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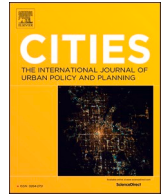
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# Bypassing institutional barriers: New types of transit-oriented development in China

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## ABSTRACT

China is often viewed as an emerging experimental base for transit-oriented development (TOD) practices because of its rapid urban growth and development of mass transit networks. The implementation of TOD can be heavily influenced by institutional barriers to urban growth. However, some newly emerging types of TOD practice allow planners and decision-makers to bypass some of the institutional barriers and achieve a certain degree of integrated development. Current academic literature, however, has little to say on how these informal institutional solutions go around these barriers. This article aims to fill this gap by examining three different types of TOD practice as applied in Guangzhou and Shenzhen. We analysed and compared the origins and effects of abovementioned informal institutional arrangements under entrepreneurial governance. We found that land value capturing can replace the existing governance mode in which local government heavily relies on revenue from land-leasing and realise better integration of transit and land development. We conclude with several suggestions for institutional reform based on these new types of TOD experiments.

## 1. Introduction

The concept transit-oriented development (TOD) is a commonly used planning tool that focuses on forming effective integration of land use and transit systems (Banister, 2008; Suzuki, Cervero, & Iuchi, 2013). Through advocating the integration of various high density and diversity urban developments around public transport nodes, it offers a possible path towards sustainable urban environment with improved accessibility and mobility, pedestrian and cycling friendliness and a high degree of human interaction (Bertolini & Spit, 1998; Cervero, 1998, 2004; Curtis, Renne, & Bertolini, 2009a, 2009b; Dittmar & Ohland, 2004). Although the same basic philosophy underlies TOD in all contexts, current studies show that its applications may vary significantly after policy transfer and implementation in different institutional environments. In its birthplace the United States, TOD is focused on dealing with the crisis of suburban sprawl by re-centring development around transit stations (Cervero, 1998, 2004). In Europe, the focus seems to shift more to the redevelopment of station areas (Bertolini & Spit, 1998). In South America, it is all about reconnecting already dense urban areas (Lindau,

Hidalgo, & Facchini, 2010). In Asia, TOD seems to be used in managing mega-city growth with transit corridors (Yang & Lew, 2009). Context-based TOD studies help policymakers, urban and transport planners to better understand the relationships between TOD and their local urban problems between station types, morphological and functional characteristics, and to develop more targeted strategies (Lyu, Bertolini, & Pfeffer, 2016).

Given the rapid urban growth and development of mass transit networks in China, TOD has gained popularity as a sustainable concept to address urban challenges such as urban land scarcity (Suzuki et al., 2013), increasing commuting time (Wang & Chai, 2009), air pollution (Ma, Chen, Li, Ding, & Wang, 2018), and unequal spatial accessibility (Cervero & Day, 2008). Many have argued that TOD has great potential in China as it has positive effects on land value and floor area ratio around station areas (Yang, Chen, Le, & Zhang, 2016; Yang, Quan, Yan, & He, 2016), nearby firms and businesses (Yao & Hu, 2020), and urban life and social equity (Liang, Du, Wang, & Xu, 2020). However, there is a lot of doubt in the current literature as regards the authenticity and genuineness of TOD in China. Doulet, Delpirou, and Delaunay (2017)

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claim that Chinese cities are not “real” TOD cities in the formal sense for lacking a structural effects of transit networks on urban development. Cervero and Day (2008) state that in China there has been a disconnect between transit investments and urban development. Wang, Samsura, and van der Krabben (2019) further identify three main institutional barriers in developing TOD in China: (1) unsupportive planning regulations; (2) limited financial instruments; and (3) inefficient governance. Moreover, there is also criticism of the pragmatic pro-growth nature of China’s existing urban development mechanisms turning TOD practices into “development-oriented transit (DOT)” serving primarily the promotion of veritable suburban bedroom communities (Cervero & Day, 2008; Cervero & Murakami, 2009; Doulet et al., 2017; Yang, Chen, et al., 2016).

On the other hand, an emerging type of practice in China called ‘rail plus property’ (R + P) has attracted quite a bit of attention in the recent literature (Cervero & Murakami, 2009; Wang et al., 2019; Xue & Fang, 2015; Yang, Zhu, Duan, Zhou, & Ma, 2020). R + P projects appear not only to integrate transit with urban development at the station level, but also serve as alternative funding sources for transit infrastructure and produce affordable social housing at the same time (Yang et al., 2020). Wang et al. (2019) identify various informal strategies used in R + P projects, bypassing the existing institutional barriers, to realise the capturing of land value. R + P seems to evolve into a new type of TOD practice with a more project-based approach. Informal strategies can be also found in another type of practice based on integrated development with regional hub railway stations, also branded as TOD. However, informal institutions can also be the outcome when local authorities are unable formally to regulate urban growth (Kreibich, 2012). Whether these new practices only represent temporary informal ways to secure infrastructure investment from developers, or whether they represent a transition to new types of governance is understudied. Compared to old types of TOD practices constrained by the existing institutional mechanisms prioritising urban growth, the way in which these new types of TOD practices deal with urban growth mechanisms has become important to TOD’s future development in China.

