in most decision-making processes, a few potential locations for an HSR station appear on the agenda; in each of our three cases there were three alternatives. A reflection on the alignment of resources and perceptions can be made here. Dealing with a diversity of perceptions, which tend to lead to impasses or stalemates, implies that it takes time to establish a location on which actors can reach consensus. As our three cases have shown, some choices are unacceptable to actors because of their consequences. Two key consequences have been identified in the cases: costs and risks of development, both for urban actors and transport actors, even though these factors may have a different meaning for each. Only occasionally does there appear an opportunity to overcome decision-making hurdles, as was seen in the Shenzhen case. The cases demonstrate that actors tend to find a way out of an impasse by discussing different alternatives, often consecutively. In an attempt to reach an agreement, they may make concessions but then make a claim on future benefits from their partners in return, thus enlarging the solution space. In order to break through and keep a process responsive to future developments, adaptive capacity, for example, can be built into the process. Understanding the processes of location choice, the rounds in which they evolve, and the interdependencies that influence actor behavior can help actors understand

which strategies or mechanisms can be adopted to prevent the process from slowing down (Heeres et al., 2016).

Furthermore, analyzing actor interdependence can help identify interaction patterns in the decision-making process and specify their impact on integrated development of transport and land use in and around HSR station areas (Facchinetti-Mannone, 2019). Studies into decision-making processes leading to location choices for HSR stations have been in short supply in China, leading to a limited understanding of why station area development does not always proceed as hoped and expected. Our findings can help railway actors and urban actors involved in such location choices to understand each other's positions, preferences, and behavior better, facilitating alignment of resources and creating conditions for successful HSR station area development in terms of a balanced node-place.

Our analysis of actor interdependencies has shown that land resources and funding resources are controlled by different players: the CRC and local governments, respectively. As a consequence, development of different but mutually connected components of HSR station areas also occurs in parallel, constructed and managed by different actors. CRC is mainly responsible for the HSR and the area within the station, while local governments are in charge of local transport and the development of areas around the station. This fragmented development results in many complications, such as the inconvenient interchange between different transport modes and the slow development of HSR station areas. A closer look at the actors' goals demonstrates, however, that integrated transport and land use development may, in fact, benefit all players: if disagreements could be overcome and joint organizational arrangements made possible from the beginning, station areas could be strengthened, improved and embellished considerably, making all players and their clientele happier. It is through adopting governance strategies and instruments aiming for goal alignment, continuous information exchange, mutual recognition of key interests, and structured interaction that such joint arrangements become far more likely to be realized. We recommend that future research on HSR location choices in China focuses on developing governance strategies and instruments that allow railway actors and urban actors to recognize their interdependencies, manage their interactions, and thus substantially improve the quality of HSR station areas. In follow-up studies in countries other than China, the theoretical premises as developed here may well also be adopted as a point of departure in coming to a good understanding of how decision-making processes lead to rational or (more probably) irrational location choices from a transport or urban planning perspective. However, countries have divergent institutional contexts consisting of different actors, policy networks and different rules of the game, leading to a similar kind of analysis and use of method but dissimilar 'data input'.

As a consequence, decision-making patterns and phases will most likely have their own specific shapes. Knowing that in countries such as Japan, France, and Germany, HSR stations are often located much closer to city-centers, we look forward to reading studies that explain the outcomes there, as seen through the lens of policy network theory as applied above.

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4 HSR New Towns Planning and Developing

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ABSTRACT This article aims to understand the booming development of high-speed railway (HSR) new towns in China through the theoretical lens of state entrepreneurialism. This lens has previously been used to examine the development of university towns and eco-cities, but no studies have been conducted on the emerging HSR new town development. To fill in this gap, this paper focuses on the question of how the local state in a medium-sized city harnesses the HSR project strategically to develop a new town and implement entrepreneurial strategies. Our findings reveal that local governments play out state entrepreneurialism in developing HSR new towns. They compete with other cities for HSR projects and plan large HSR new towns. They are motivated by land revenue generation, career advancement for officials, and maintaining state power. The development of HSR new towns may lead to loss of cultivated land and risk of local indebtedness. The paper also demonstrates how the national government attempts to curb the haphazard development of HSR new towns and how local governments respond. We argue that local governments, however, will probably continue to display entrepreneurial behavior in developing HSR station areas if the existing institutional mechanisms are not profoundly changed.

KEYWORDS HSR station areas; new towns; state entrepreneurialism; China

4.1 Introduction

Since the economic reform began in 1978, the urban transformation of China has been characterized by the development of new towns and rapid urban expansion (Hsing, 2010; Shen & Wu, 2013; Wu, 2018). This large-scale urban transformation can be divided into three rounds: development zones starting in the 1980s, university towns since the late 1990s, and eco-cities in the 2000s (Chien, 2013b; Li et al., 2014; Xue et al., 2013). These new towns are usually state-initiated new development on the urban periphery or in the rural area far from the cities (Shen & Wu, 2017). New towns are often planned to create mixed urban functions, develop massive real estate and construct new infrastructures (Shen & Wu, 2012). Local governments intend to create distinctive urban landscapes, attract new investment, economic activities and population, and enhance city competitiveness through the development of new towns (Li, 2015; Wu & Phelps, 2011; Xu & Yeh, 2005).

Along with the development of high-speed railways (HSR) in China since 2008, HSR new towns have emerged as a vital urban development strategy. China's HSR network is developing rapidly and will connect around 210 cities with a population of more than 500,000 in 2030. In 2019, 139 cities in China have each already planned and constructed at least one HSR new town (Chen et al., 2019). These HSR new towns are usually located in suburban or rural areas, around 10 kilometers away from city centers (Chen & Wei, 2013; Dai, 2015). They are usually large-scale and planned according to the estimated needs for the next 20 years. Some HSR new towns are even larger than half of the existing urban area of cities. HSR new towns are expected to boost the local economy, upgrade industrial structure, enhance the service level of the city and improve the urban competitiveness by local governments (Dai, 2015; Ureña et al., 2009; Yin et al., 2015).The construction of HSR new towns also aims to produce a considerable amount of revenue from land-leasing for the local land finance system, so a significant number of real-estate projects are planned in HSR new towns (Tang et al., 2011).

However, the development of HSR new towns has faced many challenges and sometimes fallen short of expectations, especially in small and medium-sized cities, so it has received severe criticism from scholars and the public. First, the far-out-of-town location of most HSR stations has adverse effects not only on accessibility but also the economic activities of the station area (Chen et al., 2019; Yin et al., 2015). Second, the scale of the HSR new towns tends to be far in excess of what is required for the current usage (Chen & Wei, 2013). Third, the HSR new towns often lack supporting infrastructures for creating urban vitality and attracting residents, for

example, schools and recreation centers (Chen et al., 2019). In fact, many planning areas are still vacant and the land is wasted (Lu, 2012). Because of low utilization, the media has reported these unsuccessful HSR new towns as “ghost towns.” Many HSR station development projects can be seen as another strategy for sprawled urbanization (Dai & de Vries, 2018). Furthermore, the development of HSR and new towns has unavoidably led to rising levels of public expenditure (Chen et al., 2020) and growing concerns about debt levels among local governments, which have exploded since 2009 (Pan et al., 2017).

New towns in China are planned and developed in the context of entrepreneurial governance, land-based urbanization and spatial commodification (He & Wu, 2009; Zhang & Wu, 2021), aimed to “foster and encourage local development and employment growth” (Harvey, 1989, p.3). Urban governance in China, in particular new town development analyzed according to the theory of urban entrepreneurialism, has received ample academic attention (Chien, 2013b; He & Wu, 2009; Wu, 2003). Research on Chinese new districts (Qian, 2011; Xue et al., 2013), university towns (Li et al., 2014; Sum, 2018) and eco-cities (Caprotti, 2014; Chien, 2013a; de Jong et al., 2016; Xie et al., 2020) has consistently shown that the state apparatus, especially the local state, plays a principal role in the decision-making of urban development megaprojects and captures land values, though market tools are used pervasively. This phenomenon that “the state acts through the market” is defined as “state entrepreneurialism” (Wu, 2018, 2020). So far, however, there has been little analysis of HSR new towns from the entrepreneurial governance perspective. The mechanisms and drivers for HSR new town development in China have not been properly studied, and underlying problems in urban development have not been fully revealed.

Thus, this paper aims to investigate how state entrepreneurialism plays out in the decision-making and planning of HSR new towns. It is important to explore the nature of entrepreneurial behavior among Chinese local governments during urban transformation and new town development (Chien, 2013a). This paper sheds light on the motivations and initiatives of local government in the planning process of HSR new towns. Furthermore, the literature exploring entrepreneurial cities has paid less attention to interactions and negotiations across various tiers of government, which are important in identifying the mechanisms underlying the development of entrepreneurial cities (Chan & Li, 2017). HSR new towns offer a valuable reference, as they are shaped by both central and local governments (Yang & Han, 2020). This paper, therefore, also explores how local governments interact with provincial and national government organizations during the decision-making process regarding HSR new towns.

The empirical case of this research is an HSR new town located in a medium-sized city in central China. From 2018 to 2019 data has been collected in the context of a research project on the decision-making process of this HSR station area, for which Delft University of Technology cooperated with the local government and in which the authors participated. Because of the contract, we refer to this city under the pseudonym of Yongcheng in this article, which means an "ordinary city" in Chinese. This research is based on the interviews and workshops conducted with senior officials of the Chinese Railways, railway planners, Yongcheng local officials from different bureaus and urban planners (Table App.C.1 in Appendix to Chapter 4). The analysis is also based on materials and documents collected during our fieldwork. The unique access to this decision-making process, and the data collected, allow a detailed understanding of such processes from an urban entrepreneurial viewpoint, which we consider to be illustrative for many other HSR new town developments in other medium-sized cities in China.

4.2 Probing HSR New Town under State Entrepreneurialism

The concept of urban entrepreneurialism has been widely used by scholars to describe the situation that cities are being run in a business-like manner since the rise of neoliberalism in the 1970s (Brenner & Theodore, 2002; Harvey, 1989; Jessop, 2013). It implies that the role of states has shifted from managerial government, traditionally a welfare provider for its citizens, to speculative governance, which means the government acting as an entrepreneur to promote urban growth and city marketing (Hall & Hubbard, 1998). To ensure the survival of countries and cities in a competitive global environment, the entrepreneurial city functions as a state strategic project which focuses on economic development and investment with the speculative construction of a specific place (Brenner & Theodore, 2002; Harvey, 1989; Jessop & Sum, 2000; Ward, 2003). Typical strategies of urban entrepreneurialism include the following: the construction of science and technology new towns to attract skilled labor, the promotion of cultural activities and facilities to attract consumption and investment, the upgrading of social and physical infrastructure to strengthen their position in global economic flows, and competition for national infrastructures to enhance the city's position in the region (Jessop & Sum, 2000). The growth of entrepreneurial cities is connected to the broader

neoliberal transition of a country, as part of the global capitalist accumulation system that has undergone a profound transformation (Harvey, 1989).

Most leading scholars in the field hold the position that in the Chinese context, the state plays a central role in neoliberal policy-making (He & Wu, 2009; Wu, 2018; Yeh et al., 2015). They found that a unique characteristic of the governance regime in China is the ubiquity of state intervention, not only at the central but also at the local level (He & Wu, 2009; Zhang & Wu, 2008). Some therefore argue that neoliberalism is not the appropriate lens through which China's growth model should be seen, because neoliberal policies are combined with state authoritarianism (Ong, 2007). Neoliberalism is about releasing state constraints on the market, but marketization and commodification in China provide instruments that in fact strengthen the position of the state rather than weaken it.

Along with the decentralization of economic decision-making power in China since 1978, local states have shifted from being passive regulators in the planned economy to active agents in encouraging local businesses, building local infrastructure, promoting urban development and attracting foreign investment (He et al., 2016; Oi, 1995; Wu & Zhang, 2007; Xu & Yeh, 2005). Chinese local governments act as "market actors" that mobilize special economic and political resources to meet their own interests in cooperation with other actors (Zhu, 2004). The gradualism of China's market reform and asymmetric decentralization, such as the state's regulation of the market and state-owned land property, leads to relatively constraining governance innovations (Wu, 2003, 2016). To understand the changes in governance with Chinese characteristics and respond to scholarly criticism that neoliberal urban entrepreneurialism is not applicable to China, Wu (2018, 2020) has added a new narrative, "state entrepreneurialism". It is defined as follows: the state creates a market-like environment and uses market instruments to achieve its strategic goals. The state gives its officials, usually at the local level, the ability and power to catalyze economic growth in order to advance their political careers. The state is transformed into an entrepreneurial market agency and acts through the market (Wu, 2016, 2018, 2020). The core of state entrepreneurialism is "spatial fix", which means the state capacity to organize the complex mega-project of expanding new spaces for capital accumulation (Wu, 2017). Therefore, state entrepreneurialism often drives the development of suburbs and new towns in China. In Table 4.1, we show the differences between urban entrepreneurialism and state entrepreneurialism, based on a comparison of the development of new towns in North America and China as developed by Wu & Phelps (2011) and Wu (2017).

TABLE 4.1 Key differences between urban entrepreneurialism and state entrepreneurialism in new town development

	Developing New Town under Urban Entrepreneurialism	Developing New Town under State Entrepreneurialism
Form of generation	Spontaneous clustering of office buildings to generate an employment subcenter	Comprehensive planning by local state, with mixed residential, industrial, office and commercial land uses
Investment actor	City as an independent actor or a firm in the market, public-private partnership	Local states as market agents, establishing Urban Investment and Development Corporations (UIDCs) and using these as financial vehicles
Decision-maker	Urban elites and key leaders in a more localized development corporation	State officials
Goals	Mainly economic benefits	Strategic objectives including economic interests

Sources: authors' summary based on Wu, 2017; Wu & Phelps, 2011

Entrepreneurial behavior of states leading to extensive new town development and rapid urbanization in China is explained by two main strands of literature, land revenue generation and GDP-ism (Wu, 2018; Zhang & Wu, 2021). Literature on land revenue generation has focused on how local governments adopt land development to enhance the economic competitiveness of cities under fiscal reform incentives (Tao et al., 2010; Ye & Wu, 2014). To reduce fiscal pressure, the national government launched a tax reform in 1994 to establish a tax-sharing system and realign the revenue distribution between the national government and subnational governments (Zhang, 1999). This reform has given autonomy and motivation to subnational governments to improve economic growth and urban development while turning them into tax collectors for the central government (Zhu, 2004). The unbalanced fiscal revenues and expenditures have led to growing fiscal deficits. Thus, the local governments have to depend on land marketing and speculative development to raise funds for urban construction and public affairs (Lin, 2014). Furthermore, the land and housing reform has further changed the role of local governments and provided an operational space for speculation (Zhu, 2004). The national government enacted the Land Administration Law and the Urban Planning Act, which have transformed state-owned land and housing products into tradable products and recognized the legitimacy of local governments to retain the most income generated from land development (de Jong, 2019; Xu & Yeh, 2005; Yeh & Wu, 1996). Local governments have direct control over revenues derived from land conveyance when they acquire land from peasants, plan urban development projects and then lease the land to commercial and industrial developers (Li et al., 2014; Lin, 2007; Liu et al., 2008; Xue et al., 2013). Land has become the most valuable resource for local governments (Lin, 2014). The commodification of urban land has generated over 30% of total local budgetary revenue and almost 40% of urban construction funds (Lin & Zhang, 2017). As a result, local governments can provide funding for mega projects to enhance the competitiveness of their city. Since local

governments can mobilize both capital and land resources more easily than before, they have adopted pro-growth strategies which harness mega projects to spur the local economy and improve city image (Shen & Wu, 2020; Xu & Yeh, 2005).

The literature on GDP-ism reveals that local officials, who are appointed cadres, are most concerned about GDP growth and their political career advancement in the context of political decentralization and upward accountability reform (Chien, 2010; Eaton & Kostka, 2013; Li & Zhou, 2005). Local cadres are assessed based on economic performance, alongside environmental and social achievements during their terms in office (de Jong, 2019; Gao, 2015). These development targets are most easily achieved through mega-projects (Ren, 2008; Wu & Zhang, 2007). To demonstrate their governance competency and increase the chances at promotion, they place great importance on physical mega-projects to visualize their achievements, for example, public transport projects, city squares and new development areas (Wu et al., 2006; Zhu, 2004). Local officials pay more attention to gaining political favor and prestige through mega-projects than the functionality of these projects (Chien & Woodworth, 2018). For instance, the political evaluation acted as a strong incentive for the local government of Suzhou to participate in the development zone fever (Yang & Wang, 2008).

Wu (2018) has argued that both GDP-ism and land revenue maximization focus too narrowly on specificity and ignore the need for local governments to align themselves with national government policies and achieve strategic goals to maintain state power. Most literature exploring entrepreneurial cities has focused on advanced economies and has paid less attention to complex interactions and negotiations between different levels of state (Chan & Li, 2017). Because of its authoritarian tradition and top-down administrative system, the Chinese national government can intervene in resource allocation through macro-spatial policies to maintain its power (Chien, 2010; Duckett, 2006). Local states can intentionally maintain discretion through informal practices exempted from central control and state-sanctioned informality (Chien, 2013a; Shin, 2009; Wu, 2003; Zhang & Wu, 2008). Previous studies say little about the interaction of various governments across multiple levels and how they maintain their power and serve their interests.

Entrepreneurial governance results in rampant intercity competition (Xu & Yeh, 2005). Competition does not only occur between local governments at every administrative level but also between different national government departments (de Jong et al., 2016; Hsing, 2010; Qian, 2013). Local governments have adopted mega-projects as one of the important strategies for urban growth in Chinese cities for the last 30 years (Jiang et al., 2016). The goals of these mega-projects are promoting urban renovation and expansion, upgrading industrial structure, refiguring city image

and enhancing the competitiveness of cities to attract investment (Jiang et al., 2016; Qian, 2011). The intercity competition leads local governments to imitate and compete with their neighboring cities in establishing mega-projects and enlarging urban areas for attracting investments and promoting economic growth (He et al., 2016). Local governments are keen to build central business districts, compete for national-level development zones and construct large-scale but almost empty new towns (Gaubatz, 2005; Li, 2015).

