



RAIL PLUS PROPERTY DEVELOPMENT IN CHINA: THE PILOT CASE OF SHENZHEN

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EXECUTIVE SUMMARY

China's rapid urbanization has increased the demand for both housing and transport, leading to a continuing need for urban transit. Cities face significant challenges in financing the growth of urban transit infrastructure. The current practice of financing urban metro or subway projects through municipal fiscal revenues (partly from land concession fees) and government-backed bank loans is not only inadequate to meet the demand, but also exacerbates deep-seated problems like mounting municipal financial liabilities, urban sprawl, and urban encroachment on farmland. To address these problems, Chinese cities need to diversify the ways in which they finance urban metro projects.

In a variety of approaches that aim to alleviate the financing problems of local governments, Rail plus Property (R+P) development offers a promising solution. R+P development leverages the partnership between the public sector, transit companies, and developers to coordinate planning and financing of transit systems and adjacent real-estate developments. By capturing the land value appreciation that follows transit projects, R+P can partly or completely fill the funding gaps in constructing costly metro projects. Compared to financing tools such as infrastructure bonds and bank loans, R+P provides a new stream of funding for the construction and operation of public transit facilities without creating additional debt burdens. In addition, when properly implemented, R+P can lead to sustainable transit-oriented development in Chinese cities, mitigating various structural problems such as the government's over-reliance on land concession fees.

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Despite these opportunities, the broad adoption of R+P development in Chinese cities is still hindered by widespread conceptual misunderstandings, lack of political will, and multiple legal, regulatory, and institutional limitations.

This paper analyzes the experience of the coastal city of Shenzhen as a successful example of R+P experimentation in China. Through semi-structured interviews, field visits, and a literature review, the study unravels the integrated approach employed by Shenzhen that contributed to its success. The city's integrated approach includes innovative financial arrangements, integrated urban and transit planning, land policy reforms, savvy and demand-driven business operation at the corporate level, and institutional mechanisms that facilitate multi-stakeholder dialogues. Furthermore, our research indicates that the successful implementation of R+P also depends on strong political will, a booming real estate market, mature capital markets, and a capable and willing private sector.

The study also underscores the necessity of legal, regulatory, and institutional reforms at both the national and municipal levels to enable the implementation of R+P. At the national level:

- Reform the current land legislation to permit leasing out land-use rights around transit stations at different prices and in installments based on metro projects' funding gaps and metro companies' cash flows.
- Amend the land legislation to allow for-profit developments above and around transit stations.
- Reform the government-led urban planning process through relevant planning legislation and guidelines to facilitate integrated land use and transit planning and transit-oriented development.

At the local level:

- Promote cross-departmental coordination and dialogues among different departments and developers to match projects to market demand.
- Improve local urban planning and transit planning systems, and establish local, market-responsive planning regulations to allow for pro-transit-oriented development zoning codes and private-sector engagement.
- Create multiple layers of land development rights for a single piece of land, and link different land development rights to mixed land uses to facilitate transfer of the rights.

- Issue consistent legal documents at the local level that loosen restrictions and provide a legal foundation for R+P development.
- Reinforce local capacities to manage sophisticated projects through external consulting services, dedicated institutions, and research funding sources.

To implement R+P, the following areas require particular attention:

First, R+P is a risky undertaking. Being risk-conscious and safeguarding against potential macroeconomic, real-estate market, and institutional risks from the very beginning is essential for the success of a project.

Second, reasonable risk-sharing between government and the metro company is key to incentivizing the company while ensuring the public benefit. In China, this means that R+P schemes are not one-size-fits-all; they should be innovatively tailored.

Third, R+P is a long-term undertaking, and does not offer quick wins. It requires persistent top leadership, constant evolutions of funding arrangements, and continued optimization of development proposals. It is also necessary to match developments with market demand, improve institutional safeguards (and coordination mechanisms), and strengthen government oversight and enforcement.

1. INTRODUCTION

China is currently experiencing a rapid upswing in urbanization. By 2030, 70 percent of the country's population will be living in cities (Development Research Center of the State Council and World Bank 2013). The influx of rural-urban migrants and the increasing traffic gridlock in cities have created demands for housing and transit services. How to make sustainable urban development financially viable is a real and immediate challenge facing city decision makers. Limited funding is a major constraint that prevents cities from closing the fiscal gaps in transit infrastructure needed to meet soaring demand. With the exponential growth of urban transit systems, continued reliance on governmental fiscal revenues or government-guaranteed loans as major sources of funding is becoming increasingly inadequate and less sustainable. At the same time, the long payback periods and low returns on investment typical of urban transit projects make it difficult to attract private investment.

Value capture is one powerful tool capable of driving sustainable urban development. State-owned land in China is a valuable asset as is the management of urban land resources. However, current planning structures and financing practices used to plan and fund transit projects in China result in many missed opportunities to create and capitalize on land premiums that result from improved transit services. In a strong property market, transit projects can lead to land-value appreciation, especially for land surrounding transit stations. Particularly in China, the inelastic demand for housing spurred by rapid urbanization and an undersupply of urban transit services has created uniquely favorable conditions for value capture.

However, the lack of coordination between the financing and planning of transit projects and nearby property developments means that the land-value increments have not been effectively captured and redistributed. For example:

- On the project financing front, while transit services funded mostly by urban taxpayers have led to land value appreciation, these land-value increments have accrued mainly to private home-owners and real estate developers, not benefitting the community at large.
- On the urban planning front, because urban land-use plans are usually formulated ahead of transit plans, there is a lack of coordination between the two. Consequently, when transit lines are planned, the majority of land around transit stations has already been developed and not reached its full economic potential.

Globally, capturing land values to fund transit projects while fostering transit-oriented development (TOD) has become one of the major ways to fund urban infrastructure projects. For example, revenues from land-value capture provided around 41 percent of the capital cost of the light rail project linking the city center to the airport in Portland, Oregon (Nichols 2012). Although a number of instruments are available to capture land-value increments, Rail plus Property (R+P) provides the greatest potential for densely populated and transit-dependent Chinese cities.

R+P leverages the partnership of government agencies, transit (metro or subway) companies, and developers to coordinate planning and financing of the transit systems and development of adjacent lands. On the one hand, by capturing the land value appreciation from transit proj-

ects, R+P can partly or fully fill the funding gaps of these costly projects. On the other hand, the need to maximize land-value increments around transit stations ensures the dense concentration of housing and employment opportunities in these areas. This dense development further boosts transit ridership and increases transit's farebox revenues, thereby strengthening the financial performance of transit projects. Hong Kong, Tokyo, and Singapore have successfully demonstrated the benefits of R+P projects. For example, R+P development has enabled Hong Kong's MRT Corporation to break free of reliance on government operation subsidies and enjoy a certain degree of return on investments (Suzuki et al. 2015).

Inspired by the experience with R+P development in Hong Kong, a few mainland Chinese cities like Shenzhen and Tianjin have adapted R+P for their own transit projects. However, because of multiple legal, regulatory, and institutional barriers, success has been limited.

This paper aims to develop a contextualized R+P model for Chinese cities by analyzing the innovations pioneered by Shenzhen and providing recommendations applicable to other Chinese cities. Such innovations include new financial arrangements, integrated urban and transit planning frameworks, land policy reforms, sound business operations at the corporate level, and cross-departmental collaboration to foster multi-stakeholder dialogues. The target audience of this paper includes decision makers responsible for the planning and financing of transit projects, as well as private sector entities responsible for the implementation and operation of R+P projects. Specifically, stakeholders include:

- Local Governments: municipal party committees and city governments, local Development and Reform Commissions, planning bureaus, land development bureaus, transport commissions, finance bureaus, and affiliated research institutions.
- Private Sector: metro construction and operation companies (including local state-owned companies, foreign-owned companies, and joint ventures), real estate developers, infrastructure investors (including commercial banks and policy banks), and professional consulting agencies.

Because numerous municipal departments and interest groups are involved in the design and implementation of R+P development, this paper is targeted at a range of different interest groups or municipal departments (see Section 5).

Due to the complicated nature of R+P, the analyses and recommendations presented in this paper have a number of limitations relating to spatial scale and transport modes:

- **Spatial scale.** This paper focuses on cities that are currently planning or building urban metro systems. Some recommendations may also apply to a cluster of cities connected by inter-city railway systems (such as the Beijing-Tianjin-Hebei region). However, due to the multi-layered institutional setup and different planning processes, the applicability of the study’s recommendations to city clusters and inter-city railway projects is limited. We suggest that decision makers and technicians refer to the State Council Directive on Comprehensive Land Development in Support of Railway Construction for detailed instructions for this type of development.
- **Transport modes.** This paper focuses on urban rail transit projects because these projects are usually capital-intensive and tend to have greater land-value appreciation potential compared to regular bus projects. Such urban rail transit systems specifically comprise urban light rail, heavy rail, and suburban commuter rail systems. In certain situations, the recommendations in this paper may also lend themselves well to other types of infrastructure projects, such as Bus Rapid Transit (BRT), tramways, and public parking lots.

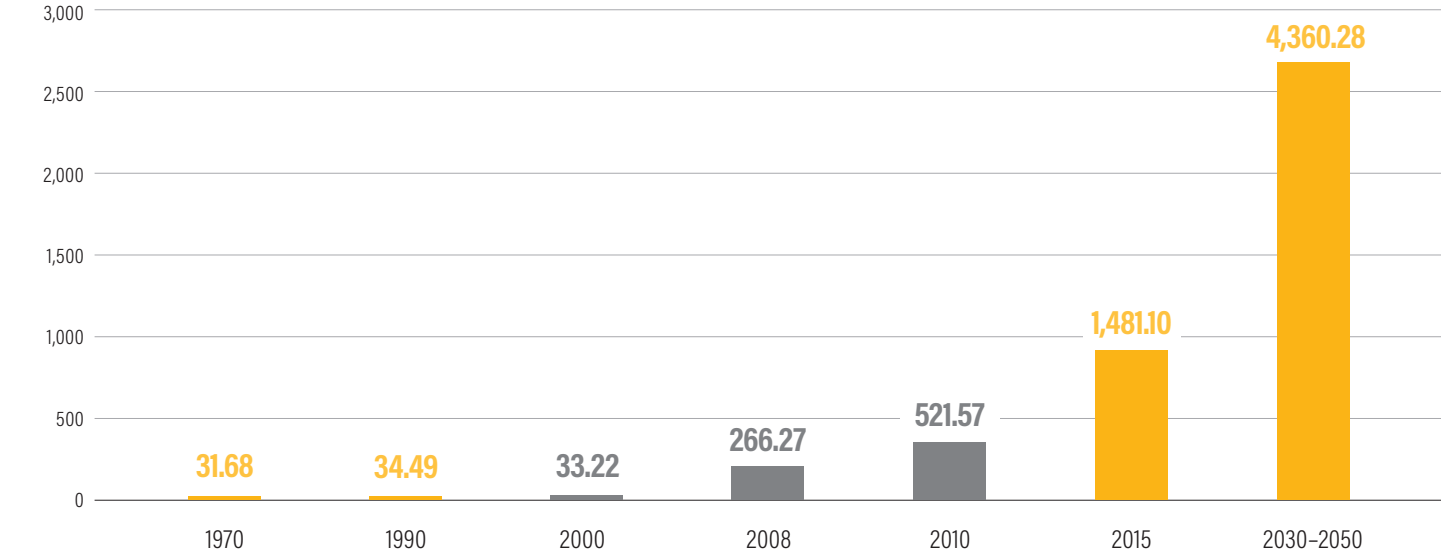
2. FINANCING URBAN RAIL TRANSIT PROJECTS IN CHINESE CITIES: THE CURRENT SITUATION

2.1 Challenge 1: Huge Demand for Capital

The push for urban metro projects in Chinese cities has created a huge demand for capital, but financial planning practices for urban rail networks remain shortsighted and unsustainable.