Currently there is little literature analysing the origins and effects of changes in institutional settings of different types of Chinese TOD practices, hence this article aims to fill this knowledge gap. More specifically, it aims to answer the question *how different types of TOD practices with different institutional settings deal with the pre-existing institutional mechanisms underlying urbanization in China*. We thus engage in both theoretical reflection and empirical study. The article is divided into nine sections including this introduction. In Section 2, we construct a theoretical framework to examine TOD practices in China from the perspective of its current institutional context. Section 3 identifies three different types of TOD practices in terms of formal or informal changes of institutional settings. Section 4 demonstrates the methodology used in our empirical study and details three types of TOD related practices. In Sections 5–7, we analyse these three types of TOD related practices. Baiyun new town in Guangzhou as a transit-adjacent development practice is analysed in Section 5; Henggang depot project in Shenzhen as a rail plus property practice is analysed in Section 6; Xintang TOD new town in Guangzhou as a transport hub megaproject is analysed in Section 7. The findings are discussed in Section 8 and final conclusions are presented in Section 9.

## 2. Conceptual framework

Generally speaking, TOD is a concept coined to structure urban growth with mass transit infrastructures at both the regional and local levels (Doulet et al., 2017). The institutional context and mechanisms of urban growth have a significant influence on how the concept of TOD is applied and implemented (Doulet et al., 2017; Wang et al., 2019). As defined by North (1991), institutions are “the rules of the game in a society and include the formal and informal constraints that shape human interactions”. We identify three dimensions of formal institutions

in the process of urban growth that we believe are essential in either facilitating or constraining TOD practices.

First, the land management system is crucial to the integration of transportation and land use. However, land development in China is regarded as a major means of local authorities to generate local revenue, also known as “land finance” (*tudi caizheng*) in Chinese. Thus, it is criticised by Doulet et al. (2017) as lacking “real land-management measures” because land development is guided by priorities relating to attractiveness for investment and economic growth, following short-term value maximisation strategies. On the other hand, land development can also be a financial instrument for developing TOD through land value capture which needs sound land asset management (Medda, 2012). The current literature has shown many international experiences using various instruments to capture land value from transit development, including rail plus property development in Hong Kong (Cervero & Murakami, 2009), land readjustment in Tokyo (Murakami, 2012), and transferable development rights in Sao Paulo (Sandroni, 2010). Thus, the institutional setting for land management in the urban growth process has great influence in either facilitating or constraining TOD practices.

Second, the planning system is also key in realising synergetic transit and land development. Planning regulations that arrange land use type and density determine whether the institutional arrangement encourage the adoption of TOD principles or not. The literature has shown that the current Chinese planning system is in fact unsupportive to TOD practices. For instance, mixed-used land development is not encouraged and hard to realise because different land use types have different leasing terms. There is also a lack of planning regulations and guidance at the national level to encourage and regulate high-density development in transit areas (Wang et al., 2019). Furthermore, urban planning is regarded as a tool in the hands of local authorities to promote urban and economic growth under the philosophy of growth-oriented development (Wu, 2015). Planning methods are criticised as “functionalist approaches favoured by communism” (Cervero & Murakami, 2009) in favour of single-function large blocks (also known as mega-blocks) such as new residential areas (*xiaoqu*), which further reduce the connectivity of the transit system and urban space.

Third, successful TOD also requires robust governance in facilitating and enhancing the cooperation of stakeholders, a mode of governance defined by Williamson (2000) as “an effort to craft order, thereby mitigating conflict and realising mutual gains”. However, the governance of urban growth in Chinese cities is often identified as ‘urban entrepreneurialism’ (Chien, 2013; He & Wu, 2009; Wu, 2015) featuring “the attempt of local governments to capture land value as a driver to fill the gap in public expenditure and desire for political career advancement” (Wu, 2018). Entrepreneurial governance can be understood as an overarching mode of urban governance affecting the land politics of urban growth. The strong motivation of local governments to capture land revenue originated from the tax-sharing reform in the 1990s causing local government to use land development as a major source to generate extra-budgetary revenue to fill the growing gap between local tax income and public expenditure (Zheng, Wang, & Li, 2016). Local leadership of GDP-ism also contributes to entrepreneurial governance due to the criterion of economic performance imposed from a top-down Cadre Appointment System (Li & Zhou, 2005). The over-emphasis of urban and economic growth through entrepreneurial governance potentially hampers TOD practices as it encourages suburbanization based on private cars (Cervero & Day, 2008) and produces ‘transit adjacent development’ (TAD) practices prioritising land revenue (Zhang & Lin, 2011), suggesting it is “physically near transit but lacks functional connectivity” (Hale, 2014; Renne, 2009). Furthermore, TOD is also potentially hampered by “segmented governance” and the “compartmentalisation of public action” (Doulet et al., 2017; Spear, 2006; Zhao & Yang, 2007) such as (1) limited regional cooperation and coordination among various tiers of local government; (2) lacking horizontal coordination between different technical agencies and departments; and (3)

lacking intermodal coordination of different transit networks.