This competition between cities leads to many problems, including a substantial loss of cultivated land, excessive investment and overspending of local governments (Ho & Lin, 2004; Wang et al., 2012). Even though the national government has published strict regulations to protect agricultural land, developers and state agencies have usually manipulated, contested and circumvented these regulations (He et al., 2016; Yang & Wang, 2008). Local governments have been strongly motivated to acquire land from farmers and develop new towns and areas (Hsing, 2010; Song et al., 2021). To protect rural land and restrict land acquisition, the national government requires all developable land to be traded transparently through bidding, auction, or listing processes, and allocates land development quotas to local governments (Lin, 2014). Moreover, local governments are prohibited from running into public debt, obtaining loans, granting loan guarantees and directly participating in the land market (Carsten & Feng, 2004). As a response, local governments have established Urban Investment and Development Corporations (UIDCs) to expropriate and transfer land and act as local financing platforms to borrow funds from the capital market (Li & Chiu, 2018). Local states are protected by the 'soft budget constraint syndrome', which means that loss-making investments never lead to bankruptcy of the city or dismissal of key officials (Xu & Yeh, 2005, p.284). Therefore, local governments have often made risky investments and overspent on mega-projects which led to mounting local debts and heightened risk of financial instability (Pan et al., 2017). The central government has recently released land-use policies, which urge local governments to develop mega-projects more strategically and mitigate debt risks (Wu, 2020).

Based on thorough study of the literature, we summarize our analytical framework on the mechanisms underlying HSR new town development in China can be examined in Figure 4.1. The development of HSR is an important national-level strategy, as well as an opportunity for local governments to implement entrepreneurial strategies. However, there are few up-to-date discussions on local state actions and on how the power between central and local government is redistributed within the Chinese institutional context. This paper attempts to investigate the behavior of local states in implementing the entrepreneurial strategy through the development of HSR new towns. The motivations and impetus of local governments in the specific context

of HSR new town development are explored empirically for the first time here. Furthermore, interactions and negotiations between national and local governments are also exemplified in the case we describe below.

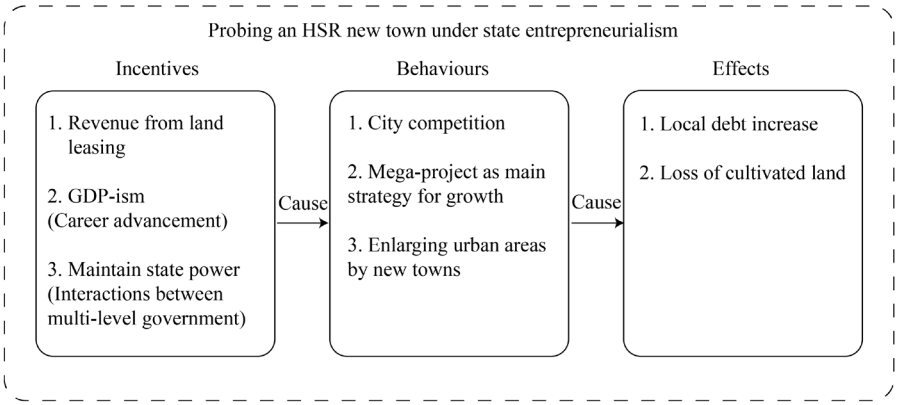

FIG. 4.1 Analytical framework for probing HSR new town under state entrepreneurialism (Source: the authors)

4.3 Planning Process of Yongcheng HSR Station Area

Yongcheng is located in a province along the Yangtze River. Its administrative area is 12, 404 km^2, of which the main urban area is 273 km^2. The total population was 2,897,500 in 2019, of which 780,000 lived in the main urban area. The urbanization rate has increased sharply from 45.5% in 2010 to 60% in 2019, which has caused social, environmental and economic problems between urban and rural areas. Yongcheng plays an important role in the grain production and chemical industry in China. Its Gross Domestic Product (GDP) reached 203.4 billion CNY in 2019. The secondary industry still dominates the economic structure, while the local government attempts to develop the service industry. The area, population and GDP of Yongcheng are all more or less average among all Chinese prefecture-level cities, so its development conditions and transformation problems are representative of a very large population.

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The national industrialization strategy *Third Front Movement* between the 1960s and 1970s has transformed Yongcheng from a county providing services for agriculture into a base for heavy industry. A conventional railway station was constructed in Yongcheng in 1970, which improved its transport advantage and brought many national industries. As a result, Yongcheng became a prefecture-level municipality in 1983. After economic reform, the project assistance and financial investment from the national government have been reduced, but the new national policies for regional and industrial development still influence its urban and economic development (Guo, 2020).

Yongcheng is currently influenced by the "Belt and Road Initiative", "Yangtze River Economic Belt Development" and "Mid-Yangtze River Urban Agglomeration". The "Belt and Road Initiative"proposed constructing the Huhehaote-Nanning HSR. The "Yangtze River Economic Belt Development" was put forward by the State Council in 2014, which proposed to construct Yanjiang HSR to connect Chengdu-Chongqing Economic Zone, the Mid-Yangtze River Urban Agglomeration and the Yangtze River Delta Region. These two railway lines would intersect in Yongcheng. Furthermore, the State Council approved the *Development Plan for the Mid-Yangtze River Urban Agglomeration* in 2015, which positioned Yongcheng as a regional transport hub in the urban agglomeration. The following parts elaborate on how the local government plays out state entrepreneurialism in connecting to the HSR network, selecting a profitable location and planning the HSR new town.

4.3.1 Stage 1 Competing for Connecting to HSR Network

Mega-infrastructure projects are adopted as a pro-growth strategy by local governments in China to build the city competitiveness (Jiang et al., 2016). Therefore, local governments have tended to compete for connections to HSR networks, and local leadership failing in this competition was perceived as incompetent. When the State Council proposed constructing the Yanjiang HSR line in 2014, only major node cities were confirmed, including Shanghai, Nanjing, Hefei, Wuhan and Chengdu. The specific location of the railway line and other nodes were not decided. Yongcheng and one of its neighboring cities are similar in many aspects such as geography, resources and culture. Local governments of both cities competed to respond to the national strategy "Yangtze River Economic Belt Development" and take the chance to develop their cities.

Citizens of both cities exerted pressure on the provincial government and local states competed for a connection to the Yanjiang HSR, because the existing conventional railway station in Yongcheng was seen as largely insufficient (Interviewee 7).

Thousands of people gathered in the commercial centers to appeal for the Yanjiang HSR pass through the neighbor in March 2015. They argued that the population of this neighbor was twice that of Yongcheng, so the HSR should pass through the neighbor. In response, thousands of Yongcheng citizens rallied to appeal for a connection of their city to the national HSR network. They claimed that 11 other prefecture-level cities in the province, including the neighbor, already enjoyed connections to the HSR network, but Yongcheng was the only prefecture-level city without an HSR station (Interviewee 9).

Local government officials, especially mayors, are spurred to plan mega-projects for career advancement and political favors (Xu & Yeh, 2005). Local officials of Yongcheng and the neighboring city both negotiated with the provincial government to make pleas for being connected to the Yanjiang HSR. The former mayor endeavored to construct the HSR station in Yongcheng. He stated that the lack of access to high-speed rail had become a constraint on Yongcheng's development and having an HSR station was the strong desire of local people at the two sessions of the Provincial People's Congress in January 2015. As a result, Yongcheng won the competition (Interviewee 3). China Railway (CR)[5] and the provincial government decided to construct the Wuhan-Yongcheng-Yichang HSR as a part of Yanjiang HSR, the Xiangyang-Yongcheng HSR as a part of Huhehaote-Nanning HSR during the "13th Five-Year Plan (2016-2020)" period.

4.3.2 Stage 2 Aiming for the HSR New Town

Due to decentralization and marketization, the funding of HSR lines and HSR stations was provided by CR, provincial governments and local governments in China. They established a joint venture company for a specific HSR line and contributed to the capital base with certain percentages (Interviewee 7). The land for railway lines, facilities and stations was allocated by the national government directly. The areas surrounding the station were controlled by the local government. The local government was responsible for land acquisition, compensation and development. Therefore, the CR, provincial governments and local governments had to reach an agreement on a location for the HSR station (Wang et al., 2021).

5 The Ministry of Railways was dismantled at the 1st Plenary Session of 12th National People's Congress (14 March 2013). Its administrative duty has been transferred to the National Railway Authority, resorting under the Ministry of Transport (MoT), while the enterprise function has been assigned to the China Railway (CR).

After CR and the provincial government confirmed that two HSR lines would connect to Yongcheng, they entrusted the China Railway Fourth Survey and Design Group (CRFSD) to formally select a location of Yongcheng HSR station in June 2015. The Yongcheng Urban Planning Bureau (YUPB) represented the Yongcheng municipal government to assist CRFSD with finding a location as well as a suitable place for the HSR new town. The local government regarded the HSR new town as a golden opportunity to develop the local economy and service industry, attract investment, enhance competitiveness, and improve spatial structure and city image (Interviewee 1). According to the urban development master plan, CRFSD and YUPB proposed three location alternatives to the west of the city in September 2015, namely Zhoujiapo, Guishan, Tandian (See Figure 4.2).

Zhoujiapo is located on the northwest urban edge of Yongcheng. It was close to the Administrative New District of Yongcheng, and 12 km away from the city center. Zhoujiaopo connected to the existing urban infrastructures of the Administrative New District, through the transport network and drainage system. The HSR station area could be 8 km^2. The Yongcheng local government thought the area was too small for the HSR new town (Interviewee 9).

Guishan is located southwest of Yongcheng, far from the main urban area and 20km away from the city center. The station area could be extended to 18 km^2, most of which was agricultural land. Compared to Zhoujiapo, the cost for the Xiangyang-Yongcheng line passing through Guishan increased by 120 million CNY. In addition, all urban infrastructures needed to be newly built. Guishan as a location was aligned with the direction of the spatial expansion proposed in the urban master plan and suitable for developing an HSR new town. Together with the Ecology and Technology New Town on its east and the Aviation New Town on its west, the local government believed that Yongcheng's urban transformation could immensely benefit from this triple new town development.

Tandian is located on the periphery of the Ecology and Technology New Town and 15 km away from the city center. It is connected to the existing transport network and can share urban infrastructures with the Ecology and Technology New Towns. In contrast to other locations, the investment of the Yanjiang line passing through Tandian could be decreased by 1.5 billion CNY, but it would be difficult to connect it with the Xiangyang-Yongcheng line. Furthermore, the HSR would pass through the city and ravage existing urban form. Many parts of the newly built Ecology and Technology New Town needed to be demolished, and the factories had to be relocated. Yongcheng's local government disagreed with the HSR passing through the main urban area because it had already been disturbed by the conventional railways.

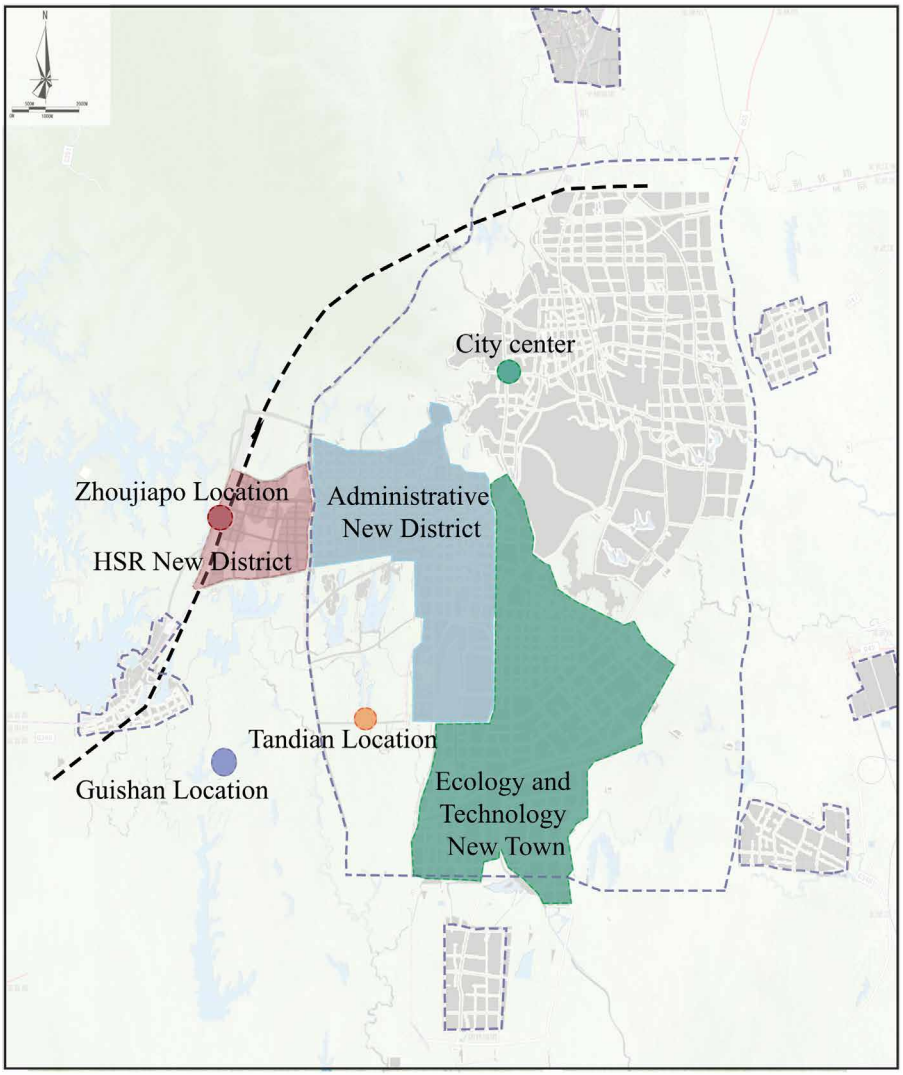

FIG. 4.2 Alternative locations of Yongcheng HSR station (Source: the authors)

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Comparing the conditions of these alternatives for the HSR new town development, the Yongcheng local government decided to construct the HSR station in Guishan in December 2016. The provincial government approved that location and the construction of the HSR lines in December 2017 and reported this to the National Development and Reform Commission (NDRC) and the Ministry of Land and Resources[6].

4.3.3 Stage 3 National Interventions and Local Government's Endeavors

However, the plan was rejected by the national government. To curb the uncontrolled development, the NDRC and the Ministry of Natural Resources, the Ministry of Housing and Urban-Rural Development and CR published the *Opinions on Improving the Rational Development and Construction of the Areas Surrounding HSR Stations* (in the following referred to as *Guideline of HSR Station Areas*) in April 2018. This policy rules that local governments should select an appropriate HSR station location as close as possible to the central city or the built-up areas, plan their station and new town on a human scale, use land intensively, establish a 'correct view' of political achievements, avoid haphazard urban expansion, and manage the risk of local government debt.

As a result, the planning of the HSR and its station stagnated. In order to facilitate its construction and protect local interests, both the provincial government and Yongcheng local government actively cooperated with the central government through formal and informal institutions. The Ministry-Province cooperation (*bu-sheng hezuo*) is a form of agreement between different ministries of the central government and specific provinces on a certain aspect of development such as education, agriculture and transport. The Ministry of Transport (MoT) and the provincial government signed the "*Cooperation Agreement on Accelerating Transport Development in the Province 2018-2020*" in June 2018, in which the MoT promised to coordinate with other stakeholders and expedite the HSR construction in the province. Furthermore, the new mayor of Yongcheng submitted a proposal to the First Session of the 13th National People's Congress in March 2018 on *Accelerating the Construction of the Wuhan to Chongqing section of the Yanjiang HSR*. Besides these formal institutions, there were also informal channels built on personal

6 The Ministry of Land and Resources was dissolved in March 2018 and its functions are replaces by Ministry of Natural Resources

relationships (*guanxi*), such as "going to Beijing to visit the ministries" (*paobu jinjing*) (Yang & Han, 2020). Local officials met the head of a ministry personally to propose development plans and ask for support from the central government. In March 2019, the new mayor of Yongcheng visited the General Manager of CR in Beijing and expressed the desire that CR could consider the interests of Yongcheng when planning the HSR line and station location.

CRFSD began to plan a new location for the Yongcheng HSR station in January 2019. CRFSD persuaded the Yongcheng local government that HSR could not become the main driver for a new town, especially in small and medium-sized cities (Interviewee 5). As a result, the Yongcheng local government decided to locate the HSR station at Zhoujiapo, and the central government finally approved it in 2020. The costs incurred by the HSR passing through Zhoujiapo instead of Tandian were defrayed by the Yongcheng municipal government. It provided 3.2 billion CNY for the capital base of Yanjiang HSR.

4.3.4 Stage 4 Planning Station Area from New Town to New District

The Yongcheng local government had already planned the HSR new town at the Guishan location in 2017. After the announcement of the *Guideline of HSR Station Areas* and the change of HSR station location, it made a new district plan on Zhoujiapo in 2020. The new national policy had restricted local government's entrepreneurial endeavors and the planning aims had been shifted from real estate development to compact development, station areas reduced from new towns to new districts and substantially cut the cost of supporting urban infrastructures. In response, the local government followed but then enlarged the size of station building. Yongcheng UIDCs (*chengtou*) acted as the financial platform to fund these place-specific spatial projects.

New towns in China are produced by planning centrality and initiated with strategic consideration, including not only economic incentives, but also other social and political pursuits such as alignment with national policies, industrial transformation and enhancement of technology and education (Wu, 2018; Xie et al., 2020). The planning goals of Guishan HSR New Town were to promote Yongcheng's industrial transformation, become an area for knowledge-based high-tech industries, and decongest the population in the main urban area. 65% of the new town area was planned to construct high-rise buildings for commercial and residential use and accommodate a population of 65,000. However, the population of Yongcheng was in fact shrinking because of pollution, with especially young people moving

out (Interviewee 11). In compliance with the *Guideline of HSR Station Areas*, the plan of Zhoujiapo HSR New District adopted the compact development concept for transit-oriented development (TOD). It aimed to develop the healthcare and tourism industries on site. The change in goals heralded the conviction that local government not only intended to develop the economy and urban area but also to pursue ecological civilization as proposed in national policies.

The HSR station area in Guishan location could be extended to 18 km^2, and the planning area was around 10 km^2. However, 88% of this area was agricultural and forestry land, and 50% was permanent basic farmland, strictly protected by national policy. Converting the land use from cultivated into construction land would take many years and could only be approved piece by piece (Interviewee 13). Moreover, some developers had obtained development rights for land in the Administrative New District many years ago but had not even started the construction yet because of the depressed economic environment (Interviewee 11). The same situation would play out again in Guishan. If the HSR New Town in Guishan was approved, farmland would be wasted, and farmers would lose their income. Meanwhile, the station area would develop at a slow pace and might become a ghost town. In contrast, the HSR station area in Zhoujiapo was 8 km^2, contained only 3.5 km^2 of construction land, and the remaining areas were water bodies, green areas and roads. This area only included 5% permanent basic farmland. Due to its location, the local government planned to integrate the area with the Administrative New District and improve land-use efficiency.