Urban metro projects have gained popularity among Chinese cities as infrastructural stimuli that meet transit needs and reverse economic slowdowns. This resulted in exponential growth in urban rail transit construction during the 12th Five-Year Plan (2010–2015) (Figure 1). Further, the devolution of approval power for metro projects from national governments to provincial governments has also spurred interest in expanding urban rail transit systems throughout China. As a result, most provincial capitals and a growing number of second- and third-tier cities have initiated or accelerated metro projects. It is estimated that, by 2020, the total length of completed subway lines will grow to 3,000 kilometers and total investment will reach 234.6 billion USD (NDRC Institute of Comprehensive Transportation 2012, figures converted from RMB to USD with the average exchange rate in 2011).

Figure 1 | **Estimated Investment in Urban Rail Transit in China (100 million USD)**



Source: Zhao (2013) (Figures are converted from RMB to USD with the average exchange rate in the corresponding year; the figure in 2030-2050 is converted using the exchange rate in 2014).

Fiscal decentralization has made Chinese cities responsible for financing their own metro projects. Because cities often lack long-term financing plans for costly metro projects, as metro systems expand, so do municipal financial pressures. For example, as of the end of 2013, Beijing had 17 metro lines that stretched a total of 465 kilometers (Beijing Bureau of Statistics 2013). As its metro network grows, Beijing must not only fund the construction of new lines, but also repay loans on existing lines, and support considerable operation subsidies (Figure 2).

- **Funding New Line Construction:** Each year, Beijing invests a total of 5.7 billion USD in constructing new subway lines, 2.46 billion USD of which are funded by the municipal government's direct capital contributions (Zhao 2013, figures converted from RMB to USD with the average exchange rate in 2012).
- **Repaying Debts on Existing Lines:** In addition to investing in new lines, Beijing has also entered a phase of debt repayment for the metro lines already constructed.
- **Operational Subsidies:** Operational costs for Beijing's metro system reach a staggering 1.02 billion USD each year (not including asset depreciation). With the artificially low transit fares, the annual farebox revenue totals only about 570 million USD, leaving an operation and maintenance gap of 750 million USD (Beijing

Municipal Commission of Development and Reform 2014, figures converted from RMB to USD with the average exchange rate in 2013).

The lack of long-term financial plans for metro systems not only adds fiscal burdens, it could also have far-reaching consequences. For example, the demand for capital in subway projects could crowd out investments in other types of infrastructure projects and essential social security programs such as healthcare and education.

2.2 Challenge 2: Current Models of Financing are Inadequate

Current models of fiscal expenditure and market financing are insufficient to support the sustainable development of rail transit.

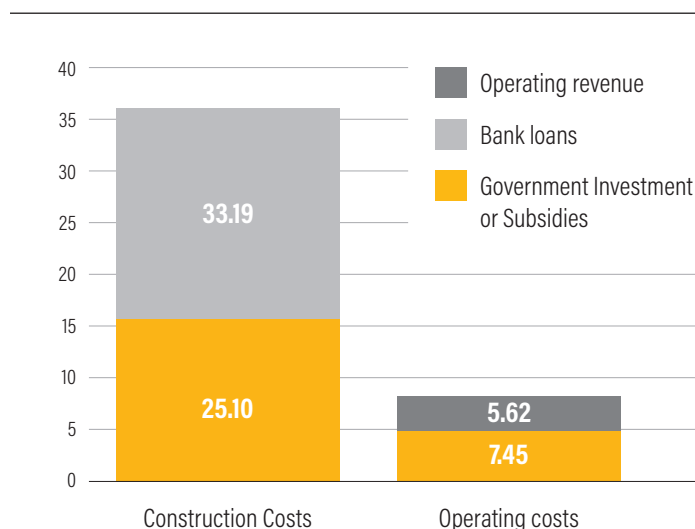
The main sources of financing for rail transit projects in China are government financial contributions and capital market financing. In general, government financial contributions constitute around 20–50 percent of capital costs, while government-guaranteed capital market financing comprises the remaining 50–80 percent. The latter is usually used to pay off debts with revenue from local government budgets or land leasing.

2.2.1 The Predicament of Government

Extensive government financing is subject to decreasing revenue from land-leasing proceeds, making it increasingly difficult to meet the capital needs of rapidly expanding rail transit projects. Furthermore, government financial contributions, especially those that rely on land-leasing proceeds, pose urban development and food security risks.

In recent years, increases in land acquisition and demolition/relocation costs due to tightened requirements of farmland protection programs have caused a downward trend in land-leasing proceeds. The net revenue from land leasing dropped from 4.2 percent of GDP in 2010 to 1.2 percent in 2012 (Development Research Center of the State Council and World Bank 2013). However, the demand for capital investment by urban rail transit projects continues to skyrocket. In 2012, the investment in urban rail transit construction accounted for 0.5 percent of national GDP, and is expected to exceed land-leasing revenues before 2020. Thus, exploring new funding sources is unavoidable.

Figure 2 | **Estimated Construction and Operating Expenses for the Beijing Subway System in 2013 (100 million USD)**



Source: Zhao (2013); Beijing Municipal Commission of Development and Reform (2014) (Figures are converted from RMB to USD with the average exchange rate in 2013).

In addition, the reliance on land leasing also causes problems in urban development, social equality, public finance, and food security. For example, the lump-sum payment of a 50–70-year land lease results in increased land prices and drives up property values. This practice also results in a vicious cycle of demand for infrastructure leading to land sales and urban sprawl, which in turn creates the demand for more transit infrastructure and ultimately threatens food security.

2.2.2 The Predicament of Capital Market Financing

In line with the new macroeconomic norm in China, fiscal growth in many cities has begun to slow and it has become increasingly difficult to raise funds through capital markets with local government backing, as was typically done in the past. This form of fundraising not only fails to alleviate funding pressures for urban rail transit expansion, it also increases the financial liabilities of the public sector. Furthermore, large-scale off-budgetary and implicit government debt, which is not subject to government supervision, also call into question the cost-efficiency of this debt.

Despite being restricted by declining local fiscal revenues in recent years, many cities have taken advantage of explicit or implicit government guarantees to raise funds in the markets at relatively low interest rates. Subway companies also strive to diversify their financing sources through corporate bonds, medium-term bills, equity shares, and trust funds. However, these financing measures create concerns of their own.

First, financing methods, no matter how innovative, only relieve the investment burden in the short run; the debt created will ultimately have to be repaid through future project revenues (or additional rounds of financing, or governmental general revenues). The principal project revenues generated from farebox revenues are usually far from adequate to cover subway operational costs, let alone capital investments. Therefore, the vast expansion of subway systems without long-term financing plans will ultimately increase the risk exposure of local governments, ultimately affecting the credit rating and solvency of both governments and businesses. Therefore, if local governments are not able to establish sustainable revenue sources, the financial problem with subway investments will only worsen.

Second, government-backed borrowing by special-purpose vehicles has created large amounts of implicit government debt that is independent of government supervision and without “hard budget constraints,” making it difficult for government to manage its debts and pertinent risks.

Furthermore, funding subway projects through governments’ off-budgetary incomes (such as land leases) is not subject to proper government auditing and supervision, and is thereby exposed to inefficient use of funding and overspending. Although State Council Directive (43) on Strengthening the Supervision of Debts Incurred by Local Governments of October 2014 encourages the adoption of public private partnerships (PPPs) for local infrastructure projects to eliminate explicit or implicit government debts, the large upfront capital investment and the long payback periods of rail transit projects make them unattractive to private investors.

In sum, relying solely on government direct funding and government-guaranteed borrowing is insufficient to meet the steadily increasing demand for capital for urban rail transit projects and will ultimately produce negative, deep-seated structural problems such as urban sprawl and government debt crises. Using land premiums created by the construction of urban rail transit projects can solve these problems inherent in the current financing models and improve overall profitability. This will help to strengthen the fiscal sustainability of local financing vehicles, attract the direct participation of private capital, and lower government debt risk.

3. IMPLEMENTING R+P IN CHINA: OPPORTUNITIES AND CHALLENGES

3.1 Definitions and Typology

R+P development is a value-capture financing instrument. It leverages partnerships between the public sector, rail transit companies, and real-estate developers for coordinated investment, construction, and operation of transit infrastructure and property developments adjacent to station areas. Rail transit companies (or a joint venture of rail companies and developers) capture the property value increases resulting from the transit investments through the sale or rental of the property assets. The recouped values are then used to recover construction (and/or operational) costs of the transit projects.

Despite being closely linked, R+P as a financing tool should be distinguished from transit-oriented development (TOD) (see Box 1) and public-private partnership (PPP) (see Box 2).

R+P can be divided into two categories based on the type of rail services and the spatial scale of land development:

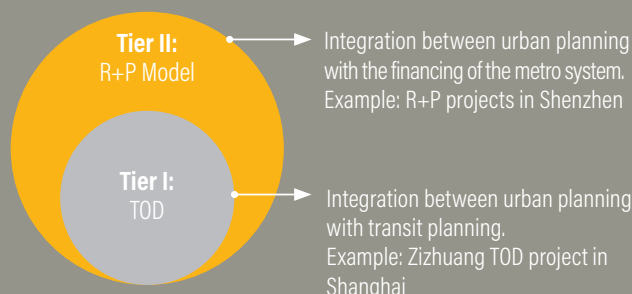
Box 1 | A Comparison of the R+P Scheme and Transit-Oriented Development

Rail plus Property (R+P) is a funding arrangement, while transit-oriented development (TOD) is a type of urban development. The two should not be confused. However, in order to ensure that profits from land-value appreciation can be captured, it is possible to make TOD a precondition for R+P. At the same time, TOD does not necessarily need to rely on R+P to achieve financing. With this in mind, we can separate TOD into two different stages depending on the level of integration of urban rail transit and property development (see Figure B-1 below).

The first level is pure transit-oriented development, which is characterized by partial integration of the planning, design, and construction of rail transit systems and property development. Generally, this category of integration does not include the elements of financing, instead concentrating on optimizing the use of land-development intensity and land uses. A classic example of this is Shanghai.

The second level is TOD that uses R+P as a financing tool. This means integrating financing, planning, construction, and operation of R+P land to create a link between the costs of subway construction and revenue from land development along subway lines. This is not limited to partial integration of planning, but extends to the integration of financing, construction, and operations. The classic example of this is Shenzhen.

Figure B-1 | Different Tiers of TOD



- **Station-level R+P:** This model is commonly seen in densely populated urban areas served by subways or light rail. Property development generally includes commercial or residential high-rise buildings directly linked to the stations. A case in point is Hong Kong's R+P development in which the Hong Kong government grants land development rights to the MRT Corporation, which pays pre-rail prices and recoups property increments after the rail construction (and asset management revenues) to cover the construction and operation costs of the metro system.
- **Corridor-level R+P:** This model can be seen in areas around commuter rail stations or intercity train stations. This type of land development often covers a much larger spatial area, with property development focusing on large, mixed-use communities or, sometimes, on new town (or new urban center) development. A classic example is a series of new town developments along the Den-en-toshi Line in Tokyo. In this case, the national government provides private rail companies with exclusive rights to readjust and develop the land parcels along rail lines and the right to retain the land development revenues. The private rail company forms a joint company with existing landowners and is responsible for construction along railways lines, including rail infrastructure, property development, and road infrastructure.