### 3. Typology of TOD applications in terms of different institutional settings

TOD in China is still in its early stages. Without national level guidance, few cities in China adopt TOD principles at the city level as their development strategy (only Shenzhen has adopted TOD principles in its urban master plan as a general development strategy). Local authorities develop their own types of TOD practices which show great diversity in terms of purposes, spatial configurations, scale, and institutional settings. Some types of practices are regarded as more successful than others, especially the emerging type of rail plus property practices that originated from Shenzhen (Wang et al., 2019; Yang et al., 2020). In order to find out how various institutional settings facilitate or constrain the application and implementation of TOD, we identify three different types of TOD practices in terms of the various institutional settings we mentioned above: (1) regular TOD application at ordinary stations, (2) rail plus property practices at depot stations, and (3) TOD application at regional railway stations.

The first type of TOD practice refers to transit station area development projects without special institutional arrangements. This type of TOD practice may vary from scale to scale, but the common characteristic is that they develop under regular institutional settings for urban growth without any specific arrangement to enhance integrated transit and land development. Local governments as key actors follow the strategy of maximising revenue from land-leasing as their mode of entrepreneurial governance. With very limited planning regulations and restrictions on the development of transit areas, and poor coordination between developers and transit providers, transit systems and the surrounding development are separately developed and often poorly connected. Because of the various undesirable outcomes, this type is often criticised as ‘transit-adjacent development’ (TAD) (Wang et al., 2019), or ‘development-oriented transit’ (DOT). As Doulet et al. (2017) stated, “although transit infrastructures have been built to serve new urban projects on the edges of cities, they do not seem to have been in any way designed as vectors to drive and shape urbanization”. Yang and Chen, et al. (2016) further discovered that even in Shenzhen where TOD principles are formally adopted in its general city development strategy, there exist many metro alignments and station placements that deliberately bypass established suburban communities for the benefit of generating revenue from new residential and shopping areas, showing an apparent character of ‘development-orientation’.

The second type of TOD practice refers to the emerging rail plus property (R + P) practices recently in Chinese cities. Taking the R + P practices in Hong Kong (Cervero & Murakami, 2009) as a model, the neighbouring mainland city Shenzhen was the first to develop R + P projects in China (Wang et al., 2019; Xue & Fang, 2015; Yang et al., 2020), and it also became a learning model for surrounding cities such as Guangzhou and Foshan. The development of R + P practices in Shenzhen is based on several innovative but informal institutional arrangements that bypass the existing institutional barriers (Wang et al., 2019). The first group of R + P practices in Shenzhen started from depot station projects, which require far more space than ordinary stations for the purposes for storing and maintaining rolling stock. Due to rising land prices, the metro company is motivated to make optimal use of land from extra development on top of depot stations. The metro company as a key actor in the urban development negotiates with local government for special planning and construction permissions. Wang et al. (2019) describe transit company-led governance as a process of coordination between local government, the transit company and developers. Informal institutional arrangements are established using land as a financial instrument to fund metro infrastructure. In return, the metro company is obliged to construct certain amount of social housing (Xue & Fang, 2015). More specific analysis on how informal arrangements are formed will be presented in the case study below.

The third type of TOD practice refers to the application of TOD in regional hub railway stations. These are much unlike the European TOD practice based on intercity train stations, which are often located in the city centre aiming for redevelopment of station areas (Bertolini & Spit, 1998). Regional railway stations in China are often located far from the city centre to stimulate urban growth through new town development (NDRC, 2018). The TOD concept then is heavily branded in combination with these new town projects, especially by the media, but experts criticised them for deviating from genuine TOD principles, being too far away from the city centre and lacking efficient connections with it, under the occasionally false assumption that land development will appear automatically around station areas (Lu, 2012; Wang et al., 2019). In some recent examples, we observe new attempts to integrate land and station development, especially on the top of stations. Informal institutional applications of regulation of land-leasing can be found in these practices, in which the land use rights above the station area are separated from those on the ground. Thus, local governments are able to lease out the use rights above the station to developers with special regulation and restriction related to station construction, thus achieving a certain degree of mixed-use development through bypassing current institutional barriers. The biggest difference with R + P practices is that local governments as key actors can further arrange the surrounding land development in the station area as a bundle project to attract investment to the transit infrastructure.

### 4. Methodology

Our research is based on a thorough review of the literature, expert interviews and three case studies. In 2017, we conducted 6 in-depth interviews (1–1.5 h) with experts. This included one urban planner from the Guangzhou Urban Planning and Design Institute, with ample experience in R + P development; another urban planner from the Shenzhen Urban Planning and Land Resource Research Centre, who led several R + P projects and general TOD planning in Shenzhen; another urban planner from the Foshan City Planning, Design and Research Institute, who was working on local R + P by learning from Shenzhen experience; one staff from the Guangzhou Metro Group familiar with transit provider arrangements in R + P projects; and two professors from South China University of Technology who study TOD practices and railway station area development. Questions focused on emerging TOD practices and urban growth mechanisms. More details can be found in the Appendix A.

Based on the three types of TOD practices we identified in Section 3, we now select three empirical cases to make an in-depth analysis of each category. The cases we selected are from Guangzhou and Shenzhen because the emerging new type of R + P practices were first developed in Shenzhen, and the integrated railway hub station projects can also be found in these two cities. We selected the Baiyun new town project in Guangzhou with ordinary stations for TOD type 1, the R + P project on Henggang depot station in Shenzhen for TOD type 2, and the Xintang TOD new town project of the Guangzhou East transport hub station for TOD type 3. It is not surprising that we find these different types of TOD practices around different types of stations (ordinary, depot and hub): different spatial configurations for different types of stations with differential potential for development are the key reason why the main actors in these projects seek to experiment with informal changes to the current institutional setting and make full use of them.