In contrast to Zhoujiapo, the investment in urban infrastructures of Guishan would increase by six billion CNY because it was far from the built-up area, while electric networks, water system and road infrastructures would still need to be built. Furthermore, the local government proposed constructing a monorail to connect the Guishan HSR New Town with the main city, which would cost another 400 million CNY. However, it would lead to a lack of subsidy for bus, taxi and road maintenance because local financial resources were limited (Interviewee 10). The Zhoujiapo HSR new district plan abandoned the monorail proposal and focused on bike and pedestrian-friendly design. It was in line with the *Guideline of HSR Station Areas,* which required the local government to prevent the risk of local debt arising from HSR station area development and improve the livability of the station area.

Yongcheng's ambitious HSR plan was thus scaled back after the abovementioned national interventions. However, the local government still found a loophole: the size of the station building. The CR usually provided funding for 6,000m^2, the cost of the excess area was covered by the local government (Interviewee 7). The CR often did not oppose large station because it would manage the station building and

gain profits from retail within these stations. The local government regarded the station as a symbol of modernity, governance competency and urban prosperity, and as a promise of investment and land value increase (Interviewee 12). The size of Yongcheng HSR station was compared with the HSR station of its neighbor, which had also preferred to construct a large station to demonstrate its economic development. The building area for the station in Guishan had been planned at 12,000m^2, the same size as the station in its neighbor. In the Zhoujiapo plan, the station building area is now enlarged to 50,000m^2. Yongcheng ranked seventh in GDP and tenth in population among the eleven cities in the province, but the HSR station size would be top five.

4.4 Discussion and Conclusion

In this paper, we adopted state entrepreneurialism as the theoretical lens to investigate the planning process of the HSR new district in Yongcheng, aiming to understand the motivations and actions of local states in planning processes regarding HSR new towns in China, and to show how the national government intervenes in the entrepreneurial governance of local governments. Building on the extensive literature about the structural drivers of state entrepreneurialism in China, we found that land revenue generation, political achievements, and maintaining state power are the main internal causes for local governments to pursue large-scale HSR new towns. Furthermore, we also revealed potential problems in HSR new town development, such as loss of cultivated land and the risk of high local debts.

This study contributes to the literature on Chinese urban transformation which is still dominated by state interventions in a broader context of marketization and decentralization (He & Wu, 2009; Li & Chiu, 2018; Wu, 2015). We find that, similar to policies regarding development zones, university towns, and eco-towns, the development of HSR new towns is driven by state entrepreneurialism, consistent with the characteristics in Table 4.1. Rather than being an urban area spontaneously formed by market choice, the HSR new town is comprehensively planned, with a mix of residential, industrial, commercial, and office land uses. The decision to build the HSR new town is made by state officials, and the plan is not designed to make a profit for state officials but to strengthen the local economy and increase the tax base. As the case shows, the local government plans the HSR new town to achieve many strategic aims, such as adjusting the spatial structure of the city, guiding the

direction of urban growth, improving the service industry, and enhancing urban competitiveness within the region. To achieve these goals, local governments prefer to select a large area far from the city to ensure enough space for capital accumulation. Planning for growth is used as a strategy by local governments to legitimize state persistence, which is contrary to neoliberalism (Wu, 2017). Furthermore, the planning of HSR and its new town is jointly dominated by the national government, the provincial government, and the local government. Neither the joint venture company for HSR construction nor the UIDCs for HSR station area development are real market actors, but they act as market instruments for the state (cf. Li & Chiu, 2018; Wu, 2019). The UIDCs organize the development of HSR new town, which is actually an "investment branch" of the state.

Our findings reveal that the Yongcheng local government exhibits typical entrepreneurial governance behavior during the planning of its HSR station area. It is regarded as a symbol of modernity, prestige, and the future, and local governments believe it can attract investment and talent while also serving as a financial tool to leverage land value. The local government uses HSR projects to improve its competitiveness and city image amidst their territorial competition with rivals around them. Yongcheng and its neighbor compete to get connected to the broader HSR network, build an impressive station, and project a large station area for the near future. The competition for HSR stations between local governments in China evokes irrational location choices and highly inefficient use of land and financial resources (Interviewee 1).

The strong motivation behind these entrepreneurial strategies of local governments is an attempt to capture the value increase of the land around HSR station, and to fill the gap between public expenditure and public revenue. Because of the budgetary system, profit from land development is a vital and almost the only source of local finance (Jiang et al., 2016). As we have shown in the Yongcheng case, the local government strived for the largest area of the HSR new town during the process of location choice. Furthermore, the desire for political career advancement of state officials is also an incentive. The Yongcheng case demonstrates how local officials, particularly mayors, use HSR projects as a governance initiative to highlight their leadership abilities and promote their career advancement. The former mayor's actions were recognized by his superiors, and he was promoted in 2017, but convicted for corruption in 2020.

However, different from university towns and eco-cities, which are mainly planned by local governments, the role of the national government is more prominent in the planning process of HSR new towns. HSR new towns are the result of bargaining processes among multiple levels of government (Wang et al., 2021;

Yang &Han, 2020). As the case shows, the national government maintains its power through its authority to approve HSR projects, approve claims on surrounding land, enact new guiding policies, and appoint local leaders subject to hierarchical control. Beside land revenue maximization and GDP-ism, strategies of local governments should be aligned with central government policies. Land-speculation-oriented development in China causes loss of cultivated land and constitutes a threat to food production; it also creates social conflict, unemployment among farmers and inefficient land use. From 2013 onward, the central government has published new policies to intensify the control of the party-state over urban development and change the aims from chasing short-term revenues to achieving sustainable development and industrial upgrading (Li, 2015; Wu, 2018). To protect cultivated land and strengthen land management, the national government has published a new land policy that requires local governments to sustainably manage the amount of cultivated land (Shi & Tang, 2020). The *Guideline of HSR Station Areas* has also curbed the excessive land use for HSR new town and the real estate development, which encourages the local government to change from incremental planning to inventory planning. In line with these policies, the Yongcheng local government changed the location of the station from the area containing 50% permanent basic agricultural land to the area containing only 5%, and reduced the station area from 18km^2 to 8km^2. Moreover, the *Guideline of HSR Station Areas* does not allow debt-burdened local governments to develop more HSR new towns. The Yongcheng local government had to abandon the plan to build an HSR new town and an expensive monorail, and chose an area nearer the existing urban area allowing for a more “compact design”.

Meanwhile, local governments are also trying to maintain discretion through informal practices that are exempt from central government control or state-sanctioned informality (Wu, 2018). Strategies of local officials are limited by upper-level priorities and local socio-material realities, so they have to coordinate the local and central governance targets (Guo, 2020). For example, the Yongcheng Mayor’s effort to facilitate the construction of the HSR through informal channels are also intended to meet the needs of local citizens and maintain his own reputation, apart from GDP-ism. Moreover, the Yongcheng local government abandoned the HSR new town plan in Guishan under the impact of national interventions and then chose Zhoujiapo as a new location rather than Tandian to prevent the project from overhauling existing urban morphology and local establishments to protect local interests, in spite of sharply rising costs. It also paid for the oversized station building. Realizing local government objectives by providing more funds for HSR development is an example of state-sanctioned informality.

Therefore, we observe that HSR projects entail massive financial costs and exacerbate the financial crisis plaguing local governments. It is noteworthy that high costs and debts are not just the consequence of HSR construction but also of supplementary projects, such as related urban transport facilities and various infrastructures inside the new town. Despite the various policies introduced by the central government to restrict haphazard development, local states have a strong fiscal motivation to circumvent these national statutory restrictions (He et al., 2016). In the 1994 tax reform, the central government recentralized the power of tax revenue collection (Li & Chiu, 2018). Local governments were asked to fend for themselves in terms of providing a fiscal foundation for urban development. Ordinary cities like Yongcheng operate within extremely tight fiscal constraints and have to rely on off-budget finance, such as land conveyance fees to develop their infrastructure (Xue et al., 2013). The current situation is that the regulatory control chain from the national government on local governments is still weak (Xu & Yeh, 2005), availability of land revenues will be exhausted soon, and massive local debts from loans taken by UIDCs need to be repaid by local governments. We therefore claim that a new tax reform plan is needed to gradually increase the proportion of local fiscal revenue to total local revenue. The Chinese central government should increase the amount of tax refunds and transfer payments to subsidize local governments.

Although we acknowledge that the implications derived from this case may not necessarily be applicable to planning practices in all Chinese HSR new towns because of regional variations, we believe this study does enrich the existing literature on entrepreneurial governance of Chinese suburbanization and new towns. It provides new insights into new town development in China by connecting state entrepreneurialism with infrastructure planning. Based on an exploration of local government entrepreneurial actions for pro-growth in China, this article also examines the political nature of these actions, that is, their alignment with national strategies to maintain state power. We recommend further research both to verify and expand on the findings here and to help demonstrate more in-depth how state entrepreneurism influences HSR new town development.

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5 Transport and Land Use Integration in HSR Station Areas

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ABSTRACT The rapid high-speed railway development in China has faced many institutional challenges for the integrated development of transport and land use in station areas. This paper aims to gain insight into the institutional rules that structure the actors' interactions and how they influence the integrated development in station areas. The Institutional Analysis and Development framework has been applied to a specific action situation, named Lanzhou West HSR station area in China. The findings from interviews, document analysis, and field visits reveal that Chinese institutional rules obstruct interactions between actors, thereby hampering the integrated development of functions in HSR station areas.

KEYWORDS Rules; Institutional analysis; Integration of transport and land use; High-speed railway; Station area

5.1 Introduction

Although there has been an increasing interest in the integration of transport and land use for decades, the planning of transport and land use is still separated (Graham and Marvin 2001; Hull 2008; Ki-moon 2013; van Geet et al. 2019). Scholars especially focus on the integrated planning of public transport nodes such as railway stations because of the dual functions of station areas, namely nodes in networks and places in cities (Bertolini and Spit 1998; Curtis and James 2004; Haywood 2005; Bruinsma et al. 2008; Zemp et al. 2011). Due to these functions, high-speed railway (HSR) stations commonly act as an incentive for large-scale urban regeneration projects which aim to spur the economy, boost property value and put forward a series of urban planning projects (Willigers and Van Wee 2011). To bring the potential social, environmental and economic benefits, integrated development of these functions is crucial for a successful railway station area (Peek et al. 2006; Marshall and Banister 2007; Trip 2008; Cervero and Murakami 2009).

There is an increasing body of literature that emphasises the importance of institutional factors in achieving integration of functions and determining station area development (Bertolini & Spit, 1998; Curtis & James, 2004; Hall, 2010; Curtis, 2012; Searle et al., 2014; Curtis & Low, 2016; Heeres et al., 2016). To exploit the development potential of a station area, actors from several organisational tiers and different functional sectors need to cooperate and coordinate (Givoni 2006; Peters 2009; Feliu 2012). These actors include national and local governments, railway companies, real estate companies, private investors, and property owners (Wolfram 2003). This poses great challenges to the integrated development and planning of a station area since these actors have different perspectives, interests and knowledge (Peek and Louw 2008; Zemp et al. 2011; Tornberg 2012). Studies argue that the governance of integrated functions planning is difficult since it is affected by institutional frameworks and multiple actors which cause various cross-boundary issues and uncertainties (Curtis and James 2004; Givoni and Banister 2006; Kokx and Van Kempen 2009; Salet et al. 2013; Johansson et al. 2018). It needs policy integration of transport policy and land use planning to achieve cross-cutting aims rather than sector-orientated objectives (Geerlings and Stead 2003; Stead and Meijers 2009).

China is a latecomer to HSR construction, but its HSR network is developing rapidly. More than 80% of major cities in China will be connected by the HSR network. There will be around 1000 HSR stations in 2030. However, the integration of transport and land use of Chinese HSR station areas faces many challenges, especially institutional

barriers (Yang and Han 2020). Urban and transportation functions around many HSR stations are severely fragmented, resulting in inconvenient interchanges and the slow development of urban functions such as retail and business (Chen and Wei 2013). The news often reports that large numbers of passengers are stranded at HSR stations due to the lack of well-functioning public transportation. Local governments have been criticised for wasting land because of planning large HSR station areas (Dai and de Vries 2018).

Most studies have focused on how HSR affects regional economic development in China (Zhang et al. 2019). Far too little attention has been paid to the institutional aspects of HSR station area development in China (Yin et al. 2015). A comprehensive and in-depth understanding of the institutional conditions which structure actors' interactions in the integrated planning process of the station area is needed (Tan et al. 2014; Isaksson et al. 2017). A focus on institutions can help identify governance solutions for station area development, particularly by looking at how institutional rules influence the development and delivery of the functions of a railway station area.

To gain insight into how institutions hamper the integration of transport and land use, we selected a typical case in the north-western China called Lanzhou West HSR station area. It is one of the most important nodes in the Chinese railway network and the largest regional hub in western China, so its development was deemed critical by China Railway (CR). The local government also attaches great importance to the planning of the station area because it is a vital node in the Silk Road Economic Belt. The local government expects that the HSR station area could boost the local economic development. However, the urban functions' development of the station area is still far behind schedule. The operation of HSR started in 2014, but part of the commercial area and public squares are still under construction in 2021. The same situation exists in many HSR station areas in economically underdeveloped Chinese cities.

The main aim of this paper is to understand how institutions shape the interactions of actors and thereby influence the integration of transport and land use in Chinese HSR station areas. Institutions can be regarded as sets of rules (Ostrom 2005). Rules guide and constrain the complex planning process, for example, the HSR station area development (Alexander 2005; Salet 2018). To systematically analyse the rules and achieve the research aim, we adopted the institutional analysis and development (IAD) framework. We applied this framework to analyse the development of Lanzhou West HSR station area. Based on this analysis, we summarise how the rules influence actors' interactions and decide the development situation of functions. We conclude this paper by discussing what rules could be improved to facilitate the integration of transport and land use in Chinese HSR station areas.

5.2 Analytical Framework: Explaining the Functioning of HSR Station Areas from a Rule-based Perspective

The integration of transport and urban functions and eventual urban development could be considered as the outcome of the actors' interaction process (Stead 2008; van Karnenbeek and Janssen-Jansen 2018). The behaviour and interactions of actors in the planning process are influenced and structured by institutions (Ostrom 2009; March and Olsen 2010). Therefore, institutions affect the extent to which the integration of transport and land use functions is achieved (van Geet et al. 2019).

Institutions are defined as any form of human-made rules for constructing social interactions and can be regarded as sets of "the rules of game" (Ostrom, 1986; North, 1991; Ostrom, 2011; Scharpf, 2018). Rules are "shared understandings among those involved that refer to enforced prescriptions about what actions (or states of the world) are required, prohibited, or permitted" (Ostrom, 2011, p.17). Institutions consist of both formal rules and informal rules where the former refer to rules that are extracted from laws, policies and regulations and promulgated through formal governmental channels while the latter are shaped by habits and norms and established outside formally sanctioned channels (North 1991; Helmke and Levitsky 2004). Rules guide individual and collective actions and interactions of actors in decision-making processes according to regulations, laws, norms and habits (Ostrom 2009; Ostrom 2014). Rules decide how information is communicated, how interests are distributed, how disagreements are solved and how actors can enter and leave the planning process (Edelenbos and Klijn 2007). Ostrom (2009, 2011) classifies them under seven categories: position rules, boundary rules, aggregation rules, information rules, payoff rules and scope rules (see Table 5.1).

TABLE 5.1 Types of rules in IAD

Rules	Definition
Position rules	Create positions and specify actors who can hold positions
Boundary rules	Define how actors can occupy or leave positions
Choice rules	Clarify the allowed, constrained or prohibited action for actors in a position
Aggregation rules	Regulate "who is to decide which action or set of activities is to be undertaken" and influence how decisions are made
Information rules	Are about the extent to which information is available to actors, authorize the communication channels and specify form and language of communication
Payoff rules	Specify the interests and costs assigned to actors as results of series of actions and outcomes. These rules create deterrents or incentives for actions
Scope rules	Delimit the factors that may result in certain outcomes of an action situation

(Sources: Ostrom, 2009, 2011; Ostrom & Basurto, 2011)

The analysis of rules offers an in-depth understanding of the power to make decisions, to perform reward or sanction actions, and their effects on interactions of actors in the planning processes (van Karnenbeek and Janssen-Jansen 2018). When it comes to HSR station areas, rules are of influence and constrain the planning process of these areas. Understanding these rules is essential for investigating the integration of transport and urban functions (Alexander 2005; Kim 2011; Salet 2018).

The integration of land use and transport in station areas could be specified as a balanced development of node and place functions (Reusser et al. 2008; Chorus and Bertolini 2011). Station areas represent nodes in networks and places in cities. The node function relies on both the HSR stations' positions in the national and urban transport networks, whereas the place function is determined by location, land use and spatial quality (see Bertolini and Spit, 1998). Based on interviews with actors, Peek et al. (2006) argue that an integrated station area should be a transportation node, a connection point for multiple transportation modes, a meeting place, and a city center. Zemp et al. (2011) have further reformulated the transport function and land use function of station areas into five functions: linking catchment area and transport network, supporting transfer between modes of transport, facilitating commercial use of the station area, providing public space, and contributing to the identity of the surrounding area (Table 5.2).

TABLE 5.2 Functions of railway stations

Function	Explanation	Subject
Function1_(F1) Link catchment area and transport network	-To select a suitable location for the station to link the catchment area and transport network -The quality of catchment area is determined by average travel time to centers and number of workplaces, shops and residents	Transport
Function2_(F2) Support transfer between modes of transport	-There should be enough space for vehicles of all transport modes and for waiting area -Convenient interchange	Transport
Function3_(F3) Facilitate commercial development	-Provide urban functions such as shopping, leisure and business to generate additional revenues and to integrate into surrounding communities	Land Use
Function4_(F4) Provide public space	-Serve as a public space for social events and activities	Land Use
Function5_(F5) Contribute to the identity of the surrounding area	-Contribute to the distinctiveness of the area and connects to the surrounding area	Land Use

Source: adapted from Zemp et al., 2011

A variety of approaches can be adopted to perform an institutional analysis (Hollingsworth 2000). In order to make a detailed and systematic analysis of the seven sets of rules in the planning process of HSR station areas and their impact on transport and land use functions, we have adopted the institutional analysis and development (IAD) framework. This framework provides a rich understanding of the context, the setting within which rules operate and change over time (Ostrom 2005; Ostrom 2009; McGinnis 2011; Ostrom 2011). It "assigns all relevant explanatory factors and variables to categories and locates these categories within a foundational structure of logical relationships" (McGinnis, 2011, p. 169). It uses the concept of an "action arena", which is the virtual locus of the action situation, the actions and interactions between the different actors on the issue at hand (Ostrom 2009) (see Figure 5.1). Actors here are organizations or social entities that have the ability to assert influence or act on a decision (Enserink et al. 2010). In an action arena, actors interact, exchange resources and solve problems. An action arena and interactions of actors are influenced by exogenous variables, for example, rules and geophysical circumstances (Ostrom 2009). This research aims to unravel the institutional influences on HSR station area planning and thus focuses on rules that structure and guide the action arena and interactions. Action arenas and the interactions of actors, in this case, refer to the planning process of transport and urban functions within the HSR station areas. For a particular case, we analyze how the actors and their interactions have contributed to each of the functions of HSR station areas as specified in Table 5.2, and summarize how different rules have influenced the HSR station area development in this case, which we consider to be comparable to HSR station area developments in other less economically developed cities in China.