These two types of R+P development differ considerably in terms of risk exposures, institutional mechanisms, difficulties of land acquisition, and planning frameworks. For a detailed comparison, see Table 1. Because of the distinction and the relevance to the case study, the following discussion will focus only on station R+P within cities.

Box 2 | The Relationship between R+P and PPP

Opportunities for public-private partnerships (PPP) exist at different stages of financing, construction, and operation of urban rail transit projects.

During the construction phase, local governments and private sector companies can enter into build-transfer (BT) agreements, which leverage the private sector's funding resources, expertise, risk control, and management efficiency to construct subway projects, later transferring the infrastructure back to the public sector when the project enters the operational phase. This is a very common form of PPP financing.

the private sector can also enter into a service concession agreement that grants the private metro company the exclusive right to operate, maintain, and sometime upgrade the system's infrastructure and equipment for a given number of years, by tapping into the private sector's operational efficiency and funding capital. This concession model has been used in the operation of Beijing Subway Line 4.

partnerships that combine build-operate-transfer (BOT) (or service concession) with the R+P scheme. In this model, the government not only grants exclusive rights for constructing and operating the subway lines, but also gives the land-use rights of surrounding land plots to the project company for cost recovery. This model has been used in the R+P project of Shenzhen Line 4.

Table 1 | **A Comparison of Station- and Corridor-Level R+P**

	STATION-LEVEL R+P	CORRIDOR-LEVEL R+P
Risk Level	Relatively low	Relatively high
Properties' Integration with Rail Transit	High (properties usually sit right above transit facilities, e.g., stations and rolling depots)	Low (properties are usually located on land adjacent to transit facilities but are not structurally integrated)
Level of Coordination	Relatively simple coordination within one administrative region (usually a city)	Complicated coordination across multiple administrative regions and vertical levels of governments
Cost and Profit Sharing Mechanism	Limited number of stakeholders involved, making cost- and profit-sharing simple	Interest groups from multiple administrative regions along railway lines, making cost- and profit-sharing more complex
Land Acquisition and Transaction Process	Relatively simple	Relatively complex (if it involves complicated land ownership structures, such as state-allocated land, rural land, or land occupied by major infrastructure such as airports and intercity highways)
Planning Process	Urban-level rail transit and land urban planning will be relevant	Regional-level and city-level railway plans and land-use plans will be relevant

3.2 Opportunities and Challenges for R+P Development in China

R+P development is commonly used to fund rail transit projects in densely populated, land-scarce cities that are well served by public transport and have a strong property market, such as are found in Asian countries like Japan and Korea, and cities such as Hong Kong.

In China, where cities are similarly densely populated and served by public transport, property markets therefore are likely to respond favorably to transit investments. Empirical studies reveal that, in major Chinese cities, property values along subway lines have great potential for value appreciation.

- **Value appreciation potential for residential properties.** The increase in values of residential properties near metro stations resulting from transit investments in Chinese cities ranges between 5 and 20 percent, slightly higher than increases noted in the United

States and European cities (see Table 2) (Zheng 2014). Based on this range, if it is conservatively assumed that metro investments would lead to an increase in residential property prices of 40.6–162.6 USD per square meter (based on average property values in Beijing, Shanghai, and Shenzhen), then capturing these property premiums would generate 325 million to 1.6 trillion USD in revenues, equivalent to 20–90 percent of one metro line's construction costs (Figures converted from RMB to USD with the average exchange rate in 2013).

- **Property Operation Revenue.** Although very few statistics are available from which to draw conclusions about rental price increases for commercial properties near metro stations, a few isolated cases show that the annual profit increases for businesses along Guangzhou's subway lines average between 30 and 175 percent (Guangzhou Metro Daily 2009)

The socioeconomic benefits and favorable conditions in China make R+P development uniquely poised to be an important new approach to fund urban rail transit projects (Box 3).

Table 2 | Land Premiums for Sample Rail Transit Projects

CITY (LINE)	SOURCE	ESTIMATED PREMIUM
Beijing (Line 13)	Gu and Zheng (2010)	Housing prices within a 1km radius of stations increased by 20%
Beijing (Line 5)	Feng et al. (2011)	Housing prices within 1km of stations increased by 4.72%
Shanghai	Gao and Liu (2011)	Housing prices per square meter for locations within 10, 20, and 30 minutes of stations within the Inner Loop increased by 49, 24 and 16 USD, respectively (Figures converted from RMB to USD with the average exchange rate in 2010)
Shenzhen	Zheng and Liu (2005)	Average value of homes within 400m of stations increased 23%, while those within 600m increased 17%
Shenyang (Line 1)	Zhang et al. (2013)	Residential home prices within 800m of stations increased 20%, within 400m 27.4%

Box 3 | Advantages of the R+P Model

Financial Advantages: R+P can speed up the initial stages of project implementation and have a positive impact on the financial state of the project over the long term. In the short term, R+P lowers the financial pressure on local governments, thereby accelerating a subway project's implementation. In the long term, profit-sharing by the government and subway operators from land premiums will bolster the financial sustainability of metro projects, lowering the debt levels for both local governments and metro companies. It can also help to attract private investment, diversify investment portfolios, and lower governments' risk of debt financing. Moreover, by bundling railway works with property development, governments also transfer the major risks associated with market fluctuations and rail operation to the metro companies, thereby reducing their risk exposure.

Sustainable Urban Development: Compared with urban sprawl and the resulting heavy reliance on the current practice of funding transit infrastructure through the land lease system, R+P development concentrates new developments around transit stations, encouraging land-use efficiency and boosting transit ridership. Moreover, R+P also confers micro-level urban development benefits, including streamlining the interface between stations and above-station development, which enables construction work on both to be done simultaneously (to reduce costs and avoid the property development affecting future railway operation).

Social Equality: The redistribution of land premiums resulting from the provision of rail transit systems in China today is unequal. The government takes on the majority of the cost for the construction and maintenance of rail transit projects, while the profits from increased land values in surrounding areas go almost exclusively to developers and property owners. This goes against the principle of investors benefiting from their investment.

In fact, R+P development has received increased attention from China's central government, which has recently issued a series of documents that provide policy guidelines to enable its local implementation. These include the following:

- The 2012 State Council Directive on Strengthening Supervision and Management of Debts Incurred by Local Governments states that market mechanisms need to be expanded to finance urban transportation projects. It also supports the use of high-quality reserve assets by public transport companies as well as the use of models based on special operational status, strategic investment, and equity financing to attract and encourage private investment in urban transportation projects, in particular the construction and operation of rail transit infrastructure.
- A motion passed at the Third Session of the 18th National Party Congress to give permission for private capital to invest and participate in the operation of urban infrastructure projects through PPP mechanisms.
- The State Council Directive on Financial Innovation and Encouraging Private Investment in Key Fields released on November 26, 2014 states that "private investors should be actively encouraged to participate in the construction and operation of urban infrastructure and comprehensive land development surrounding urban rail transit stations and rolling stock depots."
- The 2014 State Council Office Directive on Comprehensive Land Development in Supporting Railway Construction, which encourages comprehensive development of land surrounding railway stations on the condition that the basic transportation functions

are preserved and the operation safety requirements are met. This document also provides guidelines for technical issues regarding the planning of land parcels near railway stations, the transfer of land-use rights, and the technical guidance to utilize spaces above and beneath railway stations for property development. Although this document refers only to the intercity railway system, its release is an important, positive signal that encourages the wider adoption of R+P development in China.

The directives issued by the central government that support R+P development are expressed in general terms and fail to eliminate the specific barriers that inhibit R+P's implementation. In contrast, local policies and directives are more proactive and go many steps further. For example, in 2012, the Guangdong Provincial Government released the Notice on Directives for Improving Mechanisms for Overall Land Development along Intercity Rail Lines in the Pearl River Delta. The directive allows local municipal governments to utilize vacant land near railway stations as collateral for equity loans to finance intercity railway projects. Under this directive, the legal barrier to directly grant land-use rights to railway companies for commercial development is removed; it means that railway companies can obtain land-use rights for commercial development along the railway lines without having to pay a very high price through the competitive land-tender market.

Despite multiple official directives or signals issued recently, there are still misconceptions and institutional barriers that hinder R+P's implementation. The fact that R+P development is a process by which subways and surrounding properties are financed, planned, and built simultaneously means that R+P implementation requires new planning frameworks and land-leasing regimes. In the absence of these vital changes, successful R+P examples will remain isolated. For example, some cities that implement R+P projects still suffer financially and large government subsidies still prevail; others attempt to adopt R+P but are obstructed by institutional barriers.

4. ANALYTICAL FRAMEWORK

This paper first summarizes the common institutional barriers confronted by Chinese cities seeking to implement R+P projects. It then uses Shenzhen's R+P exploration as an example and delves into the practical solutions that the city developed to overcome these institutional barriers. Drawing on the experiences and lessons from Shenzhen's case, we then make recommendations that are applicable to other Chinese cities.

To gain a thorough understanding of Shenzhen's case, semi-structured Interviews and document tracing were carried out. Six on-site interviews were conducted with high-level policymakers, technical advisors, and interest groups that were closely involved in designing and implementing Shenzhen's R+P. These include the Shenzhen Development and Reform Commission, the Shenzhen Urban Planning and Land Resource Research Center, the Urban Planning and Design Institute of Shenzhen, the China Academy of Urban Planning and Design Shenzhen Division, and the Shenzhen Metro Group. The information gathered from the interviews was triangulated with official planning and design documents to filter out any subjective discrimination.

When Shenzhen began constructing its first subway line in 1998, it was the fifth city in China, after Beijing, Tianjin, Shanghai, and Guangzhou, to introduce the subway system. Today, the city has a total of five subway lines in operation, built and financed by either the Shenzhen Metro Group or MTR Shenzhen Co. The reasons for choosing Shenzhen as the case study are twofold

Demonstration Impact. Shenzhen began investigating the feasibility of R+P development as a major vehicle to finance subway projects in 2004 and was the first city to implement R+P development in mainland China. Whether in terms of the diversity of financing mechanisms or the depth of institutional reforms, its experience is more instructive than that of any other Chinese city. Nowadays, R+P development in the city has evolved into different models and became the major mechanism to finance subway expansion. Moreover, the city not only works with the state-owned metro company to advance the R+P development, it also gives broader discretion to private companies like MRT Shenzhen to operate in the city. Shenzhen's experimentation contributed to more diverse pathways to implement R+P.