To further illustrate the difference in spatial configurations, we provide a map of a major part of Guangzhou’s metro system. Fig. 1 shows that most hub and depot stations are located in suburban areas and the urban periphery, except for a few major rail stations in the urban centre. Hub stations do not only function as transport centres integrating metro and other railway systems but also as district or regional level service centres. It is likely these stations operate as cores of new town projects that require a higher level of integration. On the other hand, depot stations are often located at the end of a metro line, or in

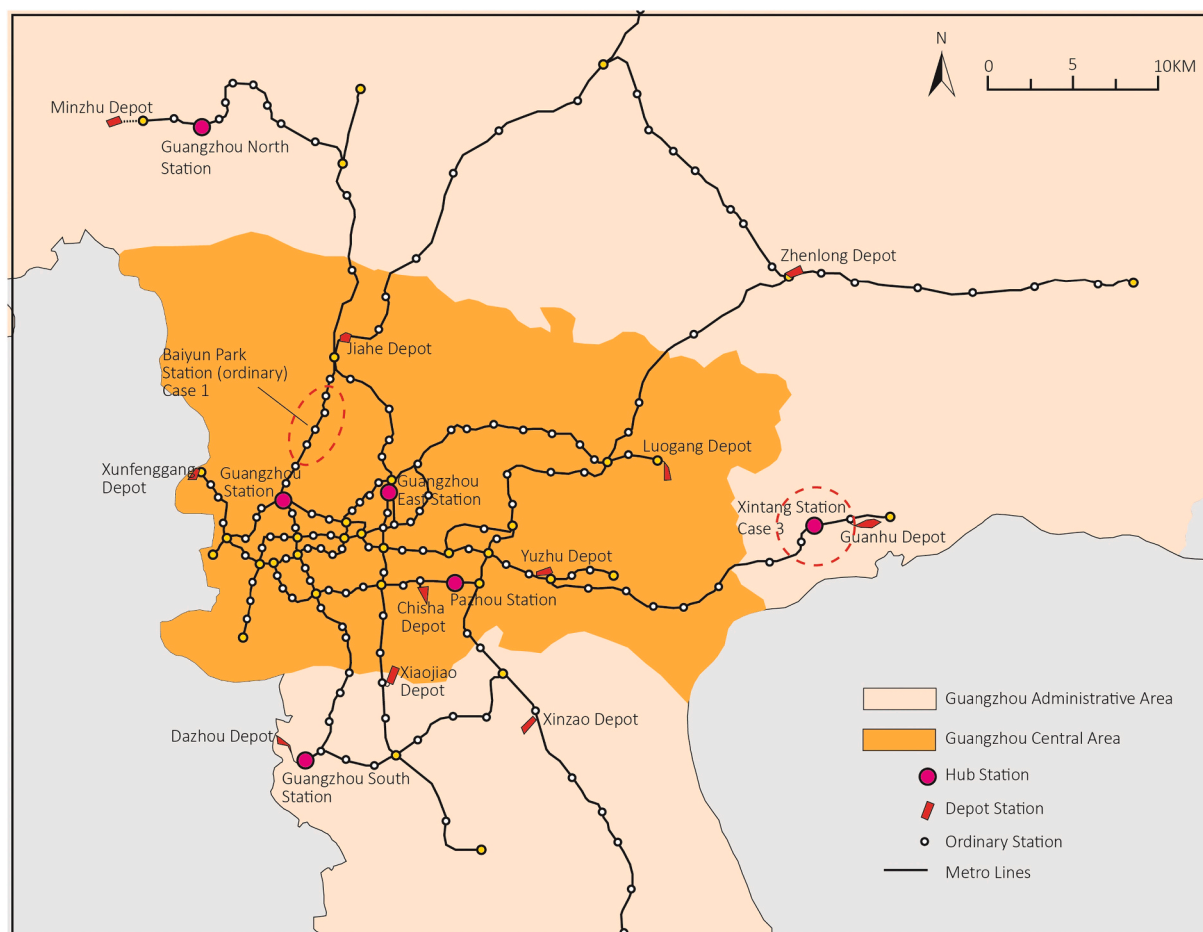


Fig. 1. Map of Guangzhou metro system, marking city-level hub stations and depot stations.

peripheral areas taking a large parcel of land; they are consequently regarded as the areas with the highest land development potential (Guangzhou Gov, 2017). This provides a motivation to transit providers to capture land value. Lastly, ordinary stations with medium levels of development potential are more likely to be beneficial for suburban residential projects following the regular development-oriented logic.

##### 5. Type 1: Regular transit stations serving suburban development

Baiyun new town in Guangzhou is a typical case of suburban development with ordinary metro stations: it represents the regular TOD practice under the existing institutional barriers. It was first planned in 1998 as a major new town project. The site of this project used to be Guangzhou's old airport until in 2004 when Guangzhou's new international airport was established 30 km away from its city centre. This relocation left a large parcel of 260 ha empty land in Guangzhou's north-west periphery. Guangzhou local government adjusted its planning of Baiyun new town and wanted to develop it as the city's second urban centre. In 2009, its plan was adjusted again emphasizing the transformation of the former airport runway into an 80 m wide central axis park for building a green CBD. Metro line 2 was placed in the middle of the central park as the future major transit system to solve the disturbing traffic congestion problems in the area which at that time was even worse than in Guangzhou's central area.