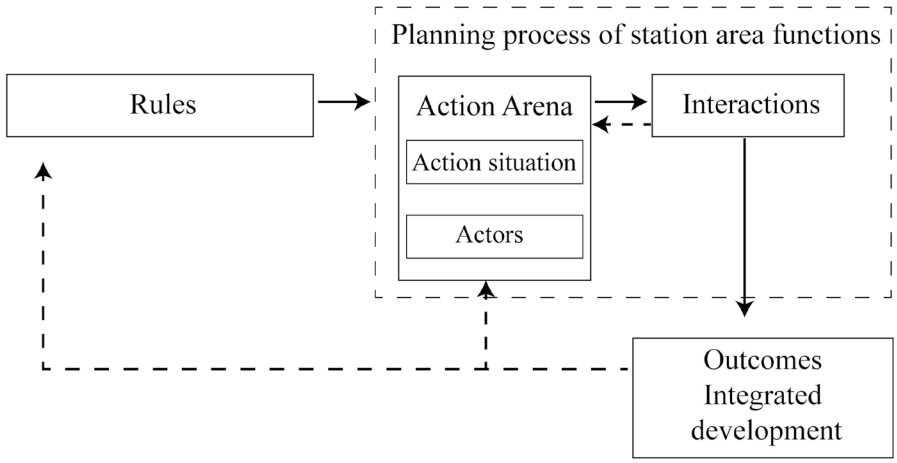

FIG. 5.1 Institutional Analysis and Development framework applied to HSR station area development and functioning (Source: adapted from Ostrom, 2009).

5.3 Methodology

5.3.1 Lanzhou West HSR Station Area as a Case

A case study illustrates an in-depth understanding of particular problems or places and a broad understanding of relevant contexts and issues (Seawright and Gerring, 2008). This paper uses the single case study method to gain a thorough understanding of a particular problem: how institutional rules obstruct or support integrated transport and land use, affecting the performance of HSR station areas in China. Lanzhou West HSR station was chosen as an exemplifier station for less economically developed cities in China. These cities usually face many challenges to developing station areas due to limited resources, inadequate funding, and lack of institutional innovation (Deng et al. 2019; Wang et al. 2021). Previous literature has focused mostly on HSR station areas in mega-cities, such as Shanghai Hongqiao Station and Wuhan Station (cf. Dai & de Vries, 2018; Yang & Han, 2020), while HSR station areas in these less economically developed cities are more numerous and

problematic. Lessons from these large cities may not apply to less economically developed regions and cities, as large cities often enjoy unique policies and institutional settings. Thus, the Lanzhou case shows a more representative picture of the problems of the HSR station area development and its lessons could be applied to a wider range of Chinese cities. Moreover, the authors had special access to relevant actors and materials, which improved the comprehensiveness and accuracy of the information, and gave them a unique insight into the dynamics of the planning and development of this station area.

Lanzhou is the capital of Gansu province, with a population of 3.31 million (Lanzhou Statistics Bureau 2020). It plays a critical role in northwest China due to its geographic location and industrial development. The Lanzhou-Urumqi high-speed railway is one of the most crucial national-level railway projects. As the start of the HSR line, the Lanzhou West HSR Station was planned in 2009 and constructed in 2013. The station opened in 2014 with a total construction area of 260,000 m^2 (LRTC 2019). It was designed as a comprehensive transportation hub which consists of HSR, inter-city railways, conventional railways, buses and metro lines. The number of annual passengers was around 10 million (Interviewee 2).

The Lanzhou West Station area was an urbanized industrial area, occupied by factories and warehousing (Figure 5.2). It is located 8km from the city center. The station area is around 1.02 km^2 and the construction investment is around CNY9.3 billion (interviewee 5). The station area has been planned to become the new Lanzhou city center (Figure 5.3). In 2019, the Lanzhou municipal government published *Implementing Opinions on Promoting the Lanzhou HSR Economic Development*, which emphasized the pronounced effect of HSR on social and economic development. In this plan, the municipal government proposed constructing a Central Business District around the station and accelerating the construction of projects on station squares, including a commercial center, business and office areas, leisure and shopping areas, and a tourism and cultural center.

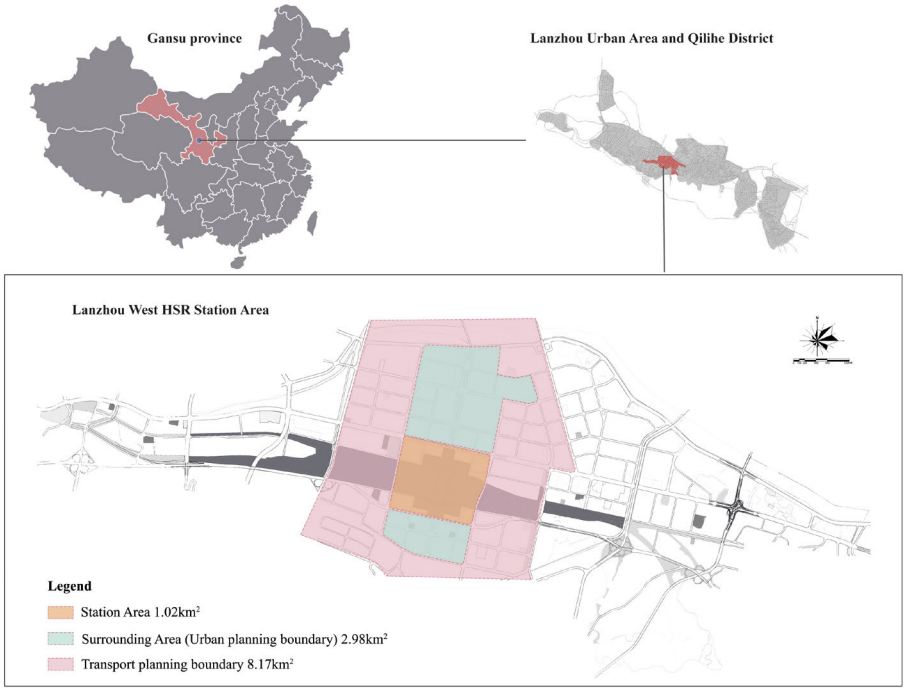

FIG. 5.2 Lanzhou West HSR Station area map (Source: the authors)

FIG. 5.3 Lanzhou West HSR station (Source: the authors)

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5.3.2 Data Collection and Analysis

Revealing rules can be difficult since they have often evolved over lengthy periods of time and are implicitly accepted by actors rather than explicitly written down (Ostrom 2009). Some of these rules are defined by formal policies, law and regulations, while some of them are influenced by consensus or customary law as part of a set of customs, practices and beliefs among different actors. To overcome this difficulty, we first collected available and accessible regulations, legislation, spatial plans, and railway plans to understand the institutional settings and rules of HSR station area development (see Table App.D.1 in Appendix to Chapter 5). Second, based on the five functions in Table 5.2, we designed semi-structured interview guidelines and interviewed the main actors face-to-face. Fieldwork was conducted from December 2018 to March 2019, in October 2019, and in January 2020. A snowball sampling method was used in which initial interviewees recommended other appropriate informants (Lewis-Beck et al. 2003). The interviewees were experts from CR, China Railway Lanzhou Branch (CRLB), China Railway First Survey and Design Group (CRFSDG), Lanzhou Rail Transit Company (LRTC), Tongji Architectural Design Co., Ltd. (TJAD) and Lanzhou Urban-Rural Planning Bureau (LURPB) (see Table App.D.2 in Appendix to Chapter 5). We interviewed the actors who made decisions for transport and land use functions in the HSR station area to find out how they interacted with other actors, and what rules influenced their behavior during the planning process of each function. All interviewees were informed of the research objectives, the purposes of the interviews, and how the data would be used and reported. Some experts were interviewed several times to follow the development of functions.

Then, we adopted the content and discourse analysis method to code the documents and interview transcripts in Nvivo (Flick 2013). Ostrom's seven rules (Table 5.1) were used as the coding framework to analyze the influence of each of the rules on the planning and development of the Lanzhou West HSR station area, the results of which are summarized in Table 5.3. In this table, the second column contains the rules that influence actors' interactions and the development of functions in the HSR station area. They are referred to in the following sections by the codes listed in the first column (e.g. ^{P1}). The third column explains which function or actor has been influenced by the rules. The fourth column indicates the document and interview sources for each rule.

TABLE 5.3 Rules affecting Lanzhou West HSR station area development

Code	Rules	Influence	Sources
Position rules			
P1	Two types of positions of actors involved in the process are: railway positions and urban positions. The MOR (CR), provincial and local governments were the main actors in the railway project.	Actors	Interviewee 1,2,3
P2	MOR(CR) was the initiator of HSR station planning and development.	Actors	Interviewee 1,2,3; D1
P3	Railway actors belonged to MOR and they still held the railway positions after the disbandment of MOR.	Actors; F1; F3	Interviewee 1,2,3,4; D1
P4	Urban positions were mainly held by the provincial government and the local government.	Actors; F1; F2; F3; F4; F5	Interviewee 3,4,6,8; D2
Boundary rules			
B1	MOR(CR), CRLB, provincial government and local government invested in the joint venture, Lanxin Railway Ganqing Ltd., and provided land to occupy the positions.	Actors; F1	Interviewee 2,3; D7,D8
B2	HSR technology and HSR-related information were controlled by MOR(CR) which excluded other actors from access and strengthened the dominant position of MOR(CR) in the decision-making process.	Actors	Interviewee 2,3,4
B3	The municipal government could decide on urban actors who might enter a position and be involved in the planning and development process.	Actors; F2; F3; F4; F5	Interviewee 3,6,7; D2, D3, D4
B4	Market actors were excluded from the planning process.	F3	Interviewee 6,8
B5	Citizens were excluded from the planning process.	F4	Interviewee 6,8
Choice rules			
C1	Railway and urban actors' activities are constrained by separate land ownership and hierarchy relationships.	F1; F2; F3; F4; F5	Interviewee 1,2,3,6,8
C2	Lanzhou local government used an informal choice rule by taking advantage of its location and its role as the capital of Gansu province to bargain with MOR(CR) and CRLB.	F1	Interviewee 3,4
C3	Station area was regarded as a general urban area, and standard approval procedures were required. Many choice rules were applicable and conflicted with each other.	F3; F5	Interviewee 6,8
Aggregation rules			
A1	Railway actors were only responsible for railway services.	F1; F2	Interviewee 3,5
A2	Local transport methods were mainly provided and operated by urban actors, so decision-making on local transport methods was dominated by local government.	F2	Interviewee 5,6,7
A3	CRLB made decisions for the retail and restaurants within the station.	F3	Interviewee 2,3,5
A4	LRTC constructed and managed the commercial development in the underground area and in the squares.	F3	Interviewee 6,7,8
A5	CRLB was responsible for the area inside the station building.	F4	Interviewee 3,5
A6	LRTC financed, constructed and maintained the public space in the station area.	F4	Interviewee 6,7,8
A7	The local government has the right to make decisions on the developers of the surrounding area.	F5	Interviewee 6,8; D2,D4

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TABLE 5.3 Rules affecting Lanzhou West HSR station area development

Code	Rules	Influence	Sources
Information rules			
I1	MOR(CR) controlled the information about HSR. CRFSDG was responsible for providing scientific studies for railway lines and stations.	Actors	Interviewee 1,2,3,4
I2	Tongji Architectural Design Co., Ltd. (TJAD) designed the HSR station building, the facilities, the transport system and the urban development plan of the station area.	Actors	Interviewee 6,7,8
I3	The communication channel between railway actors and urban actors was established through the negotiation between MOR(CR) and the provincial government at a high level (*Ludi gaoceng huitan jizhi*).	F1; F3; F5	Interviewee 2,3,4,8
Payoff rules			
PO1	The Lanzhou-Urumqi HSR line and stations were funded by Lanxin Railway Ganqing Ltd. MOR(CR) and CRLB invested around 76% of the total capital, while the Gansu provincial government provided about 12%.	Actors; F1	Interviewee 2,3
PO2	Around 70% of the station area investment was borrowed from banks by LRTC, and 30% of the sources were provided by the local government. LRTC could obtain the rent revenue from the commercial area, parking and two high-rise commercial buildings.	F2; F3; F4	Interviewee 6
PO3	In order to compensate the CRLB for its land loss, the Lanzhou municipal government allocated a new, larger area on the urban edge to the CRLB.	F1	Interviewee 2,3,4
PO4	Considering the local interest, MOR(CR) agreed to build an inter-city railway line and connect it to the Lanzhou New Area.	F1	Interviewee 2,3
Scope rules			
S1	For railway actors, the station area aimed to provide service to railway passengers.	Actors, F1; F3; F4	Interviewee 2,3
S2	The station area was planned to become the new Lanzhou city centre, integrating transport functions with a high-end finance sector, large-scale businesses and exhibition centre, and ecologically responsible residential areas.	F4; F5	Interviewee 6,7,8,9; D13, D19
S3	Planning outcomes depend on the local situation. There was no national-level integrated development policy.	F3; F5	Interviewee 6,7,8

Source: the authors

5.4 Analysis of the Action Arena, Interactions and Outcomes

5.4.1 Actors and Rules

Since the economic reforms began in 1978, the Chinese national government has delegated many governance responsibilities and economic decision-making power to local governments (Chien 2010), which has given local governments a decisive role in local development (He and Wu 2009). Therefore, there were two types of positions for actors in the decision-making process of HSR station area development, railway positions and urban positions (P1). The Ministry of Railways (MOR) occupied the railway position and initiated the Lanzhou-Urumqi HSR line (P2). MOR, as the competent department of railways, was responsible for all railway affairs and supervised all railway departments across the country. In 2013, MOR was disbanded and replaced by China Railway (CR) to improve efficiency and attack corruption. MOR (CR) had the authority to approve the planning and design of the HSR and the stations. It also had the core technologies of HSR and the power to regulate the whole railway network (B2; I1). CRLB, its local branch, was responsible for the management and operation of railway stations in Gansu province (P3). CRFSDG provided scientific studies and suggestions for railway lines and stations, such as the location choice and the layout of railway stations (P3; I1). Railway actors' perception was that the station area was a place to provide services for passengers (S1). Passengers' convenience and safety in entering and exiting the station were paramount in their efforts (Interviewee 5). Railway actors cooperated in many projects and they shared the same convictions and perceptions about the functions of stations and station areas (P3, B2, I1).

Urban positions were mainly occupied by provincial and local governments (P4). The Gansu provincial government was responsible not only for cooperating with MOR on the planning, investment and construction of the HSR in Gansu province, but also for collecting information from municipal governments and balancing the interests (I3). The Lanzhou municipal government had the authority to decide the land use rights and approve the development of the station area and its surrounding areas (B3).

Its two subdivisions were involved in particular: the LURPB[7] planned the station area, and the Lanzhou Transport Bureau (LTB) provided the local public transport services. The Lanzhou municipal government authorized the LRTC, which was a state-owned enterprise (SOE) and responsible for metro development in Lanzhou, to provide funding and develop the station area (B3). The local government was not permitted to issue government bonds, so it appointed LRTC to loan money from banks and invest in public facilities in the station area (PO2). The Lanzhou local government entrusted the TJAD to design the HSR station building, the facilities, the transport system and the urban development plan of the station area (I2). For urban actors, the Lanzhou-Urumqi HSR line was crucial for the future economic development of Gansu province. The development of HSR and station area was expected to spur the economy and bring investment to Lanzhou. They considered the station as a catalyst for economic upgrading of the surrounding area, from warehousing and factories to commercial and residential functions (S2).

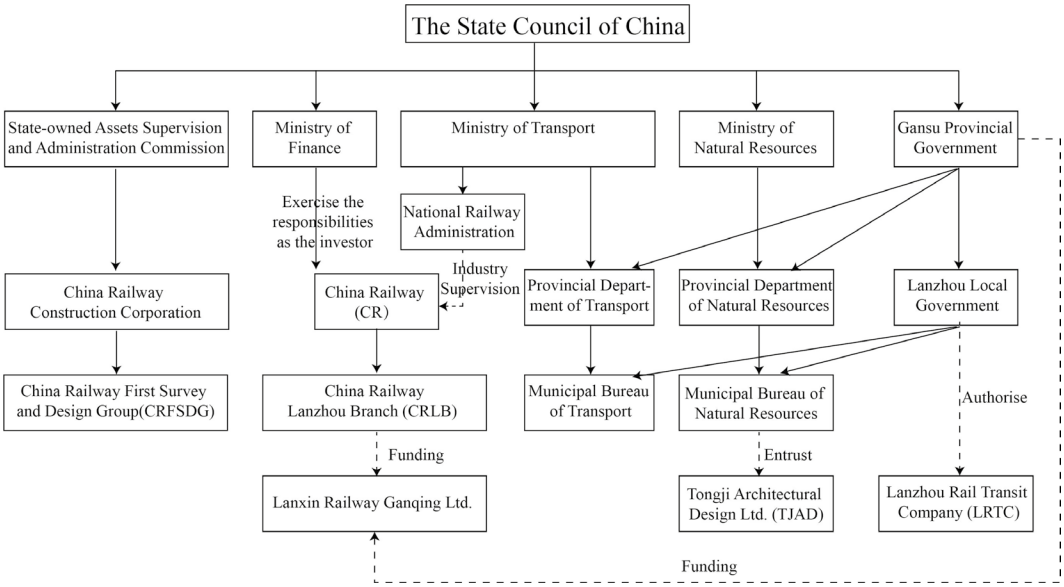

FIG. 5.4 Formal institutional relationships among actors (Source: the authors)

7 The Lanzhou Urban-Rural Planning Bureau was merged with the Lanzhou Land and Resources Bureau, Lanzhou Development and Reform Commission, Water Resources Bureau, Agriculture Bureau, and Ecological Construction Bureau due to institutional reconstruction in 2019. The new consolidation is the Natural Resources Bureau.