However, it is also worth pointing out that, although Shenzhen has implemented R+P on the ground, it is still too early to judge whether its ventures will be truly financially viable over the long term. Therefore, this paper also compares Shenzhen's experience with the widely known case of Hong Kong for which there is longer-term evidence

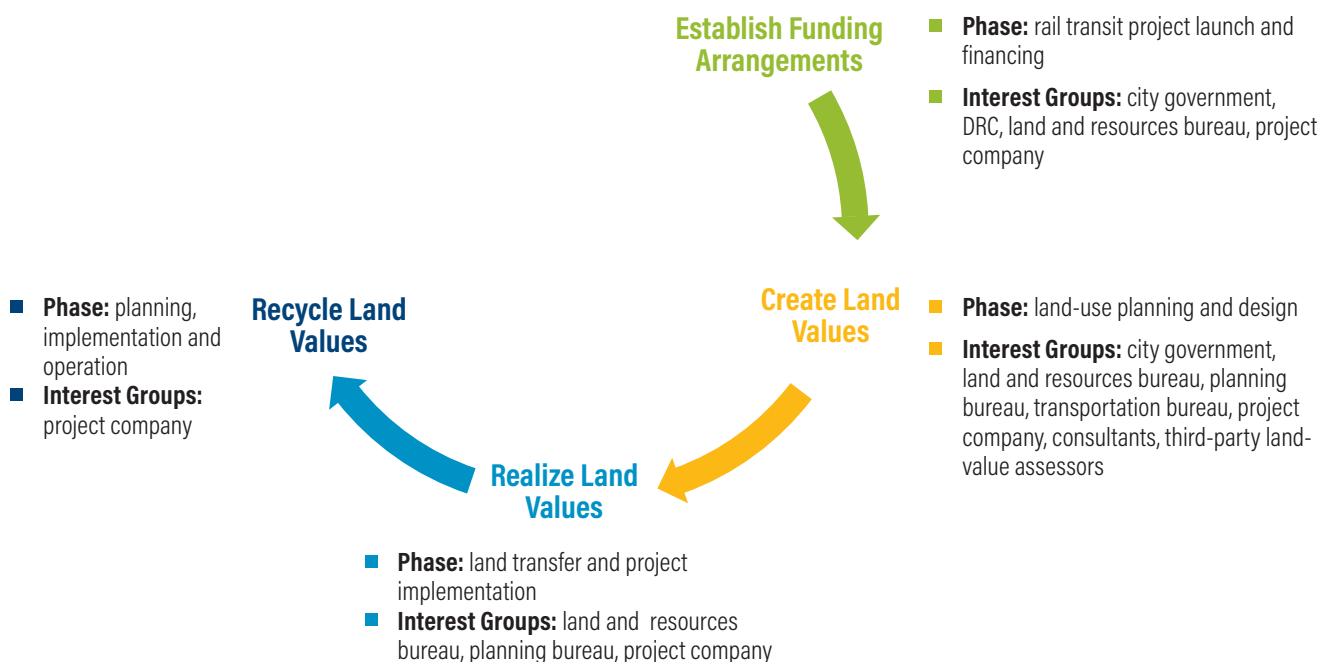
Potential for Localization. Compared to the city of Hong Kong, Shenzhen's institutional environment more closely resembles that of many Chinese cities, possessing the same macroeconomic conditions, financial environment, and policy restrictions. At the same time, Shenzhen's designation as a special economic zone gives it more freedom to promulgate policy decisions that are prohibited elsewhere. This special status has allowed Shenzhen to innovate. Hence, although Shenzhen's R+P experience offers a relevant reference for other mainland Chinese cities, its unique status means that other cities should be cautious in using Shenzhen as a template.

In order to examine Shenzhen's R+P experience in a systematic way, this study adopted a contextualized version of the value-capture financing process consisting of four phases: setting up the value-capture mechanism, creating value, realizing value, and recycling value¹ (Huxley 2009) (See Figure 3). In reality, such a process mirrors

the phases of project financing, planning and design, land leasing and construction, and operation, respectively. The goals, barriers, solutions, and relevant actors are different for each phase.

- **ESTABLISH A VALUE-CAPTURE MECHANISM** (funding arrangement). This phase corresponds to the financing phase of subway projects. It is often led by the municipal government, in conjunction with the city Development and Reform Commission, the city Land Resources Commission, and metro companies. The goal is to set up a sustainable funding mechanism for metro projects. Decisions made during this phase include whether an R+P scheme will be an appropriate mechanism to fund metro projects, the scale and form of government investments, choice of project companies to undertake subway construction and joint development (i.e., a local state-owned company or a private company), and the risk-sharing mechanisms between the government and the project company.
- **CREATE LAND VALUES.** This phase corresponds to the planning and design phase of R+P projects. It involves the municipal government, the city Planning Commission, the project company, and third-party consulting firms. The goal is to maximize the land-value increment potential while ensuring that social equity and environ-

Figure 3 | **Content and Relevant Actors in Different Phases of the R+P Scheme**



mental conservation goals are met. Major decisions made in this phase include determining the routing of the metro line, siting of metro stations, the locations of R+P projects, site plans, and zoning parameters (including floor area ratio and land-use mix).

- **REALIZE LAND VALUES.** This corresponds to the land-leasing and implementation phase during which the project company must ensure the smooth development and operation of the R+P project. This phase requires the city Land and Resources Commission and the city Planning Commission to clarify land-use rights and transfer them from the government to the project company. The project company can then proceed with joint development of subway infrastructure and surrounding properties, capturing land value premiums from the sale or rental of properties after construction is completed.
- **RECYCLE LAND VALUES.** This corresponds to the implementation and operation phase. The land-value appreciation captured by the project company or the government is used to fund the construction of new transit projects, improve the urban environment, and provide affordable housing and public services. As barriers and difficulties with R+P projects in China primarily concentrate on the previous three steps, this paper will not explore this area in detail.

5. SHENZHEN CASE STUDY

This section provides a detailed analysis of Shenzhen's experience of using R+P development. It is organized by the phases of the conceptual process presented in Section 4, explaining the innovations developed by Shenzhen in the first three phases of establishing a value-capture mechanism, creating value, and realizing value. It also describes the administrative safeguards that played an important role in the city's success in using R+P. The limits to Shenzhen's achievements are highlighted by a comparison with Hong Kong's experience (see also Box 4).

5.1 Establish R+P Funding Arrangements

Establishing a funding mechanism for capturing and sharing land-value appreciation from transit projects by the government and metro company is essential to ensure the sustainability of R+P projects. The main challenges faced during this phase include the following.

Box 4 | Comparison of Land Transaction Systems in Hong Kong and Cities in Mainland China

In Hong Kong, the MTR Corporation is granted land-development rights at pre-rail market prices so that the company can capture and retain the premiums gained from metro projects. Based on MTR's cash flow conditions, the concession fees can be paid for the land in a one-time full price payment or in installments.

However, under China's current land-leasing system, the government is unable to grant land-use rights to subway companies at no or reduced cost. Nor can it allow the metro company to pay land leases in installments. Under this arrangement, the transit premiums would fully be captured by governments through land-lease payments even before the R+P projects start. This creates a major barrier to establishing a sustainable R+P mechanism to fund metro projects without aggravating metro companies' financial burdens.

First, cities often fail to establish a reasonable cost-sharing mechanism between the government and the project company, thereby increasing the latter's cost risks. Compared with the costs of traditional subway construction, project companies have to pay both the subway construction costs and the land acquisition and property development costs in the R+P model. If local governments seize R+P as an opportunity to reduce the financial liabilities and refuse to share the cost risks, they will not only increase the companies' financial pressure to fund a larger portfolio, but also reduce the internal rate of return of the projects, and may eventually undermine the companies' motivation and jeopardize the effectiveness of the project.

Besides the cost risk, there is also the institutional risk associated with the land acquisition process. Because the project company is required to bid for nearby properties on the open market, it is likely to pay a high market price for land acquisition. In the worst scenario, where the bidding process is highly competitive, the company might face the risk of losing the bid and the chance for property development.

5.1.1 Innovation of the Shenzhen R+P Model

Shenzhen showed great flexibility and innovation in setting up R+P funding for its subway projects. It not only encouraged both state-owned and private subway companies to participate in R+P projects, but also used innovative land-use rights transaction methods to overcome current barriers within the land-leasing system. These practices evolved over more than a decade.

In terms of the government's investment methods, the R+P financing schemes of Shenzhen's metro construction can be separated into three phases featuring different land use right transaction methods (Figure 4 and Table 3): government-led capital investment, auctions with special conditions and land-concession fee reimbursement, and land equity investment.

In terms of the nature of project companies engaged in the R+P projects, Shenzhen's exploration can be categorized into two forms: a quasi-market-based model applied to the state-owned Shenzhen Metro Group and a full market-based model applied to the MTR Shenzhen Corporation.

PHASE 1: GOVERNMENT CAPITAL INVESTMENT

When Shenzhen first began to build its subway system, it lacked experience with R+P projects and, being risk-averse like most Chinese cities, it separated subway projects from property development in this initial phase. The responsibility of the subway company was solely for the construction and operation of metro systems.

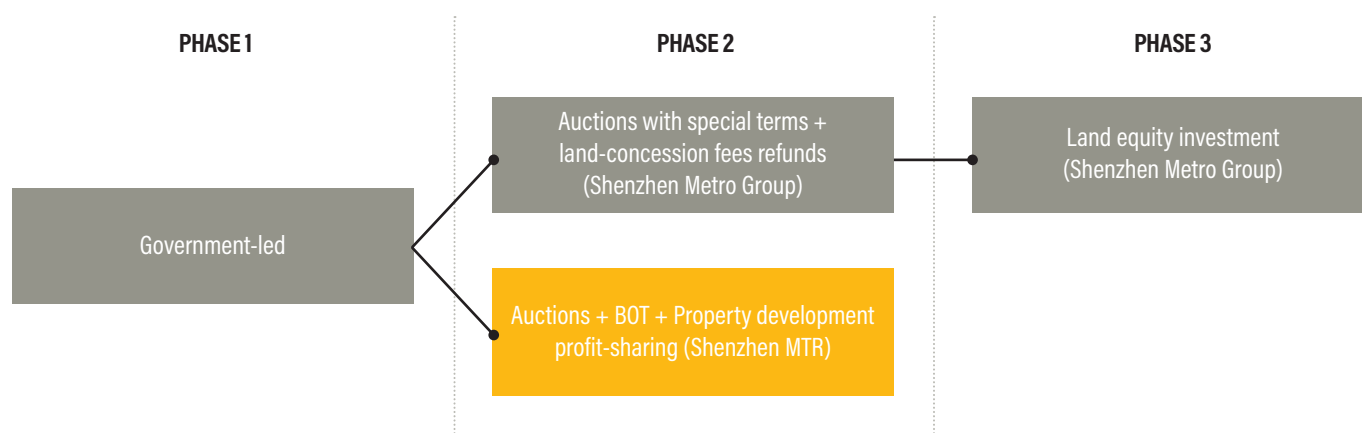
In this phase, funding of the metro lines followed the traditional practice that combines government capital investments and bank loans. For example, the Shenzhen city government investment in the Shenzhen Metro Group totaled 70 percent of the capital cost, while the remaining 30 percent was borrowed from banks by the Shenzhen Metro Group with the government's guarantees. A bank consortium comprising the China Development Bank, ICBC, and the Bank of China provided 423 million USD in long-term loans for the metro construction, with a repayment period of 15 years and relatively low cost of capital (the interest rate could float down by 10 percent, figures converted from RMB to USD with the average exchange rate in 2000).

PHASE 2: SPECIAL LAND-USE RIGHTS AUCTIONS AND LAND CONCESSION FEE REFUNDS

It was not until the later stages of Phase II that the government realized the potential of financing metro construction through joint development. Several factors made the "rail + property" development an ideal alternative:

- **LARGE-SCALE CAPITAL REQUIREMENTS.** As the burden of subway construction increased, capital requirements increased from 1.28 billion USD in Phase 1 to 10.77 billion USD in Phase 2 and 13.21 billion USD in Phase 3 (not including Lines 6 and 8). Relying solely on government capital investments became increasingly unsustainable.