The implementation process of Baiyun new town represents a typical 'development-oriented' strategy. For the local government, the number one priority in this project is to maximise land-leasing revenue. Thanks to its heavy branding as Guangzhou's second CBD, a large parcel of land

near a metro station for residential use was leased out in 2010 at the highest price of the year (*diwang*). This parcel of land remained undeveloped for a few years, which was generally criticised as an act of irresponsible land hoarding during times of soaring housing price. By the time this parcel of land was leased out, the nearby metro station had already been running for some time, but there was no specific restriction on land development to maximise the accessibility of the station. As a result, when the project was finally completed, it evolved into the most expensive gated community of that district (see Fig. 2) but was poorly connected to the station. A similar situation can be also found in its commercial land development, where a giant shopping mall was facilitated by a massive parking area but comparatively isolated from the nearby metro station. Moreover, there is no sign, or even any attempt, of mixed-use development: commercial and residential functions are placed separately around station area. For the local government, mixed-use functions are not necessary for maximising land-leasing revenue. There is also a clear lack of integration in the management process. At the heart of Baiyun new town, several major public culture buildings were planned with the central park. These should be the key projects of the whole new town development, but they were never built maybe because they necessitated a substantial amount of direct investment which the government was unable or unwilling to provide. As a result, the new central metro station has been left in the middle of a large parcel of empty land fenced with concrete walls around it for no less than ten years (Fig. 2).

The result of Baiyun new town as a major urban project is definitely suboptimal. It was intended to become a modern green and liveable CBD with sufficient open space well-served with metro transit. While skipping all neighbouring densely populated communities (Fig. 2), the

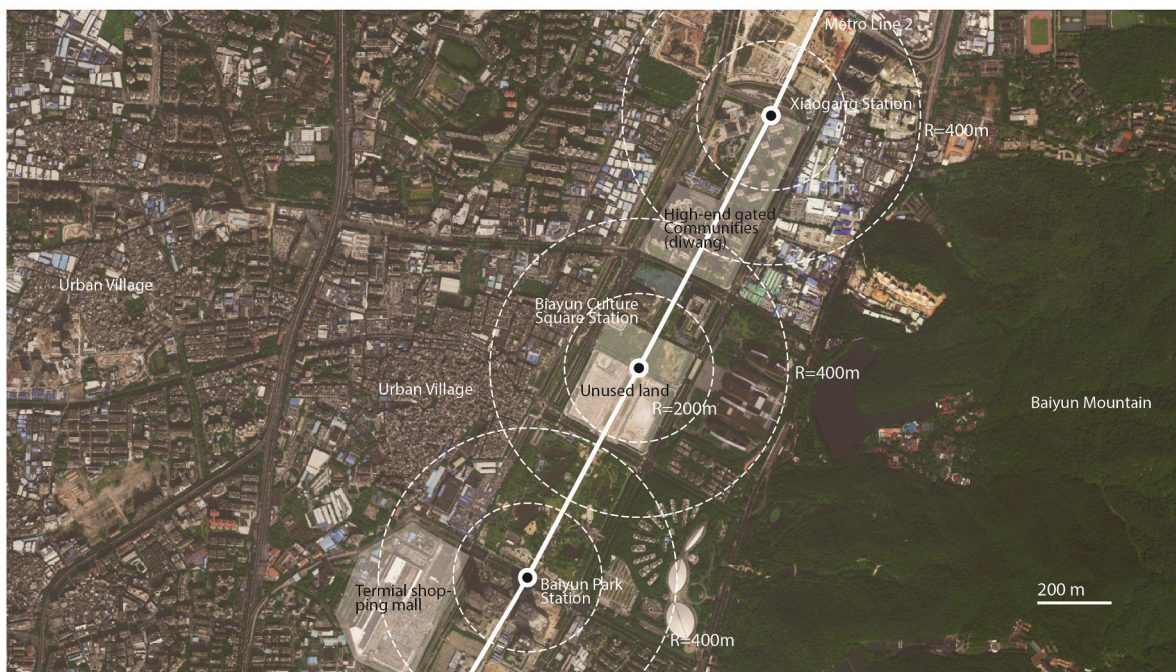


Fig. 2. Transit-adjacent development in Baiyun New Town of Guangzhou.

metro line went straight from the middle of the park to a number of isolated high-end gated communities, giant shopping malls surrounded with large parking lots, and of course, fenced unused emptied land. This has caused several stations on the line counting about the lowest ridership in the entire Guangzhou metro system. On paper, the objective to better integrate transit, car and pedestrian systems and improving local traffic flows was amply mentioned in every version of the new town planning. In reality, the objective underlying this project was to generate revenue for the local government, which is not uncommon in projects for the development of suburban areas. The same argument applies *a fortiori* to how several land-lease deals were struck for the area around Xiaogang metro station. The land development and transit system were developed separately. Transit was simply an instrument to trigger maximum land-lease prices, while quality of public space, transit connectivity, and pedestrian experience clearly came in second. As a result, these practices can be regarded as transit-adjacent development.