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Railway actors and urban actors had to cooperate to provide the funding and land for the HSR station area. MOR, CRLB, Gansu provincial government, and Qinghai provincial government formed a company for funding in 2009, ie. Lanxin Railway Ganqing Ltd. (P1, B1). The joint venture provided the opportunity and the position for the provincial government to negotiate for local interests (PO1). The land for the Lanzhou West HSR station and tracks was allocated to CRLB by the national government, while the land surrounding the station was expropriated by the Lanzhou municipal government (B3). Figure 5.4 shows the formal institutional relationship between these actors.

5.4.2 Functions as Outcomes of Actors' Interactions and Rules

Function 1 Link Catchment Area and Transport Network

The location of the station had to be determined by both railway actors and urban actors. Although the railway actors dominated the decision-making process since they possessed the authority, knowledge, information and part of the financing resources (P2; P3; A1; I1), the land resources and part of the funding were controlled by urban actors (P4; B1; C1; PO1). The main challenge was to balance the interests of railway actors and urban actors (Interviewee 2). Railway actors required that the station's catchment area be large enough to accommodate the station and its facilities, and a convenient interchange between HSR and conventional trains (Interviewee 4). According to urban actors, the cost of land expropriation should be affordable, and the area should have growth potential. Moreover, land is particularly scarce in Lanzhou due to its geographical situation, making it difficult to select a location.

MOR and CRFSDG suggested connecting the HSR line with the existing Lanzhou Railway Station for technical reasons (Interviewee 3) (I3). Transferring between the conventional railway and HSR was also convenient for passengers (Interviewee 5). However, the local government could not afford the cost of land acquisition to expand the station area (interviewee 1). Due to insufficient land and funding, the Lanzhou municipal government proposed locating the HSR station in the Lanzhou New Area, a new town in Lanzhou (Interviewee 2) (I3). The local government regarded the HSR station as a great opportunity to stimulate the development of the new town. Nevertheless, this proposal provoked opposition from railway actors because the new town is 40km away from the Lanzhou urban area and 74km away from Lanzhou Railway Station. The CRLB then proposed locating the new HSR station on the land of Lanzhou West Freight Station (Interviewee 2). The distance between the

HSR station and the existing railway station would be acceptable for transferring passengers. Meanwhile, most of the land in the freight station area belongs to the CRLB. The surrounding land of the station area belonged to several SOEs, including Lanzhou Machine Tool Factory and Lanshi Group. The local government only needed to exchange land with these SOEs. Thus, land acquisition costs were minimized (Interviewee 4). Informal payoff rules (PO3; PO4) between railway actors and urban actors also facilitated the process to reach an agreement. All actors agreed to move the freight station to the north of Lanzhou and build the Lanzhou West HSR Station in this area.

Lanzhou local government used an informal choice rule by taking advantage of its strategic location on the national railway network and its role as the capital of Gansu province to bargain with MOR and CRLB(C2), so CRLB provided the land for the station (PO3). However, officials from MOR were dissatisfied with the limited willingness of provincial and local governments to cooperate and disappointed with their narrow vision (Interviewees 3,4). This had a negative effect on the cooperation between MOR(CR) and the Gansu provincial government on following HSR projects and the further development of the station area.

Function 2 Support Transfer Between Modes of Transport

This function aimed to provide passengers with seamless interchange between different transport methods. Actors had a challenge in cooperating under the conditions of fragmented institutional settings and land ownership. Railway actors were only responsible for railway services and the area inside the station building (P3; A1). Other local transport modes and facilities, including taxis, buses, metros and parking zones for private cars, were planned, provided, and managed by urban actors (P4; B3; A2).

The Lanzhou municipal government guided the transport and urban planning processes of the station area. It created a transport planning area of 8.17 km^2 to integrate the station area into the urban transport networks (see Figure 5.2). TJAD designed a multi-layer spatial system to achieve the seamless transfer of HSR, subway, bus, taxi and other transportation modes (see Figure 5.5) (I2). The spatial arrangement of the building, traffic flows and demand were considered carefully when the planners designed the routes for different transport methods (Interviewee 7).

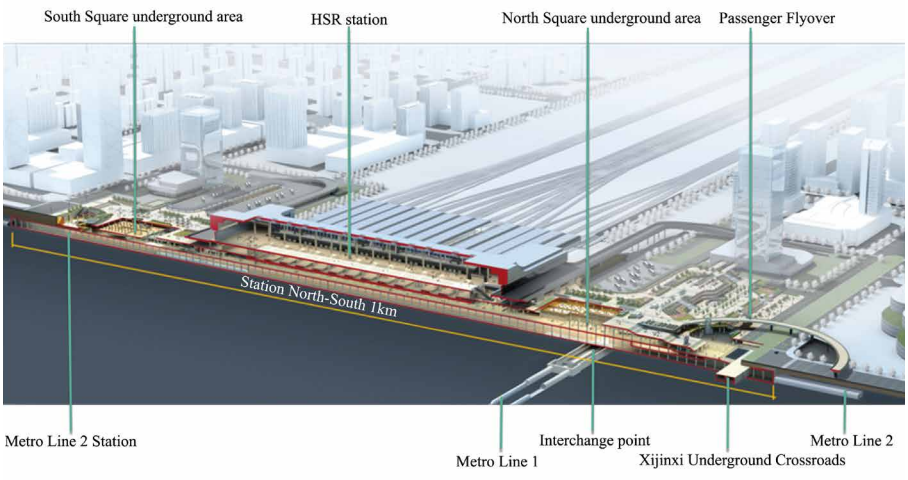

FIG. 5.5 Section map of Lanzhou West HSR station area (Source: adapted from LRTC, 2018)

Even though the railway engineers praised the design of transport integration (Interviewee 4), there were many problems in practice. The most serious problem was related to phasing. The HSR service started at the end of 2014, while the north square, bus stations, taxi zone and parking area were only opened in 2017. The subway began operating in the middle of 2019. In 2020, the south square and the east and west underpasses were still not used, because the relocation of factories had not been completed. Taxi drivers were unwilling to take passengers from the HSR station because of the traffic congestion around the station area. As a result, passengers arriving by HSR were unable to leave the station area by public transport for a length of time. LTB remedied this problem temporarily by requiring taxi drivers to convey passengers to and from the HSR station (A2). Although railway actors were aware of these problems, they did not have the resources to solve them (C1; A1) (Interviewee 2).

Function 3 Facilitate Commercial Development

Separate land ownership created difficulties for commercial functions (C1; A3; A4). It was divided into three parts, namely the retail and restaurant space on the second floor of the station, the retail and parking areas in the underground area, and the commercial buildings on the squares (S2). The retail and restaurants within the station belonged to the railway actor CRLB(A3). It aimed to provide convenience for passengers and the revenue was limited (Interviewee 5). The Lanzhou municipal government authorized the LRTC to construct and manage the commercial

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development in the underground area and squares while constructing the metro lines (Interviewee 6) (B3; A4). LRTC could obtain the rent revenue from the commercial area, parking and two high-rise commercial buildings (PO2). LRTC expected that the revenue from commercial development could compensate for the cost of construction and operation, but the goal proved difficult to achieve. Commercial development was hampered for various reasons (Interviewee 7). The following reasons were mentioned by the interviewees:

First, there was little negotiation on commercial development between railway actors and urban actors (Interviewee 6). Although CRLB proposed to develop the commercial area in the north square in 2014, it failed to obtain the development rights due to land transfer regulations, insufficiency of funds, and disagreements with the local government (Interviewee 3) (P4; B3; I3; A3; A4; C3; S3).

Second, the absence of market actors' opinions during the planning process also contributed to the difficulties of commercial development in the station area (B3; B4). Actors paid more attention to transport functions than to urban functions when planning the station area (Interviewee 6). The area planned proved to be unsuitable for retail and unattractive to market actors, so the investment absorption and rent-seeking of the commercial area were problematic. Furthermore, the design of transport connections aimed to reduce the waiting time of passengers in the station area and ensure they could leave the station area quickly (Interviewee 7). Urban actors have ignored the fact that successful commercial development needs people to assemble in the area.

Third, standard approval procedures were required and many different choice rules were applicable because there were no specific choice and scope rules for the station area development (C3; S3). There was uncertainty and confusion regarding which rules to follow since some were designed for other situations and were contradictory. For example, the commercial functions of the station area were both limited by planning regulations and fire control regulations. The fire control standards were established in the 1970s and have not been updated. It was unclear which rules applied to the station area, especially in the underground area. Each department refused to take responsibility and instead delegated decision-making to other departments (Interviewee 6). The decision-making process was prolonged, and it took LRTC more than two years to obtain all the approved paperwork. The underground commercial area opened in 2019, which was five years later than the operation of HSR. The two commercial buildings on the squares have not been finished until 2021.

Function 4 Provide Public Space

The local government regarded the HSR station area as an opportunity to improve the city image, so it planned large public squares which served as waiting and interchange areas for passengers and also as public spaces for citizens (Interviewee 7) (P4; I2; S2). Together with the commercial area, the Lanzhou municipal government entrusted the LRTC with financing, construction and maintenance of these areas (B3; A6; PO2). The north square opened in October 2017 (see Figure 5.6). Many citizens criticized that the squares were too large for Lanzhou and their construction was a waste of money. On the contrary, urban actors argued that the number of tourists had increased by 30% since the opening of HSR, and that large squares were necessary for the future (Interviewee 6). However, there was no formal scope rule for square size and the boundary rules excluded citizens from the planning process(B5). Furthermore, an underground interchange corridor is also a part of the public area, which connects the railway station, metro station, and north and south squares. It belonged to neither railway actors nor urban actors, so both CRLB and LRTC refused to manage this area (C1; A5; A6). After a lengthy negotiation, CRLB agreed to manage this area (Interviewee 5).

FIG. 5.6 Lanzhou West HSR station north square (Source: the authors)

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Function 5 Contribute to the Identity of the Surrounding Area

With the opening of the HSR station, there were some changes in the land use of the surrounding areas (S2). In the *2016 Detailed Control Plan of Lanzhou*, the area used for logistics and warehousing decreased by 0.183 km^2, while the area used for retail and business increased by 0.003 km^2. The Lanshi Group owned the area to the north of the station square, which was used for the Lanzhou Petrochemical Factory. To entice the Lanshi Group to relocate the factory to the Lanzhou New Area, the local government agreed that the Lanshi Group could keep the original site and pay only 15% of the land transfer fee for changing the land use type (Interviewee 9). Lanshi Group moved the factory and developed the area into residential areas, offices and shopping malls with a private real estate developer.

It is noteworthy that the land value of surrounding areas has increased sharply, but CRLB and LRTC have not profited from it. CRLB proposed cooperating with Lanshi Group to develop the surrounding areas, but there were no supportive regulations and institutions (B3; C1; A7; I3). Lanshi Group also did not cooperate with LRTC (P4; B3; A7). The LRTC constructed the flyover and underground passenger corridor which connected to the commercial building of Lanshi Group. It brought benefits for commercial development, but LRTC could not gain any revenue from it (Interviewee 6). Both CRLB and LRTC could not capture the land value increase of surrounding areas, which has become an institutional barrier to financing the construction and operation of the HSR station area. It urged the national and local governments to develop rules to encourage cooperation among these actors and to promote integrated transportation and land-use planning.

5.5 Discussion

5.5.1 Rules Obstructing the Integrated HSR Station Area Development and Operation

The Lanzhou case shows that the interaction of actors in each function was deeply influenced by rules. Various types of rules created barriers for actors' interaction and cooperation in developing the different functions, i.e. rules on position (P1; P3; P4), boundary (B2; B3), choice (C1; C3), aggregation (A1; A2; A3; A4; A5; A6; A7) and information (I3), and scope (S1; S2). These rules resulted in the separate development of transport and land use functions. In particular, aggregation rules revealed that the decisions in each function were mainly taken by one group of actors (Ostrom 2009).

Position, boundary and aggregation rules were sourced from laws and regulations such as *Railway Law*, *Land Management Law of China* and *Property Law*. They clearly define the responsibilities and physical boundaries in a station area between railway and urban actors. The national government allocates land for railway tracks and stations to railway actors. Local governments expropriate and govern other land parcels, such as the underground and the surrounding areas. Functions were decided upon and provided separately by railway actors and urban actors (see Figure 5.7). The most important function, function 1, which links the station area with the railway network, was decided by both railway and urban actors. Other functions were mainly decided upon and permitted by urban actors. Although CLRB and LRTC manage the station and station area together, they do not cross the physical boundary to manage functions.

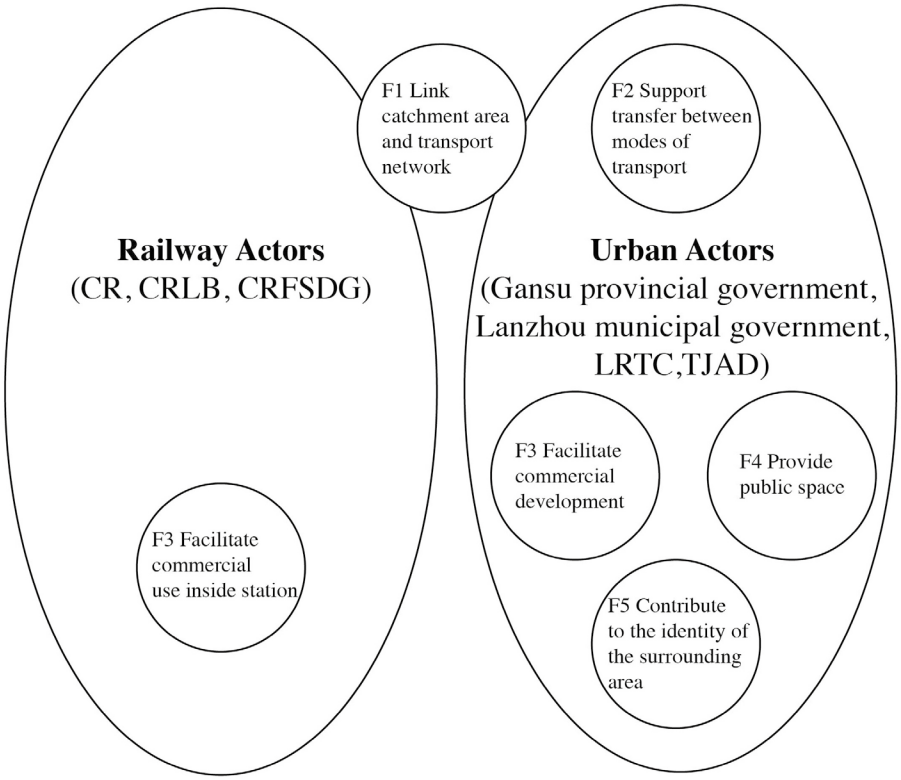

FIG. 5.7 Responsibility for HSR station area functions of railway and urban actors (Source: the authors)

Position, boundary and aggregation rules protect railway and urban actors' autonomy but hamper their cooperation. This is beneficial for the transport function's development, since the railway sector is technically complex and too many intervening external factors may decrease its efficiency (Tornberg 2012). However, these rules do create problems for urban functions, which require more cooperation between actors in the planning process. The institutional fragmentation of governance of urban functions boosts the chances of conflict in the planning process and creates enormous barriers to interaction (Klijn and Teisman 2003). Split land ownership not only creates challenges for collective action of actors, but also impedes the integrated development of transport and land use in the area. The Lanzhou case thus provides an explanation for the slow development of urban functions in Chinese HSR station areas in less economically developed regions.

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5.5.2 The National Government Should Establish Specific Rules for HSR Station Areas

For the integrated development of transport and land use in HSR station areas, the national government published *Opinions of the General Office of the State Council on Executing Comprehensive Development of Land to Support Railway Construction* and *Opinions on Improving the Rational Development and Construction of the Areas Surrounding HSR Stations*. Both documents emphasized the need for integrated development of railway stations and station areas and the coordination between railway actors and local governments. However, these documents only provided general instructions and lack specific choice rules and scope rules for station area development (C3;S3). Some interviewees stated that interpreting these abstract principles into planning practice is difficult. The scope rule 3 stated that the planning outcomes depend on the local situation, which showed that a national-level design guideline for HSR station areas is absent. The Lanzhou West Station was the first HSR station in Gansu province, so urban actors could only learn from other cities' experiences through visits and investigations (Interviewee 6). Ostrom (2009) argued that choice rules become ambiguous in a complex situation that is formed by a complex system of rules. Choice rule 3 stated that the HSR station area was regarded as a general urban area and urban actors did not clearly know which rules were applicable. The case showed that the complex situation and absence of a specific approval procedure for the HSR station area impede the development of urban functions.

Furthermore, the national government published *Opinions of the State Council on Reforming the Railway Investment and Financing System and Accelerating Railway Construction* and *Guiding Opinions of the State Council on Innovation in Investment and Financing Mechanisms in Key Fields to Encourage Social Investment*. Although both documents mention the need to attract market actors to invest in railway construction, a boundary rule for entry, a formal institution or an informal coalition between market investors and the government, are still missing. In the Lanzhou case, CRLB attempted to participate in the development of the station squares and surrounding areas. The absence of rules for land transfer, funding and revenue discouraged cooperation between railway actors, urban actors and market actors.

We recommend the national government develop specific boundary, choice and scope rules for HSR station areas to create a favorable policy context for coordinating railway and urban functions, for example, by publishing the planning guidelines. The spatial planning guidelines for the HSR station area could provide a framework for policy integration of different sectors by developing planning concepts (Stead and Meijers 2009). It helps actors to recognize that different land uses are parts of a shared spatial system from the beginning of the process (Neuman 2006;

Curtis 2008; Bertolini 2012). To achieve sustainable development, it is crucial to integrate transport policy, environmental policy and land use planning between sectors and professions (Geerlings and Stead 2003).

5.5.3 Local Governments Could Modify Rules to Encourage Integrated Development of Transport and Land Use

In line with Yang & Han (2020) and Wang et al. (2021), we found that the CR no longer had the paramount power to decide the location and development of a station, whereas the local government dominated a more decisive position. The current boundary rules contributed to the underperformance of the HSR station area because they limited different opinions from the public and market, the innovation of new solutions and institutional capacity (B4; B5). The Lanzhou case showed that the opinions of market actors are crucial for commercial development. Considering the opinions of market actors during the planning process could bring benefits for attracting investments in the HSR station area. The local government can design boundary rules for market actors and the public to enter the planning process (B3).