Figure 4 | **R+P Funding Arrangements and Profit-Sharing Mechanisms Used at Different Subway Construction Phases in Shenzhen**



Source: Interview with Shenzhen Development and Reform Commission (2015)

Table 3 | **Three Phases of Construction of the Shenzhen Subway**

PHASE	TIME	NO. OF LINES	LENGTH (KM)	TOTAL INVESTMENT (100 MILLION USD)	TOTAL AMOUNT OF LAND FOR R+P	TOTAL SCALE OF LAND DEVELOPMENT (HA)	TOTAL FLOOR AREA (10,000 M ²)
Phase 1	1998–2004	2	22	12.8	None	None	None
Phase 2	2006–2011	4	155	107.7	7	129	339.1
Phase 3	2011–2016	5	254	132.1*	7	156	477.6

*Investment total includes only Lines 7, 9, and 11.

Source: Interview with Shenzhen Development and Reform Commission (2015); Shenzhen Urban Planning and Land Resource Research Center (2013)

Notes: Phase 1 began in 1998 with a total investment of 1.28 billion RMB in two lines that went into operation in 2004 (Figures converted from RMB to USD with the average exchange rate in 2000).

Phase 2 began in 2006 and included three new lines (2, 3, and 5) and extensions of two existing lines (1 and 4) (Figures converted from RMB to USD with the average exchange rate in 2008).

Phase 3 includes a total of five lines (6, 7, 8, 9, and 11), of which 7, 9, and 11 were undertaken by the Shenzhen Metro Group and Line 6 was a joint venture between Shenzhen Metro and the MTR (Figures converted from RMB to USD with the average exchange rate in 2013).

■ **COMPETING PRIORITIES FOR FUNDING.** In analyzing the opportunity cost for public capital, Shenzhen found that the huge amount of investment required by subways would crowd out funding for social services and other infrastructure projects. This means cities must be aware of the opportunity costs of subway investments. In Shenzhen, in the midst of subway construction, the city was also preparing to host the World University Games. The pressures to fund other infrastructure projects like stadiums were high. In parallel, the social welfare system including healthcare and education also faced considerable deficits. The demands on public funds in these areas thus meant that subway projects needed to seek funding sources other than direct funding by the government.

■ **THE ECONOMIC BENEFITS OF R+P.** The concurrent planning and construction of subway stations and surrounding properties can optimize the interfaces between properties and stations by eliminating the noise and vibration impacts caused by the metro system, and planning in-station grid structures to support future above-station, high-rise development. Also, it can reduce the need for site excavation and refill, and promote the seamless pedestrian linkage between properties and stations. Overall, the coordination of the project phasing of the metro system and property development can lower the uncertainties and risks associated with property projects, and optimize the functions and design outcomes.

■ **THE BOOMING REAL ESTATE MARKET.** To a large extent, the scarcity of land in Shenzhen motivates joint development. In the hilly city, where suitable land for urban development is limited, the inelastic supply of land not only maintains high housing prices, but also encourages compact and efficient use of land.

During Phase II, the construction of different metro lines was undertaken by different metro companies. For example, Line 4 was awarded to Hong Kong's MTR Corporation and Lines 1, 2, 3, and 5 to the Shenzhen Metro Group. Based on the different operational efficiencies of the two companies, Shenzhen developed flexible R+P funding arrangements between the two companies, featuring varied cost-, risk-, and profit-sharing mechanisms.

Shenzhen Metro Group's Model

During the early stages of R+P implementation, Shenzhen municipal government realized that R+P was completely new territory for subway companies. R+P development raised the overall costs and risk for the project companies, especially when the local metro company—Shenzhen Metro Group—was inexperienced and reluctant to expand the business portfolio. To incentivize the group, the city government decided to reduce its cost and risk burdens through the following complex financial arrangement.

First, it scaled back government's direct investment. The Shenzhen city government, Reform and Development Commission, and Planning Commission proposed lowering government investment from 70 percent to 50 percent of the total capital cost of a subway line, forcing the metro company to make up for the difference through bank loans and property development premiums.

Second, the government employed special auctions to transfer land to the subway company. Although current legislation requires that transactions of for-profit land must be carried out in an open market auction, the city ventured to pilot special auctions² for R+P development projects. With special terms restricting the number and qualifications of bidders, it ensured that the metro company would obtain the land at a price that would be not be as high as often seen in the auction market.

Third, the government refunded land concession fees paid by the metro company as the capital investments back to the metro company. Through this complicated process, the city not only granted the land-use rights to the subway company free of charge, but also allowed it to keep the majority of land premiums captured in the future. As a result, the metro company's financial status improved significantly.

In addition, the Shenzhen Metro Group also commissioned developers through a build-and-transfer (BT) arrangement for property development, thereby reducing the construction risk with property development.

MTR Shenzhen's Model

Compared to Shenzhen Metro Group's reluctance, the Hong Kong MTR (Shenzhen) Co., Ltd. (MTR Shenzhen) had been proactively seeking to invest in the city's metro projects through R+P development.

In 2005, Hong Kong MTR Corporation and Shenzhen municipal government signed a build-operate-transfer (BOT) agreement for Shenzhen subway line 4. The agreement allowed the company to carry out R+P in Shenzhen, where certain pieces of land along No. 4 Line would be given directly to the MTR Corporation without the auction process. Instead, the MTR Corporation would pay the land leases in installments, based on the land value at the time of the agreement. However, because this agreement was

fundamentally at odds with the prevailing national land leasehold system, the National Development and Reform Commission nullified the agreement. This setback forced the company to wait until 2009 when the central government signed a supplementary agreement with the Hong Kong SAR that lowered the entry barrier for the company.

In 2009, the central government of China signed a supplementary agreement with the Hong Kong SAR titled Arrangements for Establishing Closer Trade Relations between Hong Kong and Mainland China, which "allowed Hong Kong-based service providers, as a sole investor, to participate in the construction, operation and management of Shenzhen Metro Line 4." Following this agreement, the NDRC and other government agencies eventually approved the BOT agreement between MRT Shenzhen and the Shenzhen municipal government, in which Shenzhen government also awarded MTR a 30-year operating concession for the expanded segment of Line 4. MTR would establish a local project company (MTR Shenzhen), responsible for the financing, construction, and operation of this extension of Shenzhen Metro Line No. 4. The R+P model used for MTR Shenzhen was different from that used by the Shenzhen Metro Group. Compared with the Shenzhen Metro Group, the R+P financial arrangement was set up in an ad-hoc manner. After MTR Shenzhen and the Shenzhen municipal government entered into a BOT contract, MTR Shenzhen further negotiated with the Shenzhen municipal government to obtain the land development rights for two pieces of land near stations of Line No.4. Like the Shenzhen Metro Group, the company received the land development rights through auctions with special terms for prices slightly below the market.

However, unlike the arrangement with Shenzhen Metro, Shenzhen municipal government did not allow MTR Shenzhen to reap all the land premium, but demanded 50 percent of the property development profits to cover the operational subsidies (offered by the municipal government according to the operation concession agreement).

PHASE 3: GOVERNMENT'S LAND EQUITY INVESTMENT

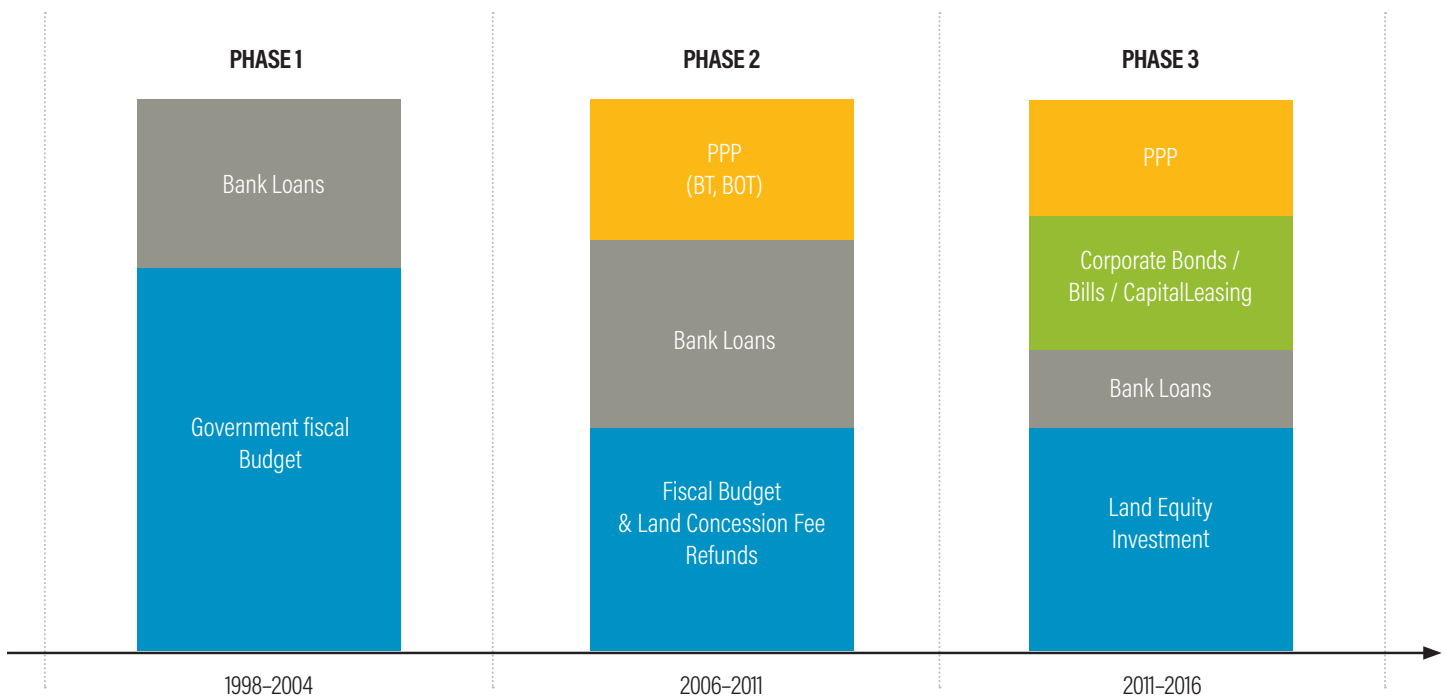
Even though land-use rights auctions with special terms work well to grant land-use rights to designated parties, there are still costs and risks associated with this method, including the following:

- The risk of failing to obtain the land-use rights. Plots near subway stations commonly have greater value creation potential and are particularly attractive to developers in a speculative market.
- The financial risk. Although the land concession fees were ultimately refunded, the project company had to raise capital in the market in order to pay the fees in cash. This exacerbated the short-term financial pressures of the company.
- The legal risk. Whatever terms that might come along with the auctions, they still represent a manipulation of the existing land-transaction system, and might be subject to power abuse. Special auctions are not viable in the long term.

The above concerns forced the Shenzhen city government to clear the institutional barriers presented by the existing land-transaction policies. In Phase III, the National Land and Resources Commission by chance pilot land policy reforms. Since Shenzhen was selected as a test site, the city proposed using land equity investment in place of the traditional capital investments to fund large urban infrastructure projects, such as airports and metro system. This innovation was recognized by the National Land and Resources Commission. As a result, Shenzhen becomes the one and only city in China where using land equity investment to fund infrastructure projects is feasible.