Such drifts in land development potential and land-leasing revenue reflect entrepreneurial governance on suburban transit station areas. Especially development near ordinary stations, where the need to increase transit ridership and connectivity can easily be eclipsed by other motives more financial in nature. Though the project of Baiyun new town is a success in the sense of boosting land-leasing revenue, it fails on the level of integrated transit and land development, pedestrian and cycling friendliness, transit ridership, and social equity. The interviewee 6 said it is because “the project did not persist and implement TOD concept, instead it used metro as a means to attract investment”. But it represents a common strategy for local government to develop suburban TOD projects under the existing growth-oriented institutional regime with its institutional barriers to ‘authentic’ TOD.

## 6. Type 2: Rail plus property development on depot stations

The Rail plus Property (R + P) practice was first made famous in Hong Kong for its efficient land value capture to finance transit infrastructure. Cervero and Murakami (2009) discovered that the R + P model not only contributed more than half of all income to the railway operators through property development but also increased ridership and housing prices. Since Hong Kong and Chinese mainland cities have

different systems of planning and land management, there are several institutional barriers to transferring the R + P model from Hong Kong to mainland cities: (1) mainland transit providers are pure state-owned enterprises (SOEs) that are not capable of and allowed to obtain land from the land market for property or commercial development; and (2) there are no regulations on developing air rights on top of transit stations. Thus, Cervero and Murakami (2009) claim that Hong Kong’s R + P model is not likely to be transferred to Chinese cities.

This explains why the R + P experiment in Shenzhen started from depot stations, as the metro company obtained large parcels of land for depot station development on the ground for the simple function of maintaining rolling stock. The problem of land acquisition then is naturally solved. Realising the development potential with depot stations, the metro company is motivated to negotiate with local government for establishing an informal strategy to make full use of the air rights. Two kinds of informal arrangements are formed: (1) the metro company is allowed to develop air rights on top of stations, but it has to obtain them through public auction in the land leasing market. ‘Bundle leasing’ (*kunbang churang*) is one means to guarantee that the metro company obtains these air rights, because the land leasing auction is not only decided by price, but also by the technical qualification of developers to develop rail and property complexes, for which only the metro company is qualified. (2) the second means is that the local government directly allocates land with air rights to the metro company, but the local government will assess the value of the air rights and regard them as a direct investment to funding transit infrastructure. Thus, local government can reduce direct capital investment. Moreover, metro companies as total SOEs were allowed to develop land and property by establishing a subsidiary company. For example, Shenzhen Metro established its property subsidiary company in 2013 to develop and manage properties on and near stations. Thus, with the metro company as the key actor, informal arrangements were formed to enable the development of R + P practices.

Henggang depot (*Liuyue*) station development in Shenzhen is an example that illustrates the features of governing R + P development. Located in the suburban district Longgang, the Henggang depot is one main parking and maintenance station of Shenzhen metro line 3. Shenzhen local government originally assigned 30 ha of land to

Shenzhen Metro (SZM) as a direct investment. SZM used the land as a mortgage to finance the construction of line 3 in the capital market. In order to maximise profit for land development, SZM developed a new double-layer structure for parking and maintenance functions which saved 35% of land. The whole project provided about 19 ha of land and air rights for property development, among which 11 ha of land turned into a commercial and residential project by SZM in cooperation with a state-owned property developer, and the rest developed into a social housing project and a school (Fig. 3). SZM's strategy was to save constructible land as much as possible for property development through technical innovation and to use air rights over depots for social housing. With the increase in land values in megacities like Shenzhen, such a compact development strategy became possible, as only a small amount of land is needed to capture the land value to fund infrastructure development. Besides the Henggang depot, almost every depot station in Shenzhen has similar R + P development. The Qianhai, Songgang and Tanglang depots are the best known and successful ones. They all followed similar property development strategies with social housing and station depots developed under a comprehensive station-area project. SZM played a leading role in the planning, land acquisition, construction, and management process. During 2011–2016, SZM developed seven depot R + P projects to facilitate five new lines. With 156 ha of land generated by these projects for property development, SZM is no longer a mere transit provider, but also a major developer in the real estate market (Xue & Fang, 2015).

Compared with the first type of TOD practice which is heavily constrained by existing institutional barriers and the entrepreneurial governance mode focused on urban growth, the informal institutional changes in the R + P practice show a far better result in terms of integrating transit development with land development. Using land as a direct investment to finance transit infrastructure provides a possibility for local governments to jump out of the dominant strategy aimed at maximising land-leasing revenue which prevails at ordinary stations. The R + P experiments in Shenzhen also result in closer cooperation between the metro company and developers. SZM even became the biggest shareholder of one major real estate developer (Wanke) in China in 2017 and formed strategic cooperation in the future R + P projects. Shenzhen's R + P development has become a demonstration model and

TOD best practice in China, and many municipal metro companies aim to emulate its success, including neighbouring cities Guangzhou and Foshan. Only in 2018, Guangzhou started five R + P projects, four of which revolved around depot station-area development; Guangzhou is also planning 29 additional R + P projects going by the name TOD.