Moreover, the interactions between actors were also hindered by information rules (I1; I2; I3). Information rules should establish channels of information flow to connect all actors (Ostrom 2009). However, the decision-making process of China's regime relies on building a consensus among the top-leaders (Xu 2011). In the Lanzhou case, the communication between railway actors and urban actors relied on the interaction between CR and the provincial government because of the railway and provincial governments' high-level dialogue mechanism (*Ludi gaoceng huitan jizhi*). The information rules restrained the communication of actors, and actors usually did not have the overall information of all functions in the station area. On the contrary, during the decision-making process of the Wuhan HSR station, for example, the mayors of Wuhan visited the leader of CR in Beijing to express their demands directly(Yang and Han 2020). We suggest that local governments modify the information rules and improve communication with railway actors. Urban actors and railway actors could make decisions together for more functions and encourage integrated transport and land use development in the station area.

The local government can modify boundary, choice, aggregation and information rules for station area development by establishing a cooperative organization for railway and urban actors. The cooperative organization, which consists of government departments and developers, can make decisions together and speed up the approval procedure, so that urban functions can be constructed alongside transport functions. It could also

provide an opportunity for actors to capture the land value increase in the surrounding areas. For example, delegates from 23 Shanghai municipal departments founded a massive project planning agency, which was responsible for the spatial development of Hongqiao airport and HSR station area. The land development rights of Hongqiao hub were detached from segmented land ownership and a value capturing model was used to develop the station area as a whole and to provide funding for unprofitable development (Dai and de Vries 2018). The Lanzhou case showed that both railway actors and urban actors would like to be involved in the development of surrounding areas and capture the land value increase. However, the Lanzhou local government lacked the governance capacity to innovate rules to encourage integrated development, which is a key difference with the big cities where this innovation has been successful.

5.6 Conclusion

Although the integrated nature of HSR station area development has been of interest to policy making, there is limited knowledge of the institutional settings of their implementation. This research provides an in-depth understanding of the institutions which structure and constrain actors' interactions in the HSR station area development process. Literature mainly focuses on what functions a station area should have and which actors are responsible for certain functions (Bertolini and Spit 1998; Peek and Louw 2008; Zemp et al. 2011). This paper adds a comprehensive and detailed analysis of how the institutional rules influence the interactions of actors during the planning process towards integrated development of functions. Based on previous studies that have focused on HSR station areas in China's mega-cities, such as Shanghai and Wuhan (Dai and de Vries 2018; Yang and Han 2020), this paper extends the investigations to ordinary Chinese cities and explains why integrated transport and land use development were difficult in most Chinese HSR station areas.

This paper reveals that rules shape actors' interactions to a great extent and, therefore, influence the level of integration of transport and land use in the HSR station area. We found that the rules had a negative impact on the integrated development in Chinese station areas, especially on urban development, because the institutions provide no incentive for cross-sectoral and multi-level governance, and even discourage it. There was little interaction and communication between railway actors and urban actors in the decision-making process, which hindered the economically advantageous development of urban functions.

The national government has not established specific rules for integrated planning and development of HSR station areas. Due to a lack of such rules, the technical characteristics, funding, operation and management of different functions were decided and provided by different actors without cooperation. Furthermore, only railway actors and a few urban actors joined the planning process at an early stage, focusing mainly on transport functions. The lack of consideration of urban functions led to difficulties in the development process, especially with regard to commercial development. To achieve sustainable development, it is crucial to integrate transport policy, environmental policy and land use planning between sectors and professions (Geerlings and Stead 2003).

Thus, we advise the local governments to establish cooperative organization in the short term, which could modify current rules to involve market actors and the public in the planning process of HSR station areas and encourage integrated transport and land use. In the long term, we suggest that the national government publish planning guidelines and new rules for integrated development in station areas, such as scope rules, boundary rules and choice roles. These rules can support the complex decision-making process by providing clear purposes, developing a common understanding of integration and functions, encouraging interaction and supporting trade-offs between diverse interests of actors.

Through applying the IAD framework, van Geet et al. (2019) have provided in-depth insights into the Dutch institutional contexts that impede transport and land use integration, so they have recommended applying the framework in different national conditions. This article underlines the usefulness of the IAD framework in the Chinese context, both in descriptive and prescriptive terms. It allowed us to conduct an in-depth analysis of the Lanzhou HSR station area planning and development, showing the institutional structures and mechanisms underlying the poor performance of HSR station areas. Since the lessons from Lanzhou could be applied to many cities in China, this paper provides a basis for restructuring future decision-making on HSR station area development, to safeguard the integrated planning of future station areas. Future research could employ this analytical framework to compare different cases in order to investigate the rules that improve the interactions of actors and the integrated transport and land use development, which could provide a basis for national planning guidelines in station areas. This framework could also be used to examine the institutional barriers to the integration of transport and land use in the metro station areas in Chinese cities. We also suggest that future research explores the institutional conditions of the integration of transport and land use by adopting this framework in other national contexts.

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6 Conclusion

6.1 Introduction

Since the State Council officially approved the construction of HSR in 2004, HSR in China has entered a phase of rapid development. With huge investments from the national government, HSR in China has already reached 38,000 km at the end of 2020, connecting 80% of major Chinese cities. Rapid development has also brought many problems, especially at the city level and station area level. First, the development of HSR station areas in China is unsustainable from environmental, economic and social perspectives. Second, most Chinese HSR station areas are located far from urban centers, which may hamper accessibility and future development. Furthermore, most HSR station areas are planned as new districts or new towns, which has resulted in urban sprawl (Deng & Wang, 2018; Wu et al., 2022). Finally, these HSR station areas have faced many problems since opening, especially the difficulties in transferring and the slow development of urban functions. However, the reasons for these problems in Chinese HSR station areas are not well understood due to a lack of research on the decision-making process and institutional context.

To explore the reasons for these problems, the previous chapters analyze the planning and development of Chinese HSR station areas from a governance perspective and reveal the complexities of this process. The second chapter of this study examines why Chinese HSR stations, planned according to TOD principles, have resulted in unsustainable development. The third chapter compares three different sized cities to reveal the processes of selecting locations for Chinese HSR station areas. Chapter 4 focuses on the motivations of Chinese local governments to plan HSR new towns and how their haphazard planning is curbed by the national government. By deconstructing the institutional rules that structure the interaction of actors, Chapter 5 investigates why Chinese HSR station areas are difficult to transfer between transport modes and slow to develop urban functions.

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This study demonstrates the causes of development problems in Chinese HSR station areas through three dimensions, from the physical level of planning, to the decision-making process, and finally to the Chinese institutional system. This final chapter of this PhD study summarizes the findings of Chapters 2, 3, 4, and 5, draws overall conclusions, and provides recommendations for planning and policy practice. First, in Section 6.2, findings are discussed according to the research questions set in Chapter 1. Then, Section 6.3 reflects on the findings and provides policy recommendations based on the main objectives of this study. Section 6.4 summarizes the research contributions. Finally, Section 6.5 reflects on the method and data of this research, and summarizes limitations and recommendations for future research.

6.2 Summary of the Research Findings

This section summarizes the research findings from the four main chapters (Chapters 2-5) of this study. Each chapter focuses on answering one main research question and related sub-questions. Table 6.1 summarizes how each research question and sub-questions are answered in the previous chapters. It ensures that each question is properly addressed and also allows the reader to easily grasp the main findings of this study. It is worth noting that the summary of the planning characteristics of Chinese HSR station areas in Chapter 2 provides background information for Chapters 3, 4, and 5.

TABLE 6.1 Summary of Responses to the Research Questions

Chapter	Research Question	Sub-questions	Highlighted Summaries of main findings
Chapter 2	RQ1: Why do HSR stations in China, planned according to the TOD concept, result in unsustainable development?	What success factors should be included in a TOD plan for HSR station areas?	According to literature, three main categories and ten main factors are defined.
		To what extent are these factors indeed considered in the plans for Chinese HSR station areas?	-The planning of Chinese HSR station areas deviates from most TOD planning principles. -Compared to station areas in megacities, station areas in large cities and small and medium-sized cities deviate more significantly. -TOD is used by local governments as a financial tool to promote suburban urbanization.
Chapter 3	RQ2: Why are Chinese HSR station areas far from the city centers?	How are location choices for HSR stations in China made?	Location choices for Chinese HSR stations are the result of bargaining processes between railway actors and urban actors in a decentralized context.
		How are they influenced by institutional settings, power positions and interdependencies between urban and railway actors?	-Actor interdependencies have shown that land resources and funding resources are controlled by different players: CRC and local governments, respectively. -Usually three potential locations for an HSR station appear in most decision-making processes: city center, new town and urban fringe. -The location of the HSR station must meet the interests of both railway and urban actors, and this location is usually at the edge of the city.
Chapter 4	RQ3: Why are Chinese HSR station areas so large?	How does the institutional context in China influence the governance behavior of local governments?	Though market tools are used, the state apparatus, especially the local state, plays an important role in the decision-making of urban development megaprojects and captures land values. "The state acts through the market" is defined as "state entrepreneurialism".
		How does state entrepreneurialism play out in the decision-making and planning of HSR new towns?	-Incentives: Revenue from land leasing; GDP-ism for their career advancement; Maintain state power -Behaviors: Cities compete for HSR station; HSR mega-project as main strategy for growth; Enlarging urban areas by HSR new town -Effects: Local debt increases; loss of cultivated land
Chapter 5	RQ4: Why does the development of Chinese HSR station areas lag behind planning from a governance perspective?	How do institutions shape the interactions of actors?	Institutional rules shape actors' interactions to a great extent and, therefore, influence the level of integration of transport and land use in the HSR station area.
		How do institutions influence the integration of transport and land use in Chinese HSR station areas?	Institutional rules had a negative impact on the integrated development in Chinese station areas, especially on urban development, because the institutions provide no incentive for cross-sectoral and multi-level governance, and even discourage it.

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6.2.1 TOD in the Spatial Plans of HSR Station Areas

— Q1: Why do HSR stations in China, planned according to the TOD concept, result in unsustainable development?

Based on the literature review, I conclude that the TOD planning of HSR station areas should include three major categories of factors: urban context and governance, transport and interchange, and land use planning. The planning of HSR station areas should first consider the urban context, such as the local economic base and the location in the region. The development of the HSR station area also requires a clear, wise, strong, and long-term vision (Loukaitou-Sideris & Peters, 2017). Furthermore, the quality and design of transport services in the HSR station area are fundamental to the successful implementation of TOD, including the station location in the city, effective connections to other modes of transport, seamless transfers, convenient pedestrian systems, and a complete cycle network. Moreover, the planning of the area around the HSR station should follow the principles of high density, great diversity, and high-quality urban design.

Based on these factors, I developed a coding framework to compare and analyze the master plans of 15 HSR station areas. I found that the planning of Chinese HSR station areas deviates from most TOD planning principles. First, these HSR stations are far away from urban centers. At the same time, the station areas are very large regardless of the size, GDP, and population of the city. Even if the city is smaller, the station area is planned to be much larger. The vision of these HSR station areas is focused on promoting market growth and becoming new commercial and service centers in the city, with insufficient attention to environmental sustainability. Second, roads take up a large percentage of the station areas, which not only wastes land and encourages private car travel, but also hinders the walkability of the area. Most of the stations propose public transport priority, but the smaller the city, the lower the percentage of public transport. The opening of subways often lags many years behind the opening of HSR. Because of their enormous size and security checks, these stations do not offer truly seamless transfers. Safe and complete cycle and pedestrian networks are ignored in most station areas. Third, at the city level, these HSR station areas are not located on vacant land or brownfield sites following the principle of compact, but on agricultural and forest land, resulting in a large amount of agricultural land being converted to construction land. Furthermore, a large number of high-end commercial and real estate developments are planned in these HSR station areas to demonstrate the modernity and prosperity of the city. However, the economic base of the cities and the location of these HSR station areas cannot support such a development model, and it is difficult for the development to succeed. It also creates social exclusion for low-income people and farmers who have lost their land.

There are various reasons for the deviation from TOD principles in the planning of Chinese HSR station areas. Some principles are ignored while some principles are affected by the complexity of the various actors involved in the decision-making process, institutions, and the fragmentation of land ownership. Furthermore, station area planning problems are more pronounced in large cities and in small and medium-sized cities, which deviate more from TOD principles than in mega-cities. Moreover, in line with Shen & Wu (2020), TOD in HSR station areas is also used by local governments as a financial tool to promote suburban urbanization. These station areas are planned with a focus on market-based growth, developing high-end commercial and residential areas that generate land leasing revenue for local governments, which is an unsustainable development method.

6.2.2 Decision-Making Process on Location Choices for HSR Station Areas

— Q2: Why are Chinese HSR station areas far from the city centers?

Through in-depth interviews with actors involved in the decision-making processes of HSR stations, I reveal that the different resources are controlled by various actors and their interdependencies in the Chinese institutional context. The main actors involved in the process of selecting locations for HSR stations are railway actors and urban actors. Railway actors include CR, China Railway branches, and China Railway Survey and Design Groups. CR and its branches have the legal right to plan, regulate, invest in and manage the national railway network and stations. The land required for stations and facilities is allocated directly to CR by the national government. China Railway Survey and Design Groups are responsible for providing professional feasibility studies and plans for HSR. Furthermore, the urban actors that can participate in the decision-making process are the provincial and municipal governments. Provincial governments cooperate with CR branches to establish joint ventures that finance the construction of HSRs and HSR stations. The provincial governments aim to maximize the number of stations in their province and represent the local governments in communicating with the CR to maximize the local benefits. Local governments have the right to develop the land around the station and provide urban transport facilities such as subways. Thus, the land resources of stations and station areas are controlled by railway and urban actors, respectively. The planning of HSRs and stations requires approval from the NDRC, and changes in land use of station areas require approval from the MoNR. Meanwhile, the funding for HSRs and stations is also provided by both railway and urban actors, while the funding for land acquisition in the station area is provided by the local government. Thus,

the actors in the decision-making process for HSR stations are interdependent. These complex decisions cannot be achieved through the unilateral action of any dominant player.

By investigating the processes of selecting locations for HSR stations in Shenzhen (Guangdong), Lanzhou (Gansu) and Yongcheng (Hubei), I found that the decision-making process usually has three rounds, representing a spatial sequence in the process of finding a new station area and balancing node and place functions. In the first round, the actors aim to find a location around the existing train station in the city center. Railway actors usually preferred this location because of the ease of transfer and the possibility of renovating the old train station. However, urban actors could not accept the fragmentation of the city by the HSR line and the high cost of land acquisition for the station area. In the second round, local governments often propose and prefer the option of placing the HSR station in a distant new town because they pursue land speculation and expect to promote large-scale urban development through HSR connection. This location alternative is often vetoed by the railway actors or the Chinese national government. In the third round, actors turn their attention to finding locations in sub-centers or urban fringes. The location alternative at the urban fringe or in sub-centers usually balances the interests of the railway and urban actors. The technical challenges and construction expenses of HSR can be minimized. For urban actors, land acquisition costs and damage to the existing urban form are limited, and there is still enough space for mixed-use development. Therefore, HSR station areas in China are often located at the edges of cities or sub-centers, far from the city center.

6.2.3 HSR New Towns Planning and Developing

— Q3: Why are Chinese HSR station areas so large?

Most HSR station areas in China are planned as HSR new towns or new districts, usually located far from the built-up area and on a grand scale. New town development has been one of the main features of urban transformation in China since the economic reforms of 1978, and has been preceded by many eco-cities and university towns. Scholars have analyzed these Chinese new towns through the theory of urban entrepreneurialism. They have argued that new towns in China are developed in the context of entrepreneurial governance, commodification of space, and land-based urbanization with the goal of promoting and encouraging local economic development and employment growth. Unlike in neoliberal-dominated countries, both marketization and commoditization in China have been used as tools

to strengthen state power. Despite the widespread use of market tools, local states play a major role in the decision-making process of urban projects. This phenomenon is summarized by Wu (2018, 2020) as the state acts through the market and is defined as "state entrepreneurialism."

Adopting state entrepreneurialism as a theoretical lens, I provide an in-depth analysis of the behavior, incentives, and effects of the Yongcheng local government in planning the HSR new town. As with other types of new towns, the HSR new towns are driven by state entrepreneurialism and the planning process is dominated by local government. Because HSR stations are not only a symbol of modernity but also bring investment and talent, local governments compete with each other for HSR stations. Local governments use these megaprojects as a major strategy to promote urban growth. In order to have enough space for capital accumulation and to achieve many strategic goals, such as strengthening the local economy, influencing the direction of urban development, and increasing the competitiveness of the city in the region, local governments tend to build HSR new towns in massive size and away from the urban area. Furthermore, revenue from land leasing is an important and almost the only source of local finance (Jiang et al., 2016). Therefore, local governments expect that large HSR station areas can generate substantial land conveyance fees and capture the land value increase. In addition, HSR new towns can also highlight the ability of local leaders to advance their careers.

However, unlike other new towns, the HSR station area is also decided by the Chinese national government in the planning process. Through approving HSR projects, approving changes in land use, issuing new guiding policies, and appointing local cadres, the national government maintains power and prevents the local governments from building oversized HSR new towns. However, by lobbying and providing more funding, the Yongcheng local government still chose a more favorable location for the HSR station and planned an HSR new district. Finally, these HSR new districts or new towns seem to have not brought the expected economic development but rather a significant increase in local debt and a dramatic loss of farmland.

6.2.4 Transport and Land Use Integration in HSR Station Areas

— Q4: Why does the development of Chinese HSR station areas lag behind planning from a governance perspective?

HSR station areas fulfill both transport and urban functions. To realize the potential environmental, social, and economic benefits, the integrated development of these functions is essential (Cervero & Murakami, 2009; Peek et al., 2006). However, these functions in Chinese HSR station areas are developed separately by actors, which results in inconvenient transfers and the slow development of urban functions. This chapter reveals that interactions between actors are hindered by institutional rules, thereby preventing the integrated development of transport and urban functions.

I found that only the location of HSR station areas is decided jointly by the railway and urban actors. In order to reach an agreement, railway and urban actors created informal payoff rules to compensate for each other's losses. Regarding the transport interchange function, the railway actors are only responsible for the railway services within the station, while all other transport methods are the responsibility of the urban actors. Institutional rules prevent actors from cooperating and lead to transfer problems in many HSR station areas in China. The approval of metro development is more complex, so the opening of the metro is always later than the opening of HSR. The traffic brought by HSR puts enormous pressure on the poor road network around the stations, leading to severe congestion. Furthermore, due to fragmented land ownership, actors are not able to plan commercial functions as a whole. Commercial development within stations is the responsibility of the railway actors, while commercial development around stations is the responsibility of urban actors. Likewise, the public space of the stations is also divided according to land ownership for management. Last but not least, due to institutional rules and the lack of governance capacity of local government, neither the HSR actors nor the metro company in charge of station area development are able to capture the land value increase of the surrounding area. Fragmented land ownership not only poses challenges for collective action by actors but also hinders the integrated development of transportation and land use in the area. This provides an explanation for the slow development of urban functions in HSR station areas in less economically developed regions of China.