Under this new pilot legislation, the major change is that the government no longer deposits money directly into the account of Shenzhen Metro Group. Instead, it grants pieces of undeveloped land to the company through a three-party agreement between the Shenzhen Urban Planning, Land, and Resources Commission, the State-Owned Assets Supervision and Administration Commission, and

Figure 5 | Funding Structure of the Shenzhen Metro Group over the Three Phases of R+P Development



Source: Interview with Shenzhen Development and Reform Commission and Shenzhen Metro Group (2015)

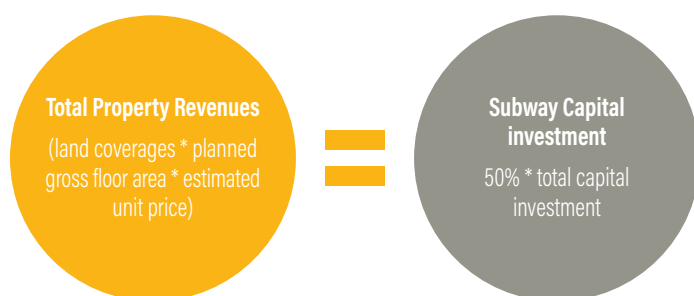
the subway company. At the same time, land equities are added to the company's asset, allowing it to use the equity asset as collateral to raise fund in capital markets, including bank loans or corporate bonds. In establishing the amount of land contributed to Metro Group, the city government used previously established capital ratios, fixed at 50 percent of the cost of construction. Some currently under-construction projects such as Henggang Depot, Shenwan Station, and Qianhai Interchange are being developed in this way.

Compared with previous methods, this arrangement saves the metro company the costly land concession fees and allows it to keep all the land-value appreciation, thereby considerably reducing the transaction costs and institutional uncertainties associated with Phase II while greatly improving the profitability of the metro company. Because, in China, the overall rate of return on land assets is generally higher than that for cash investments, this "rail + property" model has been proposed as the major financing vehicle for the third phase of metro construction in Shenzhen.

5.1.2 Summary of Shenzhen's R+P Practice

The evolution of the Shenzhen subway's funding arrangements is the result of more than 10 years of persistent efforts shepherded by the top leadership of Shenzhen municipal government. Despite Shenzhen's continued efforts to eliminate institutional barriers, there is still some room for improvement when compared to the R+P structure used in Hong Kong.

Figure 6 | **Rationale for Funding Arrangement in Shenzhen's R+P Model**



Note: In this formula, subway capital investment and unit housing prices are all baseline estimates and do not include risk contingencies.

First, in terms of the form of government investments, funding Shenzhen's subway system has transitioned from direct government investment to land equity investment (Figure 5). This has required both local governments and project companies to break away from the conventional practice and seek more diverse and innovative funding sources. However, it is important to admit that Shenzhen is not ideal.

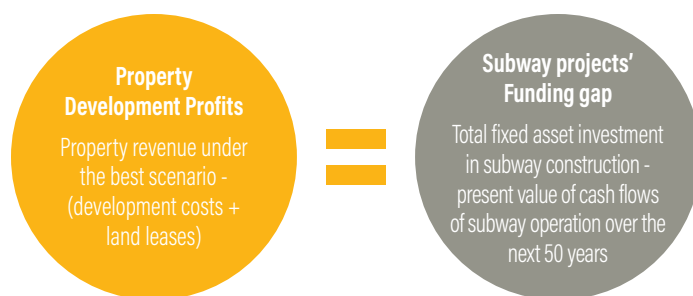
Shenzhen's Funding Arrangement

In establishing the amount of land equity to be contributed to Shenzhen Metro Group, the Shenzhen government used the capital ratio established previously in Phase I, which is fixed at 50 percent of the subway construction costs throughout the years (Figure 6).

Hong Kong's Funding Arrangement

The Hong Kong government decides how to fund subway projects on a case-by-case basis. When real estate market demands around new subway lines are strong, and the property developments around stations are compatible with the city plans and public expectations, R+P is considered (Figure 7). Furthermore, to ensure that government funding support in the form of land-development rights is reasonable, the government commissions third-party consultants to review the metro project's lifecycle costs and funding gaps and ensure that future revenues generated by the land development (mostly under the optimistic market scenario) are sufficient to bridge the funding gaps.

Figure 7 | **Rationale for Funding Arrangements in Hong Kong's R+P Model**



Note: In this formula, the subway project's funding gap is defined as the difference between total fixed asset investment in subway construction and the present value of cash flows of subway operation over the next 50 years. The total fixed asset investment in subway construction is the present value of subway capital investments plus 30% risk premiums (based on unforeseen additional expenditures). The present value of cash flows over the next 50 years can be simply viewed as the operation revenues (i.e., farebox revenues, advertising, etc.) minus metro operation costs.

Based on this rule-of-thumb, the government establishes a fair and reasonable amount of land to grant to the metro company, and any risks arising from real estate market fluctuations will be borne by MTR.

When subway station catchment areas lack market potential, or the proposed developments are not compatible with city plans, or there is a lack of developable sites along the lines, then direct government investment or PPP (either service concessions or BOT) will be considered.

In recent expansions of Hong Kong’s subway system (Table 4), two lines out of five used the R+P funding arrangement, while the others relied on direct government investments or PPP (Suzuki et al. 2015).

A Comparison of Funding Arrangements in Hong Kong and Shenzhen

While Hong Kong’s model may be more complicated (Table 5), it has the following advantages. First, as with any investment, proper risk management by both Hong Kong government and MTR in the course of setting up the funding arrangements (as well as the project implementation) is the key to insulate the R+P project against market fluctuations and reduce both parties’ risk exposures. Second, although the Hong Kong government, MTR, and third-party surveyors take great pains to forecast projects’ lifecycle costs and revenues, their efforts form a solid basis for clear-cut risk sharing between Hong Kong government and MTR (in particular, Hong Kong government is responsible for filling up the funding gap, while the market risks should be borne by MTR), and will be useful for resolving any possible future disputes if the project fails.

Table 4 | Funding Arrangements for Five Hong Kong’s Most Recent Subway Lines

LINE	TOTAL CAPITAL COST (100 MILLION HKD)	FUNDING GAP (100 MILLION HKD)	FUNDING ARRANGEMENT
South Island Line-East	124	99	R+P scheme
Kwun Tong Line Extension	53	33	R+P scheme
West Island Line	154	127	Government Capital Investment
Guangzhou-Shenzhen-Hong Kong Express Rail Link (Hong Kong Section)	669	—	Service Concession
Shatin to Central Link	798	—	Service Concession

Source: Suzuki et al. (2015)

Table 5 | A Comparison of R+P Funding Arrangements in Shenzhen and Hong Kong

	SHENZHEN	HONG KONG
Guiding Principles for Government Investment	—	A clear and holistic guiding principle
Government Funding Arrangement	Dominated by R+P scheme (especially in Phase III)	A wide range of choices among R+P scheme, direct government capital investment, and PPP
Scale of Government Investment	Fixed rate, i.e., 50% of the total subway capital cost at each construction phase	Line by line investigation to ensure future property revenues will just cover the funding gap of each line
Government Estimates of Property Development Revenues	Baseline values based on current market prices	Based on optimistic market condition

Second, in establishing the entity that will carry out R+P development, Shenzhen evolved from a government-led model to a mixed model that leverages the land resources and the future land value appreciations in different ways. Shenzhen's success can be attributable to the following three factors:

Government Leadership. The evolution of the Shenzhen Subway's financing mechanism has benefitted from more than 10 years of tireless efforts by the Shenzhen city government, in which the government played a critical role from the inception by decisively breaking away from its previous model of direct capital subsidies to the subway company. It created instead a flexible mechanism of cost recovery that allowed the government and private business to share subway construction costs as well as the revenue generated by land premiums. This approach was effective in incentivizing the subway company to participate in R+P programs and ensuring the financial sustainability of subway projects.

Transition of the State-owned Subway Company. As the form of government investments evolved from capital investments to land equity investments, the Shenzhen Metro Group also transitioned from a passive subsidy-recipient to a more active profit-generating role. It is now not only proactively seeking more corporate financing channels, but is also actively expanding business portfolios in property development.

The Introduction of Private Subway Companies. Shenzhen involved Hong Kong's MTR Corporation early, allowing the city to draw on the company's rich experience in R+P development. The MTR Corporation not only provided valuable experience in areas such as market analysis and site plan and design, it also served as a sound benchmark for the local subway company, encouraging competition.

In Hong Kong, the finance and construction of the subway system is also undertaken mostly by the government-controlled MTR Corporation, but the differences between Hong Kong MTR and Shenzhen local subway company lie partly in the fact that MTR is a profit-oriented listed company (see Table 6). However, more importantly, the Hong Kong government outlined clear rules and responsibilities on the outset for both the government and the MTR Corporation through a contractual regime. These written rules and obligations not only serve as a sound basis to effectively monitor the performance of the company and

safeguard public interests, but also regulate government's behavior, provide legal protection for metro companies, and offer stable market predictions (Liu et al. 2013).

5.2 Creating Opportunities for Land Premiums

Unlocking the value in land surrounding metro stations requires not only well located, developable land near stations, but also the proper urban plans and designs that aim to maximize the land (and property) value appreciation. In reality, this is often achieved through fostering transit-oriented development (TOD) around stations, with a purpose of encouraging dense, mixed-use, and pedestrian-friendly development in the transit station catchment areas that helps generate more property revenues and higher transit ridership.

However, the default planning framework in China does not support TOD. For example, the transit and land use plans are not integrated: when urban rail transit lines are planned, the process fails to trigger the statutory zoning amendment process for up-zoning or land-use changes. Likewise, the planning process is often government-led and lacks the match to market demand. Last but not the least, the current regulatory zoning is so inflexible that achieving high-density, mixed-use development often means a time-consuming, tedious process that would be very likely to compromise the financial viability of the project because of the delay involved in property development.

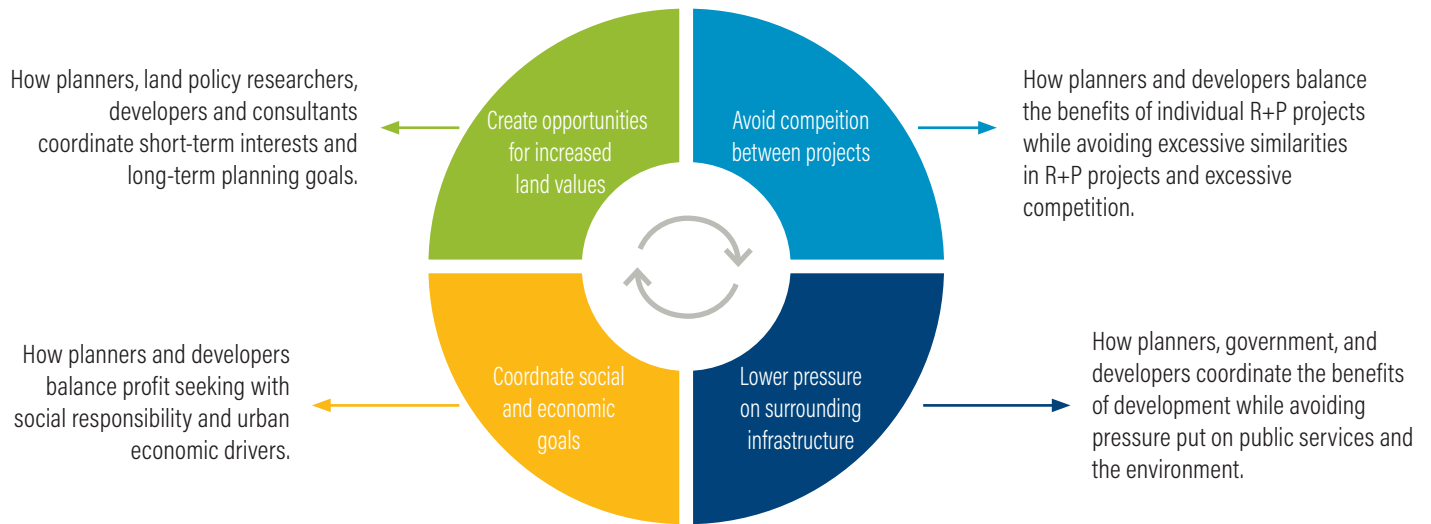
5.2.1 Innovations in the Planning System

R+P development poses new challenges to China's existing planning process. In view of the challenges, Shenzhen has made a number of bold innovations, including working to align the visions of different stakeholders, integrating rail transit and land-use planning with financial planning, and introducing flexible regulatory zoning. These are discussed below.