## 7. Type 3: Integrated development on regional transport hub stations

Before going to the development of regional transport hub stations, we have to dig deeper into the background of new town development around high-speed railway stations, since it has profound influence on the emergence of the latest informal changes to the prevalent institutional arrangements. Starting from the 2008 global economic crisis, the Chinese central government issued a 'four-trillion investment project' to stabilize China's economic growth. Interregional and regional railway systems like high-speed rail network became key national infrastructure projects to spend these national funds (Lu, 2012). Local governments were enthusiastic about being absorbed within a regional transport network with infrastructure development. Second, local governments are also eager for urban growth. Combining the development of new regional railway stations with their new town projects became an effective way to stimulate their suburban growth. Some local governments even intended to locate the new stations farther away from their built area to justify larger new town development plans.

However, the resulting high-speed rail new towns are criticised for being isolated and too far removed from city centres. The capability of regional railway stations to attract residents was also overestimated. These new towns are at risk of developing into 'ghost towns'. Soon the central government imposed tighter land management and location selection restrictions on these practices to cool down the fever of constructing station-based new towns (NDRC, 2018). Local governments, especially of megacities, had to change their strategies to increase the attractiveness of regional railway stations and promote compact development of their mega urban projects. Transport hubs were created by connecting multiple modes of rail transit including high-speed rail, intercity rail, urban metro, urban light rail, and tramway. These inter-model connections increased the attractiveness to passengers,



Fig. 3. R + P project of Henggang depot station in Shenzhen.

residents, and investments at any single railway station. Integrated development is needed to build on top of hub stations and create a land mark for promoting the new town project. Similar to the evolution of R + P practices, special institutional arrangements are needed to enable the development of air rights above hub stations. The difference is that here with local government acting as the main promotor, it can further use the priority to obtain the surrounding land for residential development as an attraction for developers to invest the costly land mark project.

Guangzhou East transport hub, also known as Xintang TOD new town, is an example that illustrates the features of governing such mega urban projects. Located about 30 km from the Guangzhou city centre, Xintang TOD new town is built in the peripheral area of the suburban county-level town of Xintang (Fig. 1). Led by a coalition of three levels of provincial, municipal and district governments, with the municipal government as the main actor, this transport hub brought together three high-speed rail lines, two intercity rail lines, and four metro lines. The high-speed railway will have its own station, and the intercity rail and metro will be integrated into a super high-rise complex, as a central landmark of the new town (Fig. 4). Invested by a Shenzhen real estate group and designed by a Japan-based architecture firm, a 360,000 square metre complex with a twin tower up to 260 m high was jointly developed with a dozen SOEs including national rail, provincial rail, and metro companies. With the transport hub landmark as a core, the whole new town will develop 269 ha of land and populate 31,000 to 34,000 residents in its initial phase. The main Shenzhen investors were able to obtain the surrounding residential-use land for further development.

Compared with regular high-speed rail new towns, the integrated development on top of transport hub stations delivers much higher quality of station areas which contribute to a more successful future development of the entire new town project. In that case, local governments will be able to benefit much more than only by collecting one-time land-leasing revenues as they do from regular rail station new towns. In comparison with R + P practices, local governments in hub station projects have more power to generate informal institutional arrangements bypassing the current institutional barriers to achieve multifunctional mixed-use development. But for a new town project, too much emphasis was put just on the central land mark, while the surrounding area is still short of strong application of TOD principles, such

as with pedestrian friendliness, mixed-use space, and restrictions on car use, even though the project was heavily branded as a TOD new town. This may eventually become a challenge to the authenticity in implementing TOD in the project.

## 8. Discussion

We have examined three types of TOD practice occurring in different institutional settings and studied how these practices deal with the existing institutional mechanisms that prioritise urban growth. We have found that the current institutions for planning and land management systems result in rigid land use and financial regulations which acts as barriers to the integrated development of land and transit, and also hamper collaboration between actors during decision-making processes. As the first type practice shows us, local governments tend to maximise their land-leasing revenue around transit stations, which results in undesirable outcomes such as TAD. On the other hand, new types of TOD practices like R + P development and integrated hub station development show more tightly woven coalitions of local government, transit provider and private developer acting jointly in more unified project management. These coalitions are established for different reasons and purposes, but they form various informal arrangements to bypass the existing institutional barriers and thus realise a certain degree of integrated development. Moreover, they represent new types of governance that satisfy the need for urban growth, combining the capture of land value in more mature and sophisticated ways than by merely relying on land-leasing revenue.

We propose several key recommendations for future institutional changes. First, the comparison of three cases has shown that there is a need to reform the current institutions in the planning and land management systems. The current institutional mechanism was designed for achieving rapid urban growth. As Chinese cities enter a transitional period in which the quality of the built environment is more important than its quantity, strict regulations on monofunctional land use should be replaced by flexible regulations that encourage multifunctional and mixed land use. Furthermore, institutionalising the informal institutional arrangements from practices of both R + P and hub stations is crucial for establishing a new mechanism for effective integrated transit and land development. [Suzuki, Murakami, Hong, and Tamayose \(2015\)](#)



Fig. 4. Guangzhou East Transport Hub, also known as Xintang TOD new town.

propose some key principles for effective value capture that can be considered in establishing such a new mechanism: (1) having special floor area ratios (FARs) and restrictions for developments in transit station areas; (2) transferring development rights of station area land to transit providers at a pre-rail market price; and (3) having clear rules for sharing costs and profits between the public sector and developers.