Based on Ostrom's institutional analysis and development framework, I also found that the Chinese national government has not enacted specific rules for the development of HSR station areas, although it wants to promote the integrated development of HSR station areas. As a result, urban actors can only explore how to develop HSR station areas by learning from the experiences of other cities. The

complexity of HSR station areas has led to urban actors not knowing which rules are applicable, shifting responsibilities between bureaus and slowing approval processes. This also hinders the development of urban transport and urban functions in HSR station areas. Moreover, both market actors and citizens are excluded from the decision-making process by these rules, which also leads to difficulties in the subsequent development of urban functions. Furthermore, although actors have tried to capture the value increase of surrounding land, railway actors and urban actors have not been successful due to a lack of appropriate policies and rules. The ability to value capture requires the strong governance capacity of local governments. Local governments need to bring actors together to create a collaborative organization that can compensate for fragmented land ownership and make joint decisions to promote integrated transportation and land use development in HSR station areas.

6.3 Reflections on the Research Outcomes and Policy Recommendations

The main aim of this PhD research is presented in Chapter 1:

To understand the causes of difficulties in developing Chinese HSR station areas through gaining insights into the actors, decision-making processes and institutional context, and to provide strategies for cooperation of actors and supporting policies to achieve integration of transport and land use in Chinese HSR station areas.

To achieve the research aim, a conceptual framework is proposed in Chapter 1, which illustrates three dimensions that need to be focused on for the exploration. The first dimension is the spatial planning to achieve integrated transport and land use development in the HSR station areas. The second dimension is the decision-making process that led to the integrated development. To further understand the motivations and mechanisms, the third dimension investigates the institutional context for the integrated development in station areas. On the first dimension, Chapter 2 examined the master plans of HSR station areas in China. Based on the results, Chapters 3 and 5 unravel the decision-making process of the location choice and development of HSR station areas. On the third dimension, Chapter 4 explored the Chinese institutional context and its effects on the HSR station area development.

In this section, I reflect on the research findings and present some suggestions based on the three dimensions.

6.3.1 Reflections and Recommendations for Station Areas

In the interviews, when actors were asked who the HSR station area was built for, most of them responded that it was for the "people." This "people" refers to the macro "public interest" of promoting economic development in China rather than the specific people who use the station area. The previous four chapters demonstrate that the planning and design of the HSR station area is led by the central and local governments to promote infrastructure development and urbanization. This traditional line-oriented planning strategy is designed to control and reduce the negative impacts of infrastructure on urban areas. As discussed in Section 1.2.1, this planning strategy results in the positive effects of infrastructure development tending to occur at the national and regional levels, enhancing overall economic performance. However, the negative impacts of infrastructure, such as noise and barrier effects, are mainly borne by cities and station areas. Therefore, the transport line-oriented planning strategy inevitably leads to a conflict between national and local interests (Heeres, 2017).

To overcome this problem, the planning of Chinese HSR station areas should shift to an area-oriented planning strategy that integrates transportation and land use planning, pays more attention to the spatial quality of station areas, and balances transport and urban functions. As discussed in Chapter 2, TOD theory is more often used to guide the design of subway station areas, and the applicability of planning for HSR station areas still lacks discussion. If local governments and planners in China continue to claim that HSR station areas are planned according to the TOD concept (HSR-TOD), there is a need for specific, applicable planning criteria for HSR station areas. The most important thing is to follow the TOD theory, which emphasizes planning the station area on a human scale and for "real people." The national government should have detailed standards for station area size, transferring, mixed-use, street scale, etc. It is important to note that there should be different design standards for megacities, large cities, and small and medium-sized cities. *Opinions on Improving the Rational Development and Construction of the Areas Surrounding HSR Stations* only presents preliminary rough criteria. Local governments and planners should design complementary policies and provide funding to support the development of TOD in HSR station areas and select appropriate scales and functions according to local conditions. In addition, through TOD planning, attention should also be paid to capturing land value increase from the

combined improvement of accessibility and station area quality, i.e., value capture. As TOD in Hong Kong shows, these funds can be used to subsidize the operation of public transportation such as HSR and subways (Cervero & Murakami, 2009). Value capture requires not only design at the planning level but also a collaborative decision-making process, which is discussed in the next section.

6.3.2 Reflections and Recommendations for the Decision-Making Process

Chapters 3 and 5 focus on the planning process of HSR station areas. The coordination between actors is characterized by a large number of horizontal and vertical governance fragmentations. During the planning process, actors can only achieve limited goals based on their own resources, with no room for learning about common interests and creating new opportunities. As a result, it is difficult for transport and urban actors to achieve value capture and integrate transport and land use in the station area. Furthermore, the decision-making process lacks the participation of market actors and the public.

The vertical governance of HSR station areas requires the cooperation of the national government, the CR, provincial governments, and local governments, while the horizontal governance requires the cooperation of multiple sections and jurisdictions such as the urban and rural planning bureau, the land resources bureau, the transportation bureau, the public security bureau, etc. The institutional reform in 2018 established the Ministry of Natural Resources to integrate urban and rural planning and land resources management, which to a certain extent has promoted policy integration. However, many HSR station areas were planned before this reform, and only the local planning bureau could participate in the decision-making process of HSR station areas. It results in many governance fragmentation problems in the construction and operation phases.

One solution to the governance fragmentation is to establish a cross-sectoral and cross-jurisdictional coalition responsible for the planning and operation of the HSR station area at a local level, much like the proposal of Dai (2015). Unlike her proposal to delegate authority to local actors below the municipal level, i.e., district governments, I suggest that this coalition must be established and led by the local government. District governments do not have sufficient governance capacity and resources to unite the various sectors and develop the HSR station area, especially in small and medium-sized cities. Cooperative coalitions also require the support of the Chinese national government, which can provide a framework for the cooperation through the publication of HSR station area planning guidelines (Stead & Meijers, 2009). The cooperative coalition should include the local branches of CR, the provincial government, actors at similar administrative levels in local government but from different sectors, market actors, and public representatives.

This cooperative coalition creates opportunities for transportation and urban actors to learn about common interests and also provides an arena for negotiations, creating the possibility of win-win situations. Actors in the coalition can discuss the integration level at each planning phase and for each function rather than being completely separated after the location choice. Actors can break down barriers of information exchange, make decisions together, reduce fragmentation in the decision-making process, and speed up the approval process, thus facilitating the integration of urban and transportation functions. The coalition can also provide a room for market actors and the public to express their opinions. Furthermore, the cooperative coalition can integrate land development rights from segmented land ownership. It can use the value capture strategy to develop the station area as a whole and finance unprofitable development. By granting the actors shares in the development of the station area, the actors gain real benefits from the integration of transport and land use. The benefits may give actors a strong incentive to participate in the planning coalition and improve the urban quality of the station area. Moreover, the cooperative coalition responsible for the development of the HSR station area can ensure policy consistency and support from local governments. This will be explained in detail in the next section.

6.3.3 Reflections and Recommendations for Institutional Context

This PhD study demonstrates that the development of HSR station areas in China is strongly influenced by the Chinese institutional context. The planning and development of HSR station areas are led by the state and used as a strategy of state entrepreneurialism. Due to the institutions, market actors are unable to participate in the decision-making process of HSR station areas. Although the national government has announced the *Opinions of the State Council on Reforming the Railway Investment and Financing System and Accelerating Railway Construction* and the *Guiding Opinions of the State Council on Innovation in Investment and Financing Mechanisms in Key Fields to Encourage Social Investment* to attract market actors to invest in railway construction, no supporting policies have been introduced to show the entry method for market actors. The participation of market actors can provide funds for the construction of HSR and reduce the debts of local governments. Meanwhile, the HSR station area in China is usually developed by the local government financing vehicle, which is not a real market actor, so it often faces problems in operation, such as failure to attract companies and commercial investment and slow development of urban functions. Market actors can provide suggestions on how the HSR station area can attract business and investment during the decision-making process.

Furthermore, the promotion of Chinese local officials is based on economic performance. GDP-ism is most easily and quickly achieved through large urban projects. As a result, each mayor is motivated to plan urban mega-projects to be his or her political achievement. Each successive local leader redraws the focus area for urban development, but the economic, environmental and social base of most cities is not sufficient to support the development of several centers at the same time. Many actors expressed their worries in the interviews that the HSR station area is planned as a new center, but once the leadership changes, the urban development focus and resources will shift to other new areas. The continuity and consistency of supporting policies are critical to the successful development of HSR station areas (Facchinetti-Mannone, 2019; Loukaitou-Sideris & Peters, 2020). Many HSR station areas in China have lost the support of local governments after a few years, leading to the development predicament. Cooperative coalitions can help with maintaining policy continuity for the development of HSR station areas because of the involvement of multiple levels of government and various departments. A better solution to this problem requires a change in the performance appraisal system for officials. The central government needs to build a diversified and comprehensive evaluation system that meets the current needs of society and the current situation of the government.

Moreover, Chinese local governments should be restricted from using mega-infrastructure to convert large amounts of agricultural land into urban land. Land finance (*tudi caizheng*) creates significant negative impacts, including high real estate prices, the capital decline in the real economy, and the continued increase of local government debt financing. The real estate market in many small and medium-sized cities supplies more houses than demand, but local governments still use HSR projects for urban expansion and land revenue. The central government needs to improve land-related institutions and policies to help local governments get rid of their excessive dependence on land finance. The "two-centralized" land leasing policy, which means centralizing the announcement of land leasing and centralizing the land leasing activities, has been implemented in 22 cities since 2021. The purpose of this policy is to increase the transparency of land leasing and stabilize the expectations of real estate companies for the future land market. The central government has somehow taken back land management rights in disguise. However, whether the policy can achieve the expected effect still needs to be further tested. Furthermore, local governments should (re)utilize the existing urban construction land and optimize the industrial, residential, and commercial land use structures. In addition, the development of rental housing is necessary. Local governments should explore how to use collective construction land for rental housing construction, and they should increase the land supply for rental housing construction. Moreover, a deeper reform in the tax sharing system is also recommended to gradually increase the proportion of local fiscal revenues to total local revenues and decrease the proportion of transfers to the national government.

6.4 Contributions

6.4.1 Contribution to Knowledge

As shown in the previous chapters, most studies focus on the economic and environmental impacts of Chinese HSR and describe the problems of HSR station areas. Few studies, however, explore the decision-making process and planning of HSR station areas. Meanwhile, most of these studies are quantitative, and qualitative studies on HSR are rare, with a small number of studies focusing on megacities in China such as Shanghai and Wuhan. The reasons for the planning and development dilemmas of most HSR station areas have not been revealed. The way to promote the integration of transport and land use in HSR station areas through the cooperation of actors in the decision-making process and supportive policies has also not been explored. Therefore, the focus of this PhD study is to systematically discuss the decision-making process of HSR station areas in China by comparing HSR station areas in cities of different sizes and levels of development. The purpose is not only to better understand the current decision-making system but also to provide a set of strategies to address the identified problems and to facilitate the integration of transportation and land use in Chinese HSR station areas.

The planning of HSR station areas in China differs markedly from that of Europe and Japan, while the institutional context is also quite different. Thus, it is difficult to make international comparisons of planning and development experiences of HSR station areas. This study provides an in-depth analysis of the institutional context and planning process of HSR station areas in China, which provides a basis for international comparative studies. Furthermore, this study sheds light on how central and local governments bargain in the infrastructure planning process and also describes the role of formal and informal rules. It provides new insights into the practical workings of China's massive bureaucracy, showing how bureaucratic negotiation and state entrepreneurialism play a role in infrastructure development.

In addition, this research establishes a theoretical framework. Although the data for this study is primarily from China, the methodology can be applied in the context of other countries. It adds new knowledge to the exploration of the planning, decision-making process, and institutional context of urban mega-projects. This study also applies Policy Network Theory and Ostrom's Institutional Analysis and Development Framework to China, demonstrating the applicability of these theories in studies with a Chinese context.

6.4.2 Contribution to Society and Practice

This study contributes to the integration of transportation and land use in Chinese HSR station areas and the realization of their economic, social, and environmental benefits. It compares international good design experiences in literature with the planning of Chinese HSR station areas to identify the gaps and demonstrate design flaws. These experiences are not only important for the HSR station areas under planning but also for the upgrading of existing HSR station areas. Furthermore, this study unravels the decision-making process for HSR station areas, which provides an opportunity for actors to understand the goals, interests, and behaviors of other actors, thus speeding up the decision-making process, reducing impasse, and providing conditions for successful HSR station area development. This study provides an in-depth analysis of the impact of institutions on the planning and development of HSR station areas and suggests strategies to address problems. This provides sustainable strategies and policies to develop mega-infrastructure for the Chinese government. By adopting these strategies, the central government may be able to mitigate the growing HSR debt, while local governments can mitigate the increase in local debt.

In addition, the findings of this study are mainly related to the planning of mega-infrastructure projects, so they can also be applied to similar planning fields, such as subways and highways. The planning process of these projects is also full of complexity and uncertainty since many actors with different interests are involved. There is also a game between very strong and weaker interests in the planning process, or between fast and slow planning and development speed. Moreover, an in-depth study of the planning process of Chinese HSR station areas provides valuable lessons for other countries that are building HSR or considering building HSR, such as Southeast Asian countries, HS2 in the UK, and the US.

6.5 Limitations and Agenda for Future Research

6.5.1 Reflections on Methods and Data

The focus of this thesis is to explore the decision-making process in Chinese HSR station areas, involving many actors, mostly government agencies. It is based on in-depth interviews with actors in three cases: Shenzhen, Lanzhou and Yongcheng. The three cases were chosen because they represent cities of different sizes and statuses in China, and because the chronology of HSR station planning varies, providing a comprehensive picture of HSR station area development in China. However, at the start of this PhD study, more cases were investigated. The data collection process encountered many difficulties, and ultimately, these three cases yielded the most robust and well-developed data. There were cases in which only interviews and planning documents from railway actors were collected, and there were no resources to reach urban actors to triangulate the data, so they had to be abandoned. Furthermore, the HSR station area project usually takes 10 years from the beginning of planning to its final completion, so there were cases where the relevant decision makers had moved out of their positions and could not be reached. In addition, some actors refused to be interviewed because they believed that the information related to HSR involved national secrets. Many government officials were cautious about the interviews, giving only relatively positive but vague comments. They are also concerned about any form that requires their signature, believing it would be detrimental to them. Informed consent forms commonly used in European studies are not as applicable in Chinese studies and may also lead interviewees to refuse interviews. Moreover, the railway system in China remains relatively closed and independent, making it difficult for people outside the system to reach the actors involved. This study was supported by some of the interviewees' acquaintances when conducting in-depth interviews. This is important because it builds mutual trust between the interviewer and the interviewee, which is necessary for the interviews to reach a certain depth. Finally, the master plan of HSR station areas used in Chapter 2 is not public data in China and is also difficult to obtain.

Overall, studying the decision-making process of mega-infrastructure in China through qualitative methods is difficult but rewarding work. Case studies can provide an in-depth analysis that quantitative research cannot. Using qualitative methods

allows researchers to consider the specific institutional and organizational context of the case (Flyvbjerg, 2006). This study explores the cases using scientific insights. Only through qualitative research can the interdependencies and interactions between actors be understood, as well as the institutional barriers to integrating transportation and land use and strategies to facilitate integration.

6.5.2 Limitations and Agenda for Future Research

Qualitative research has the advantage of allowing in-depth study. Due to time and financial constraints, only a small number of cases can be studied. This research has tried to select representative cases, but it is still not possible to represent the experiences of all Chinese HSR station areas. Therefore, it is recommended that future studies explore more Chinese cases based on the conceptual framework to provide comparisons. It is suggested that they especially focus on economically underdeveloped small and medium-sized cities and successfully developed station areas. Furthermore, because this study provides the institutional and organizational context of HSR station area planning in China, a comparison of international HSR station area planning processes becomes possible. It is suggested that future studies could compare the international planning experiences, especially those from Europe, Japan, and China.

This study recommends that the Chinese national government issue detailed guidelines for the planning of HSR station areas. The specific content and the planning indicators corresponding to different cities are beyond the scope of this study and require further research. As discussed earlier, the Chinese government is attempting to integrate urban and rural development planning and land use planning, and it would be interesting to explore the possibility of integrating railway planning and urban planning policies. Such an investigation could pave the way for successful value capture of HSR station areas to reduce HSR debt and local debt.

As this study shows, the development of HSR in China has had a huge impact on both urban and rural areas, but there has been relatively little attention paid to social issues such as the resettlement of farmers and the transport disadvantage of low-income groups. There is a lack of research to in-depth analyze the social equity issues brought about by HSR, the series of problems in transforming rural areas into urban areas, and the employment issues of farmers who have lost their land. It is recommended that future studies explore these social issues brought about by HSR development. A longitudinal study is suggested to compare the impact of the HSR before and after its opening over the past decade.

In conclusion, the construction of HSR in China started late, but it is connecting all important cities in China at a rapid pace. This brings great opportunities and challenges to the urban development of Chinese cities. Both international and Chinese experiences show that the impact of HSR is not definitive and is related to many factors such as city economic base, station location, institutional context, local officials, development strategies, and supporting policies. This study explores these factors and identifies the reasons that hinder the development of HSR station areas. It demonstrates the need for policy and institutional innovation to achieve cross-agency cooperation and integration of transportation and land use. Objectives of these innovations and policies should go beyond short-term growth to promote long-term sustainable development and maximize societal, environmental and economic benefits.