ALIGNED VISIONS FOR R+P AND MULTI-STAKEHOLDER ENGAGEMENT

To increase land value creation potential while also meeting the city's economic development, social integration, and environmental conservation goals, R+P projects require aligned visions and coordinated actions among different players. Specifically, Shenzhen's pilot experiences demonstrate that four kinds of goal should be coordinated as safeguard measures for R+P projects (See Figure 8).

Figure 8 | **Multiple Planning Goals in R+P Development**



Note: By doing so, it would save larger amounts of land to be listed on the tendering market, thereby generating more upfront municipal revenues.

Matching property development with market demand

One unique feature of R+P development in China is that planning and land resources agencies have a strong tendency to increase the R+P development intensity in order to minimize the size of land needed for R+P projects¹. On the other hand, subway companies tend to avoid overly dense developments to mitigate any potential real estate market risks. In order to properly identify and allocate the market risks, Shenzhen carried out thorough market analysis and phased the construction timelines in tandem with the market demand. For example, persuaded by the market trend presented by the metro companies, the municipal government and the metro companies have arrived at the consensus that the quantity of property developments put on the market cannot be unrealistically high; therefore, they greatly scaled back the housing supply plans from 7.8 million square meters to 4.8 million square meters in Phase III.

Coordination among individual projects and with overall city plans

The tendency to maximize the benefit of individual projects and to standardize the site and business plans of R+P projects by metro companies may result in unnecessary competition across R+P projects (Figure 8). For instance, on a broader scale, the lack of coordination among R+P projects and citywide plans could lead to housing oversupply, inter-district competition, and excessive investments. One example commonly seen in Chinese cities is

the excessive provision of commercial complexes around metro stations. To address the issue, in Shenzhen, the property development in proximity to subway stations is centrally planned, enabling coordination among properties as part of overall city plans. The city also tailors the land development proposals to the specific locational contexts and aspirations of the local neighborhoods. This means that projects are not uniformly mixed-use, for-profit projects, but also feature public amenities like sports, city parks, and educational facilities.

Coordination between economic and social goals

Planning property developments along subway lines needs to balance the short-term interests of property profitability with the long-term social goals of delivering transit service to underserved residents and improving the city's overall transit accessibility. In Shenzhen, misguided policies during the early phase of R+P development resulted in multiple high-end complexes around subway stations affordable only by the affluent, who rarely use the subway system. Hence, although gains from the property developments were maximized, the transit ridership (along with the farebox revenues) was negatively affected. This prompted Shenzhen to demand a large portion of affordable housing and public amenities for R+P projects in the later phase. Although this intervention may lower the overall profits of property developments, it helps the city to make transit stations more attractive and accessible to transit users.

Coordination between dense development and the capacities of nearby facilities

Despite the fact that dense developments around transit stations in the existing urban centers have the potential to alleviate acute housing demand and generate high property value gains, the strains that they place on the nearby services, infrastructure, and environment cannot be ignored. In Shenzhen, to increase the surrounding carrying capacity to accommodate the intensive development, the planning agency diligently works with multiple departments (e.g., transportation and public works) to expand the capacity of urban utilities, adjust the surface road network, and reduce the overall environmental footprint of the property developments.

To ensure the above goals can be attained, Shenzhen chose not to follow a traditional government-led planning process. Instead, it allows city Reform and Development committee to lead the way, with participation by the project company and multiple municipal entities, to jointly evaluate and decide upon metro companies' proposed adjustments, including specific land sites, planning parameters, or even metro lines' routing. Although the final decision-making power is retained at the city's Planning Committee to balance among divergent departmental interests and safeguard public interests, the equal dialogue platform without government agency dominating the process enables a more market responsive process, thereby mitigating the market risk incurred at the planning phase, and increasing the value creation potential.

INTEGRATING RAIL TRANSIT AND LAND-USE PLANNING WITH FINANCIAL PLANNING

The success of Shenzhen's R+P planning is also due to the streamlined and coordinated planning process that integrates transit planning, land-use planning, and financial planning.

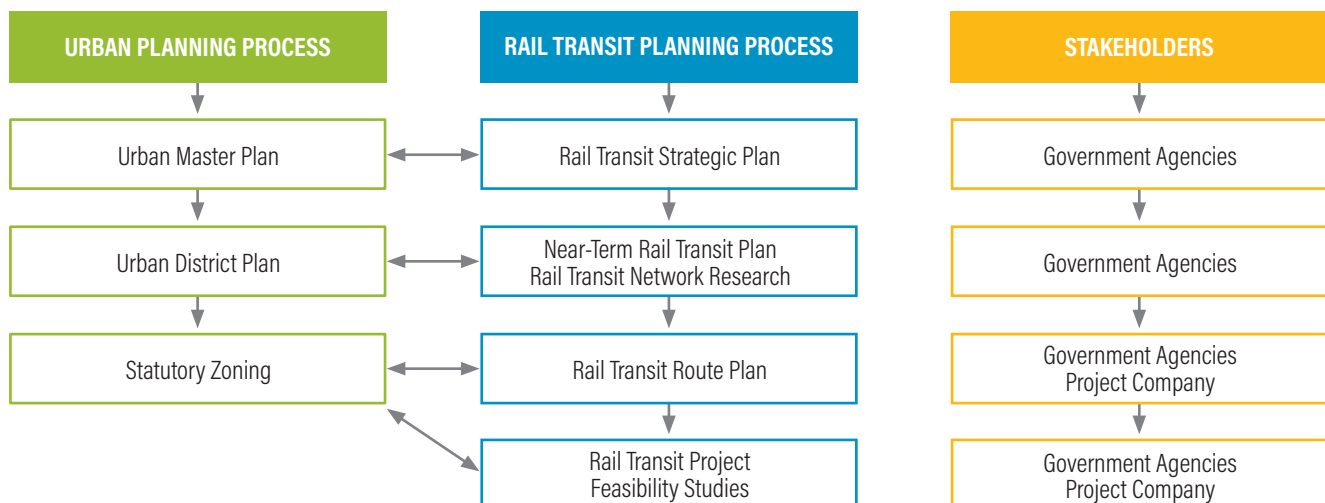
Integration between urban rail transit plans and land-use plans

Shenzhen borrowed from Hong Kong's experience not only to streamline the details of the different phases of rail transit plans, but also to adjust its planning process as needed to create synergies between the series of rail transit plans and the overall urban planning process, thus laying the foundation for TOD development around transit stations.

Shenzhen built its metro system according to the urban rail transit strategic plan³, which provides long-term vision and construction phasing. Guided by the strategic plan, the route-level plan, the feasibility study, and the financial plan of individual subway lines will be developed before initiating each construction phase.

The coordination between land-use and transit plans in Shenzhen occurs at the route level by bundling zoning revision proposals with rail transit route plans (Figure 9). Specifically, once the route plan of new metro lines is determined, the planning institute and metro companies

Figure 9 | Coordination between Transit Planning and Urban Planning in Shenzhen



conduct independent market analyses and land-use surveys along the planned lines to pinpoint vacant or underutilized land with great market potential and formulate new zoning proposals to reshape the areas. Then the planning institute, in consultation with the metro company and other governmental departments, will shortlist land lots to be used for joint development. All the relevant stakeholders will further discuss and propose new zoning codes for these land lots accordingly. Normally, the flooring area ratio (FAR) of developable sites near metro stations is increased significantly, and the land uses will be more diverse with better provision of public amenities to drive the area's transformation. This draft route plan with zoning proposals will be then submitted to the municipal planning committee (led by the mayor of the city) for further deliberation.

Conversely, besides zoning proposals, metro companies can also propose to adjust the specific locations of subway stations or line routing, based on land supply and market potential. For instance, during the rail transit feasibility study of Line 6, MTR Shenzhen found that the siting of the Changzhen rolling stock—on a hillside far away from the urbanized areas—greatly limited the property development's market potential. The project's profitability concerns prompted discussions between the company and Shenzhen's planning committee that resulted in the relocation of the rolling stock to a more central area with a greater market potential and better alignment with the city's urban master plan.

Lastly, the interactive planning process not only enables the integration of transport facility provisions and urban development at metro stations, it also provides a valuable multi-stakeholder dialogue mechanism for other municipal departments to further expand capacity of urban utilities and adjust surface road networks.

Despite this process innovation, Shenzhen's integrated planning experience remains limited, when compared with Hong Kong. As the "master planner and designer," the MTR Corporation is actively engaged in the entire urban planning process from urban master plans to regulatory zoning. However, in Shenzhen, given the weaker role played by the metro companies, the corporation's active participation in the planning process occurs only when route-level plans are determined. This late-stage engagement may lead to missed opportunities to introduce metro lines to urban areas that had more potential

for joint development, thereby restricting the extent to which transit plans could be optimized and limiting the degrees land values could be created.

Synchronization of urban planning and subway financial plans

Since decisions on the scale, locations, intensity, and functions of land developments in vicinity to metro stations bear a strong relationship with the level of government investments and future property revenues, Shenzhen's planning commission and the Development and Reform Commission took into consideration of the above parameters as prerequisites of funding arrangements for the R+P projects.

Moreover, the planning process and financing decisions are closely connected in an interactive process with feedback loops: if the initial planning parameters and scale of land developments fail to bridge the funding gaps, governments work with metro companies to keep fine-tuning planning parameters (such as increasing FARs, changing land-use functions, adjusting locations) or simply searching for a larger land lot. The process will iterate until the funding gap is bridged or the projected property revenues have reached the pre-defined level (that is, 50% of the capital investment). During this process, third-party agencies are often commissioned to perform independent property valuation for the development based on the baseline market scenario.

To summarize, the integrated land-use planning and financial arrangement process can be broken down into four steps (Shenzhen Urban Planning and Land Resource Research Center 2013):

- **STEP 1:** Estimate the funding gap based on the overall capital investments; comb through developable land along the metro lines to shortlist the land lots to be used for R+P development.
- **STEP 2:** Establish initial planning parameters for the land lots.
- **STEP 3:** Assess whether the future property revenues can meet the funding gap; if not, iterate Step 1 and 2.
- **STEP 4:** Determine planning parameters and grant land-use rights to metro companies.

FLEXIBLE REGULATORY ZONING

R+P projects often require a certain degree of flexibility in the zoning regulations⁴. It is especially the case when the zoning ordinance is stipulated before the rail transit plan is initiated. Also, the lack of flexibility in zoning and the lengthy procedure necessary to amend the zoning may also create a time lag between the property development and metro projects, aggravating the financial pressure on the project company. However, if the zoning regulation can be changed easily, it will weaken zoning's authority and encourage power abuses and even corruption (Zhao 2011).