Second, over-reliance on land-leasing revenue by local governments not only hampers integrated development, but also constrains the ability to experiment with innovative planning practices. A previous study has shown that at the city level, in the Pearl River Delta region Shenzhen relies the least on land-leasing revenue, and is more likely to have sustainable and innovative planning experiments (Song, Stead, & de Jong, 2020). The most efficient way to reduce reliance on land-leasing revenue is to develop new revenue sources, such as property taxation or land value taxation. Although land value taxation may be more efficient in value capturing (Cohen, Cughin, & Ott, 2009), it requires a great deal of institutional and administrative support. Property taxation seems more feasible in the Chinese context.

Third, we found two more successful practices bypassing institutional barriers. International experience has shown that allowing planning experiments that may bypass current regulations can generally be a good way to test and try innovative planning approaches. For example, the Dutch government allows local governments to engage in two planning experiments per year, putting aside prevailing legislation to test innovative planning approaches. This was legalised through grafting the so-called *Crisis-en Herstelwet* (Crisis and recovery law) to the regulation on spatial planning in the Netherlands.

Additionally, the comparison of three types of TOD practices also brings up the discussion of the balance between growth and equality of transit systems and their roles in urban development. Transit stations bypassing established suburban areas for new property development sacrifices certain rights of local residents to what in apparently seen as a greater development goal. New property development near stations is mostly done in the form of gated communities which segregate residents physically and socially. Physically, gated communities not only create a negative interface to the city by their hard-fenced enclosure; their homogeneous superblock-style also deteriorates street connectivity, road density, and accessibility of transit services. Socially, by separating themselves from the city, gated communities create *de facto* collective rights to the residents to enjoy a higher quality of management and services inside by having their access controls, security guards, janitors, and gardeners. As compensation to the absence of private property and land rights, such collective rights become a commodity to a group of people who can afford to create their urban space in the city. This strengthens the segregation of social classes. This segregation also generates a dilemma to TOD practices in China: the middle-class residents living in the station-area gated communities are more likely to own private cars and enjoy automobile travel, while the bigger population of residents living in the urban villages and informal housing are outside walking distance for transit stations even though they are more dependent on public transport. In 2016, the central government issued a policy document to stop the construction of gated communities and urged the established gated communities to gradually open up to the city (State Council, 2016). However, this national policy is barely implemented at the local level. Gated communities are deeply rooted in China's institutional setting, market orientation, and urban governance. When the state is captured by and represents capital, urban change is driven by a need for growth rather than a need to redistribute welfare. The social housing development in Shenzhen's R + P practices is an attempt to balance between growth and equality to some extent, but in the bigger

picture, gated communities still dominate in the Chinese real estate market. Consequently, urban development and the social challenges in TOD practices will persist.

## 9. Conclusions

The term TOD as a sustainable concept is frequently used in city branding by local governments and developers to justify their urban projects. Like other sustainable concepts, their implementation in China has been questioned and criticised for an underlying systematic implementation gap caused by mechanisms for accumulating capital and power from urban development (de Jong, 2019). Particular urban morphologies are created under particular institutional constellations, even when they conflict with parts of the TOD concept, like increasing street connectivity and pedestrian friendliness. Rather than being merely seen as contextual factors for transfer, particularity and specific institutional settings should be seen as a part of the urban process on which the concept of TOD is superimposed.

The existing literature on TOD practices in China has shown that the existing urban growth mechanism and the current planning and land use systems have become institutional barriers to a genuine application of TOD practices. Although new types of TOD such as R + P and integrated hub station development have emerged and created informal bypasses around these barriers, there was not yet any explorative study into the origins and effects of these informal arrangements and how these arrangements interact with the underlying mechanism for urban growth. By identifying and comparing three types of TOD practices with different institutional settings, we found that land value capture can replace the existing mode in which local government heavily relies on land-leasing revenue and also leads to a better integration of transit and land development. We have also provided several suggestions for future institutional improvements based on these new types. Although the informal arrangements have proven effective in achieving land value capture and integrated development, the formal restrictions to station-area development obviously still exist. Genuine TOD would necessitate a national level legal framework and policy strategy for urban master planning in compliance with TOD principles, supporting by policies from various relevant agencies.

## Declaration of competing interest

None.

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## Author statement

**Yun Song:** Conceptualization, Methodology, Investigation, Writing-Original Draft. **Martin de Jong:** Supervision, Writing-Review & Editing, Project administration. **Dominic Stead:** Supervision.

## Appendix A

Detailed information of interviewees.

	Respondent's host organisation	Respondent's position
1	Guangzhou Urban Planning and Design Institute	Urban planner working on R + P projects in Guangzhou
2	Shenzhen Urban Planning and Land Resource Research Centre	Senior urban planner who led several R + P projects and general TOD planning in Shenzhen
3	Foshan City Planning, Design and Research Institute	Urban planner working on R + P project in Foshan
4	Guangzhou Metro Group	Architect is familiar with transit provider arrangements in R + P projects
5	South China University of Technology	Professor with experience in station area development in Guangzhou and Foshan
6	South China University of Technology	Professor with experience in TOD planning and urban growth theory

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