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Appendices

APPENDIX A

Chapter 2

TABLE APP.A.1 Summary of the hierarchy of nodes

Name	Sources	References
Total	15	1303
Context and Governance	15	177
City area	14	33
GDP	12	21
Population	11	17
Visions	15	106
City gateway & landmark	6	18
Commercial and business center	8	19
Integrated transport hub	9	11
New city center or sub-center	5	16
New town	9	24
Provide service for region and urban clusters	5	15
Tourism and travel-related services center	3	3
Transport and Interchange	15	458
Connected HSR lines	15	27
Distance to city center	15	28
Passenger number	15	28
Pedestrian priority	5	9
Pedestrian-vehicle separation	8	13
Planning of local transport methods	15	165
BRTs and Bus	14	39
Metro	11	21
Parking	13	29
Private car	12	21
Taxis	12	20
Walking and Cycling	11	32
Public transport priority	9	14
Road network	15	103
Road system	15	81
Road width	10	22
Seamless transfer	11	39

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TABLE APP.A.1 Summary of the hierarchy of nodes

Name	Sources	References
Station level	15	17
Traffic volume of different methods	7	15
Land Use Planning	15	668
Architecture aesthetics	15	100
Design of public space	14	76
Floor area ratio	14	47
Land use before development	14	57
Cultivated land, Woodland and fishpond	11	35
Industrial and warehousing land	7	10
Residential land	6	12
Land use percentage	15	34
Land use types	15	297
Business and financial functions	15	72
Commercial function	15	67
Green area	13	46
Residential function	13	48
Squares and parking	11	29
Tourism function	9	31
Mix of housing types	9	19
New residential housing development	9	13
Resettlement of farmers	3	5
Station area	15	38

TABLE APP.A.2 Matrix of nodes and the 15 master plans

	Hang zhou East	Nan jing South	Shanghai Hongqiao	Guang zhou South	Shenzhen North	Luo yang Longmen	Fo shan West	Chang zhou North	Hu zhou	Bengbu North	Jin jiang	Xin yu North	Fu yang	Tonglu	Hai ning West
1 : Total	96	90	71	72	50	136	53	74	65	65	65	106	49	63	25
2 : Context and Governance	17	21	11	5	5	21	8	12	16	9	5	10	7	10	4
3 : City area	2	4	0	1	1	3	2	2	5	3	1	1	3	2	3
4 : GDP	1	1	0	0	1	3	2	4	2	2	1	0	1	2	1
5 : Population	4	2	0	0	1	1	1	2	1	1	1	0	1	2	0
6 : Visions	10	14	11	4	3	14	4	7	8	5	2	9	3	4	1
7 : City gateway & landmark	0	0	0	0	0	1	3	5	0	2	0	5	0	2	0
8 : Commercial and business center	0	7	3	1	1	0	0	0	2	1	0	3	0	0	1
9 : Integrated transport hub	0	1	1	0	1	1	0	2	2	0	1	0	1	0	1
10 : New city center or sub-center	4	3	3	0	3	0	0	0	3	0	0	0	0	0	0
11 : New town	3	0	0	1	0	9	1	0	0	4	1	2	2	1	0
12 : Provide service for region and urban clusters	3	3	4	2	0	3	0	0	0	0	0	0	0	0	0
13 : Tourism and travel-related services center	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0
14 : Land Use Planning	51	40	29	47	31	73	29	32	20	35	46	72	21	27	19
15 : Architecture aesthetics	10	3	2	6	7	15	1	3	2	7	6	23	6	2	7
16 : Design of public space	8	2	5	15	2	14	0	3	2	6	4	6	6	2	1
17 : Floor area ratio	2	3	4	3	4	5	2	3	0	2	8	7	1	2	1
18 : Land use before development	1	2	0	3	2	3	3	2	5	3	8	2	1	8	3
19 : Cultivated land, Woodland and fishpond	1	1	0	3	2	3	2	2	5	0	7	2	0	7	0
20 : Industrial and warehousing land	0	1	0	0	0	0	2	1	0	1	0	0	1	1	3
21 : Residential land	0	1	0	0	2	0	0	0	0	3	2	0	0	2	2
22 : Land use percentage	3	3	2	2	1	2	5	2	2	4	1	1	1	2	3
23 : Land use types	29	25	13	27	15	30	13	20	7	11	16	31	5	11	5
24 : Business and financial functions	5	8	5	4	6	9	2	4	3	2	5	11	4	3	1
25 : Commercial function	9	7	5	8	4	5	3	7	2	1	2	9	1	1	3
26 : Green area	6	2	2	3	3	6	3	4	0	4	4	4	0	2	3
27 : Residential function	1	6	0	5	0	4	4	6	1	5	5	2	2	3	4
28 : Squares and parking	6	0	2	3	4	1	2	1	0	3	2	4	0	0	1
29 : Tourism function	4	4	2	2	0	11	0	1	1	0	0	3	0	3	0

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TABLE APP.A.2 Matrix of nodes and the 15 master plans

	Hang zhou East	Nan jing South	Shanghai Hongqiao	Guang zhou South	Shenzhen North	Luo yang Longmen	Fo shan West	Chang zhou North	Hu zhou	Bengbu North	Jin jiang	Xin yu North	Fu yang	Tonglu	Hai ning West
30 : Mix of housing types	0	3	0	1	0	2	1	2	0	1	5	0	1	0	2
31 : New residential housing development	0	2	0	1	0	2	1	2	0	1	2	0	1	0	1
32 : Resettlement of farmers	0	1	0	0	0	0	0	0	0	0	3	0	0	0	1
33 : Station area	3	3	3	2	2	2	4	1	2	2	2	2	3	3	4
34 : Transport and Interchange	32	29	36	21	17	43	16	32	29	21	16	27	22	27	12
35 : Connected HSR lines	1	3	1	1	2	4	2	2	1	1	1	1	2	2	3
36 : Distance to city center	2	1	2	1	1	1	2	3	1	2	1	1	3	4	3
37 : Passenger number	2	2	2	1	1	4	1	4	1	1	1	1	1	2	4
38 : Pedestrian priority	0	0	1	2	0	1	0	0	0	0	0	4	0	1	0
39 : Pedestrian-vehicle separation	0	0	1	3	1	2	0	0	1	2	0	2	0	1	0
40 : Planning of local transport methods	22	13	10	11	10	15	6	6	5	7	7	9	6	7	1
41 : BRTs and Bus	6	6	2	2	2	2	1	2	1	3	3	3	2	4	0
42 : Metro	1	2	3	1	2	4	2	1	0	3	1	0	1	0	0
43 : Parking	8	2	2	2	2	4	2	1	1	1	1	0	2	0	1
44 : Private car	4	2	1	0	1	1	1	1	2	0	1	2	2	3	0
45 : Taxis	3	1	1	1	1	3	0	1	2	0	1	3	1	2	0
46 : Walking and Cycling	6	1	2	3	5	4	0	3	0	1	0	3	1	3	0
47 : Public transport priority	1	2	0	1	0	3	0	2	1	0	1	2	0	1	0
48 : Road network	5	5	8	3	4	5	2	8	15	9	9	7	5	8	7
49 : Road system	4	5	6	2	4	4	2	7	15	7	6	3	2	7	7
50 : Road width	1	0	2	2	0	1	0	1	0	2	3	5	3	2	0
51 : Seamless transfer	2	1	10	0	0	6	1	6	2	0	0	1	7	2	1
52 : Station level	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
53 : Traffic volume of different methods	0	2	1	0	0	2	2	4	3	0	0	0	0	0	1

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APPENDIX B

Chapter 3

TABLE APP.B.1 Interviewees list for location choice

Interviewee No.	Position	Organisation	Interviewed Cases
1	Director of Railway Yard Department	China Railway Company	Shenzhen, Lanzhou, Yongcheng
2	Chief Engineer	China Railway Fourth Survey and Design Group	Shenzhen, Yongcheng
3	Director of Railway Yard Department	China Railway Fourth Survey and Design Group	Shenzhen, Yongcheng
4	Director of Transport and Economic Department	China Railway Fourth Survey and Design Group	Shenzhen, Yongcheng
5	Director of Architecture Department	China Railway Fourth Survey and Design Group	Shenzhen, Yongcheng
6	Chief Engineer of Lanzhou Branch	China Railway First Survey and Design Group	Lanzhou
7	Deputy Manager of Comprehensive Development Department	Lanzhou Metro Company- Metro Real Estate Co., Ltd. [1]	Lanzhou
8	Chief Engineer of Lanzhou Branch	China Railway Company	Lanzhou
9	Manager of Lanzhou Railway Stations	China Railway Company	Lanzhou
10	Senior Planner	Tongji Architectural Design Co., L[td.] 2	Lanzhou
11	Senior Planner	Lanzhou Urban-Rural Planning Bureau	Lanzhou
12	Director of Railway Office	Yongcheng Development and Reform Commission	Yongcheng
13	Manager of Passenger Management Branch	Yongcheng Transport Bureau	Yongcheng
14	Director	Yongcheng Urban Planning Bureau	Yongcheng
15	Director	Yongcheng Housing Construction Committee Construction and Management Centre	Yongcheng
16	Deputy Director of Zhanghe New District	Yongcheng Local Government Zhanghe New District Branch	Yongcheng
17	Director of Infrastructure Construction	Yongcheng Local Government Zhanghe New District Branch	Yongcheng
18	Director	Yongcheng Land Resource Bureau	Yongcheng

1 *Lanzhou Metro company was entrusted by the Lanzhou municipal government to provide fund, construct and develop the HSR station area.*

2 *Tongji Architectural Design Co.,Ltd. was entrusted by Lanzhou municipal government to plan the Lanzhou West HSR station, transport system and station area.*

APPENDIX C

Chapter 4

TABLE APP.C.1 Interviewees list for Yongcheng HSR New Town

Interviewee No.	Position	Organization
1	Researcher of Comprehensive Transport Institute	National Development and Reform Commission
2	Director of Railway Yard Department	China Railway
3	Chief Engineer	China Railway Fourth Survey and Design Group
4	Director of Railway Yard Department	China Railway Fourth Survey and Design Group
5	Director of Transport and Economic Department	China Railway Fourth Survey and Design Group
6	Director of Architecture Department	China Railway Fourth Survey and Design Group
7	Director of Railway Office	Yongcheng Development and Reform Commission
8	Manager of Passenger Management Branch	Yongcheng Transport Bureau
9	Director	Yongcheng Urban Planning Bureau
10	Director	Yongcheng Housing Construction Committee Construction and Management Center
11	Deputy director of Administrative new district	Yongcheng Local Government Administrative New District Branch
12	Director of Infrastructure Construction	Yongcheng Local Government Administrative New District Branch
13	Director	Yongcheng Land Resource Bureau
14	Vice Head	Yongcheng Planning and Design Institute
15	Officer	Yongcheng Planning and Design Institute
16	Officer in Technical Section	Yongcheng Planning and Design Institute
17	Vice Head	Yongcheng Land Investment and Development Company
18	Director	Yongcheng Bus Company
19	Officer	Yongcheng Traffic Police
Meeting	Officer	Meeting with Urban Planning Bureau
Workshop	Experts from Mainland China, Hong Kong and the Netherlands	Experts Workshop

APPENDIX D

Chapter 5

TABLE APP.D.1 Key documents analyzed for the Lanzhou West HSR station area

Code	Issue year	Documents
D1	1991	Railway Law of the People's Republic of China (Revised)
D2	2004	Land Management Law of the People's Republic of China
D3	2007	Property Law of the People's Republic of China
D4	2007	Provisions on the Assignment of State-owned Construction Land Use Right through Bid Invitation, Auction and Quotation (2007 Revision)
D5	2011	Opinions of Gansu Provincial Government on Supporting State-owned and Province-owned Enterprises and Industries in Lanzhou Urban Area to Expand to New Area
D6	2013	Implementation Plan for the Relocation and Transformation of Lanzhou Enterprises from the Urban Area to the Industrial Park in New Area
D7	2013	Opinions of the State Council on Reforming the Railway Investment and Financing System and Accelerating the Railway Construction No.33
D8	2014	Opinions of the General Office of the State Council on Executing Comprehensive Development of Land to Support Railway Construction
D9	2014	Guiding Opinions of the State Council on Innovation of Investment and Financing Mechanisms in Key Fields to Encourage Social Investment
D10	2014	The Promotion of Integrated Railway Land Development in Lanzhou Report
D11	2015	Master Plan of Lanzhou (2011-2020)
D12	2015	Lanzhou West HSR Station Urban Support Phase II Project Feasibility Study
D13	2016	Detailed Control Plan of Lanzhou
D14	2016	Mid- and Long-Term Railway Network Plan
D15	2017	General Layout Planning of Lanzhou Railway Nodes (Revised)
D16	2018	Opinions on Improving the Rational Development and Construction of the Areas Surrounding HSR Stations
D17	2018	Lanzhou Urban Area Road Microcirculation Planning
D18	2019	Planning and Construction of Lanzhou West HSR Station Comprehensive Transportation Hub Project
D19	2019	Implementing Opinions on Promoting the Lanzhou HSR Economic Development
D20	2020	Statistical Communique of National Economic and Social Development of Lanzhou in 2019

TABLE APP.D.2 Interviewees List

No.	Position	Organizations
Interviewee 1	Senior officer	China Railway
Interviewee 2	Senior engineer	China Railway Lanzhou Branch
Interviewee 3	Senior officer	China Railway Lanzhou Branch Railway Land Development Department
Interviewee 4	Senior engineer	China Railway First Survey and Design Group
Interviewee 5	Senior officer	China Railway Lanzhou Branch Lanzhou Railway Stations
Interviewee 6	Deputy manager	Lanzhou Rail Transit Company
Interviewee 7	Senior Planner	Tongji Architectural Design Co., Ltd.
Interviewee 8	Senior Planner	Lanzhou Urban-Rural Planning Bureau
Interviewee 9	Manager	Lanshi Group

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Curriculum Vitæ

Biyue Wang was born in 1991 in Gansu, China. She received her B.A. (Hons.) in Urban Regeneration and Planning from the University of Liverpool, UK in July 2013. Her Master of Research (MRes.) in Inter-disciplinary Urban Design was awarded by The Bartlett, University College London, UK in November 2014. During that time, she found her special interest in the relationship between transport and land use. She started her PhD research at the Department of Management in the Built Environment, Faculty of Architecture and the Built Environment, Delft University of Technology, in November 2017 with a grant from the China Scholarship Council. In her PhD research, she focused on the integrated development of high-speed railway stations and urban areas through better planning processes in China. She analyzed questions of the decision-making process, actors, institutions, and planning in the urban environment and transport infrastructures. Research methods used are especially of a qualitative nature, including interviews, focus groups, and content and discourse analysis. During her PhD, she published several journal papers and presented at international conferences.

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List of Publications

Published articles contained in this dissertation

Biyue Wang, Martin de Jong, Ellen Van Bueren, Aksel Ersoy & Yawei Chen (2021): Unravelling Decision-Making Processes on Location Choices for High-Speed Railway Stations in China: A Comparison of Shenzhen, Lanzhou and Jingmen, *Planning Theory & Practice*, *22*(3), DOI: 10.1080/14649357.2021.1933578.

Biyue Wang, Aksel Ersoy, Ellen Van Bueren & Martin de Jong (2022): Rules for the Governance of Transport and Land use Integration in High-speed Railway Station Areas in China: The Case of Lanzhou, *Urban Policy and Research*, 40(2), DOI:10.1080/08111146.2022.2067843.

Biyue Wang, Martin de Jong, Ellen Van Bueren, Aksel Ersoy, Yun Song (2022): Planning and Developing the High-speed Railway New Town under State Entrepreneurialism in China, *Urban Geography*, Minor Revision.

Biyue Wang, Martin de Jong, Ellen Van Bueren, Aksel Ersoy (2022): Transit-oriented Development in China: A Comparative Content Analysis of the Spatial Plans of High-speed Railway Station Areas, *Planning Theory & Practice*, Under Review.

Other publications

Qiming Zhang, Linda Yin-nor Tjia, **Biyue Wang**, Aksel Ersoy (2021): Sustainable Construction and Financing—Asset-Backed Securitization of Expressway's Usufruct with Redeemable Rights, *Sustainability*, *13*(16), DOI: 10.3390/su13169113.

Yun Song, Martin de Jong, Dominic Stead, Wei Yang, **Biyue Wang** (2022): Dreaming the wrong dream: An exploratory case study of a policy change towards sustainable urban development in a medium-sized Chinese city, *Journal of Urban Affairs*, Vol. ahead-of-print No. ahead-of-print, DOI:10.1080/07352166.2022.2059377.

Yawei Du, Shouren Zhang, **Biyue Wang**, Qing Ye (2021): Research Progress and Practical Application Analysis of Smart Green Campuses, *New Architecture*, 2, 47-53, DOI: 10.12069/j.na.202102047 [In Chinese]

Yun Song and **Biyue Wang** (2023): TOD and HSR Stations: Public Transport and its Contribution to Sustainable Urban Development, in Fangzhu Zhang & Fulong Wu (ed.) *Handbook on China's Urban Environmental Governance,* England: Edward Elgar, Forthcoming.

Conference activities

Presenting participants, panel "SS11 II. High-speed Rail Stations Areas", *Regions in Recovery Global E-Festival*, Online, May 24-June 18, 2021.

Presenting participants, panel "A.3 Migration, densification, and mobility transition", *European Urban Research Association Conference 2021 - Contradictions shaping Urban Futures*, Online, May 6-7, 2021.

Presenting participants, *The 7th International Conference on Transportation and Space-time Economics*, Beijing, October 11-13, 2019.

Presenting participants, panel "Planning for accessibility and sustainable mobilities", *AESOP Annual Conference*, Venice, July 9-13, 2019.

Participants, *Summer School: Integrated Mobility Challenges in Future Metropolitan Areas*, Delft University of Technology and Amsterdam Institute for Advanced Metropolitan Solutions, August 1-28, 2018.

21#17

Integrating High-speed Railway Stations and Urban Areas in China

Actors, Processes and Institutions

Biyue Wang

There is an increasing need for understanding the impacts of institutions on the integrated planning of transport and land use. High-speed railway (HSR) station areas, as nodes in transport networks and mixed-use areas, have become a focus in planning. The fast development of HSR station areas in China causes many problems, such as remote locations, oversized station areas, transfer difficulties, and unsustainable urban development. Facing these problems, this study aims to explore the influences of actors, decision-making processes, and institutions on the planning and development of HSR station areas in China. An analytical framework is built based on Transit-Oriented Development (TOD), Policy Network Theory, Institutional Analysis and Development Framework, and State Entrepreneurialism. Qualitative methods offer an effective way of investigating Chinese governance in the development of HSR station areas, including content analysis, case studies, and interviews. The findings show that HSR station areas are mainly used as a tool to promote urbanization. Both the Chinese national government and local governments have an important role to play in the planning of HSR station areas because they control different resources. Their interactions in the decision-making process, influenced by institutions, determine the location of HSR stations and the size of station areas, and lead to transfer difficulties and slow development of station areas. This dissertation reveals the causes of the development problems of Chinese HSR station areas, demonstrates the drawbacks of the current mechanism, and proposes strategies to promote the integration of transport and land use in China.

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