Shenzhen reformed its zoning procedure in two ways, increasing its flexibility while maintaining its authority:

Measure 1: "Case by case adjustment"

This refers to situations in which the Urban Planning and Land Resources Committee initiates zoning amendment requests for individual R+P projects, following the legal zoning adjustment procedure. In fact, Shenzhen allows the densities for residential and office developments around transit stations to fluctuate within a certain range (Table 7). This gives Shenzhen's Planning and Land Resources Committee the discretion to change the densities based on the needs of the site development proposals, without triggering the time-consuming zoning adjustment procedure. But if there is a need to further increase the density, the city's Planning and Land Resources Committee must undergo technical review, initial approval, public announcement, and a series of other approvals as required by the Urban and Rural Planning Law and the Shenzhen Urban Planning Regulations.

Measure 2: A "Special Control Zone"

Following Hong Kong's successful trial of comprehensive development area (CDA), Shenzhen experimented with "Special Control Zones" to encourage a relatively flexible land-use type for land parcels surrounding transit stations. Hong Kong spearheaded flexible zoning through "CDA." This new land-use type allows developers and the government to specify the zoning codes for R+P projects after developers are identified, with final approval given by the planning committee and resident representatives. In Shenzhen, the Special Control Zone was introduced with a similar rationale. It is used particularly when the locations of subway stations are determined before the zoning of the areas (often newly urbanized areas) is stipulated, but real estate developers and their development visions are still unclear. At the early zoning stage, the special control zones outline only the general function and numbers of buildings needed for the areas to satisfy the social and environmental interests, while the specific land uses and densities for subdivided land plots are defined at a later time through multilateral discussions with developers and other public stakeholders. The establishment of a Special Control Zone expedites the zoning amendment process, increases land-use flexibility, while at the same time maintaining zoning's legal authority.

5.2.2 An Overview of Shenzhen's R+P Projects

Shenzhen has a total of 14 R+P projects under way or completely constructed, 7 of which were launched in Phase 2 and another seven in Phase 3. These projects diverge widely in terms of location, scale, land-use mix, and development intensity.

Table 7 | **Density Correction Coefficients for Subway Stations, Based on the Shenzhen Urban Planning Regulation**

	DISTANCE FROM STATION (METERS)	STATION TYPOLOGY	
		Major Interchanges	Average Stations
Correction Coefficient	0-200	+0.6	+0.4
	200-500	+0.4	+0.2

Source: Shenzhen Planning, Land and Resources Commission (2014)

Note: the density correction coefficients are the ranges within which the densities can vary from planned levels. For instance, a coefficient of +0.6 means that the density can be increased to 1.6 times the current planned density.

Based on locational characteristics and physical typology, Shenzhen's R+P practices can be categorized into two types: namely, projects on the periphery of urbanized areas (Type 1) and projects in existing urban centers (Type 2).

TYPE 1: PROJECTS ON THE PERIPHERY OF URBANIZED AREAS

The low development cost, especially low land acquisition cost, on the periphery of urban centers often makes these areas popular for R+P projects, on condition that there is demand in these areas. R+P projects of this kind are often built over rolling stock depots at terminal stations, and sometimes on irregular-shaped, left-over land that is criss-crossed by transit lines or highways and that, without R+P development, would remain under-utilized and unpopular on the land market.

Such R+P projects often cover a wider geographic area beyond the boundaries of rolling stock depots. Since reducing impacts of vibration, noise, and emissions from the depots becomes increasingly challenging and cost-prohibitive as the built-over structure increases in size, metro companies commonly advocate for a low FAR of 1.2–2.5 for development rights above the depots. To improve the projects' financial performance, the city's metro company therefore acquires more pieces of land adjacent to the depots and applies a higher FAR of 4.0–5.5 to offset the development costs.

TYPE 2: PROJECTS IN EXISTING URBAN CENTERS

Due to the high cost of land acquisition and demolition work to redevelop station areas in built-up centers, R+P projects of this kind are rare in Shenzhen. For these few projects to be financially feasible, land was usually acquired and banked early before the construction of subway lines.

The existing R+P projects of this kind commonly take two forms: the first is major transit interchanges with large land coverages (e.g., the Qianhai Transit Interchange), and the second is building structures with small land coverages. For the latter to capitalize on the property price premium, the FAR is usually as high as 6–10⁵. In the case of Shenzhen University Station, the land reserved for R+P development is only 1 hectare, but has a FAR stretching to 10.

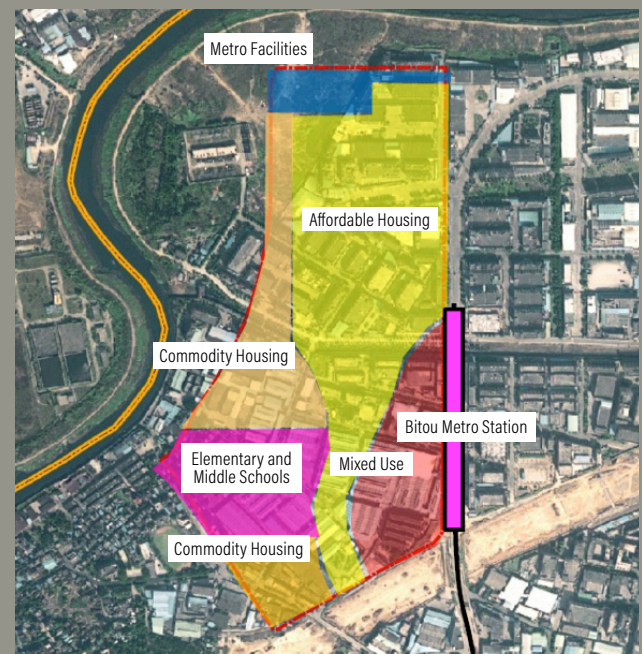
Whether both types of R+P projects are financially viable is determined by the market demand and the development proposals conceived for each project (Table 8). Notably, unlike Hong Kong's gradual evolution from small, simple redevelopment towers to large-scale new town developments, Shenzhen undertook a steep learning curve with

Box 5 | R+P Development Proposal for the Songgang Rolling Stock Depot

The Songgang rolling stock depot is a typical example of the R+P development occurring in the suburbs of Shenzhen (Type 1). The Songgang rolling stock depot is located near Bitou Station along Line 11 bordering Shenzhen and Dongguan. The depot is situated on three separate land plots that cover an area of 42.09 hectares. The area is planned as a "special control zone," based on future expectation of subway construction. In line with the aspirations of local communities, this land will not only be served by public transit services, but will be equipped with mixed residential and commercial uses as well as community facilities. These include:

- Affordable housing on land above the rolling stock depot—FAR 2.0.
- Schools and residential housing east of the depot—FAR 3.0.
- Commercial and office developments near Bitou Station—FAR 6.0.

Figure B-2 | Layout of the Songgang Depot



Source: Comprehensive Plan and Design of seven Rail plus Property Development projects in Phase III (Shenzhen Urban Planning and Land ReSource Research Center 2013)

large-scale new town projects adopted at the outset. The reason is that small-scale redevelopment projects are perceived to be extremely costly and time-consuming, whereas large quantities of low-cost land are readily available on urban peripheries. At present, prototyping large-scale R+P developments at the urban outskirts of the rapidly evolving Shenzhen is justified in its own right,

in particular, to provide funding for much-needed urban rail services linking newly-urbanized areas to city centers. However, as the land available for new developments decreases in the future, redevelopment projects will be inevitable. Shenzhen's limited experience demonstrates that with timely land banking and coordinated land use and transit planning, it is still possible for redevelopment R+P projects to be financially feasible and time-efficient. Further, Shenzhen's experience also indicates that increasing land supply is not necessary to attain the levels of funding needed for subway construction. With average housing prices in Shenzhen in thousands of USD per square meter⁶, development of a relatively small piece of land (in the case of city centers) would be sufficient to recover 50 percent of the subway construction cost.

5.3 Value Realization

Value realization is made possible through land transactions and implementation of R+P projects. However, institutional factors are also principal obstacles in this phase. In particular, the National Land Management Law

dictates that land used for public transit infrastructure should be categorized as Allocated Land and should be free of charge. No for-profit development is allowed on the allocated land. Land used for commercial, residential, or office development has to be auctioned publicly.

This specific legislation creates confusion for both planning and land-resource agencies when transferring land from the public sector to the metro company. For example, for planning agencies, the National Land Management Law limits the compatibility of transit facility land uses with for-profit activities such as commercial, residential, and office uses. For land resource agencies, even if planning agencies adopt mixed uses for transit facilities, problems remain as to how to transfer land-use rights when one piece of land is usually bound by one type of land use rights (that is, either free-of-charge allocated land, or auctioned land).

In order to overcome existing barriers to the transfers of land-use rights, Shenzhen has reformed the planning and land transfer processes.

Table 8 | **A Comparison of Type 1 and Type 2 R+P Development**

	TYPE 1: URBAN PERIPHERY AND EMERGING CENTERS	TYPE 2: EXISTING URBAN CENTERS
Advantages	<ul style="list-style-type: none"> Land easily acquired, low land prices, low development costs 	<ul style="list-style-type: none"> For cities that have limited room for expansion, this type of development can lower the demand for land and raise the land use efficiency through redevelopment
Risks	<ul style="list-style-type: none"> As the developments often occur on suburb, the market risk is higher, thereby requiring careful selection of areas with greater demands 	<ul style="list-style-type: none"> Land availability is limited in the built-up areas Land acquisition cost is too high to trigger redevelopment, and dense development might also put pressure on surrounding public services and the environment

Table 9 | **Land Use Compatibility Matrix (Partial) for Transit Uses under Shenzhen Urban Planning Regulations**

LAND USE TYPE (BROAD)	LAND USE TYPE (SPECIFIC)	COMPATIBLE LAND USES (NO GOVERNMENT APPROVAL REQUIRED)	COMPATIBLE LAND USES (NEEDS FURTHER GOVERNMENT APPROVAL)
Transit Infrastructure	Urban rail Transit (S3)	C1 (commercial) R2 (Type 2 residential)	GIC2 (cultural/sports) R3 (Type 3 residential)
	Bus terminals and Interchanges (S4)	C1 (commercial)	GIC2, R3

Source: Shenzhen Planning, Land and Resources Commission (2014)

Note: Encouraged categories for mixed-use land generally refer to projects that are able to use land more efficiently and are frequently used within the scope of planning. Authorized categories for mixed-use land refer to projects that are permitted and are approved based on the specific planning needs. Other categories confirmed for mixed use must pass special evaluation.

5.3.1 Improved Land Use Compatibility Matrix to Encourage Land Use Mix

In 2010, the Shenzhen Planning and Land Resources Committee enacted the local Provisional Guidelines for the land use compatibility matrix, which grants the permission for land originally zoned as transit uses to accommodate value-creating activities such as commercial, office, hotel, and residential uses (Shenzhen Planning, Land and Resources Commission 2014) (Table 9). This implies that, without changing the zoning, urban rail transit facilities can be legally compatible with residential and commercial functions.

5.3.2 Vertical Separation of Land-Use Rights

Because land-use rights (including valuation and time limit of usage) are defined and transacted based on land uses, mixed uses require reform of the existing land transaction policies. As a pioneer, Shenzhen is the first city in China to experiment with vertical division of land-use rights for the same piece of land. The R+P development at Qianhai rolling stock depot is a pilot project adopting the vertical division of land use rights. In this case, the underground space is used for metro tracks, and the land-use right is still granted through free-of-charge allocation. The above-ground space is divided into two different sections: the section below 15 meters will be used for rolling stock depot and relevant interchange facilities, the land-use rights of which are granted through agreement with negotiated prices; the section above 15 meters will be used for office space, shopping malls, or housing units, the land use rights of which are granted through public tendering. See Figure 10 below for details.

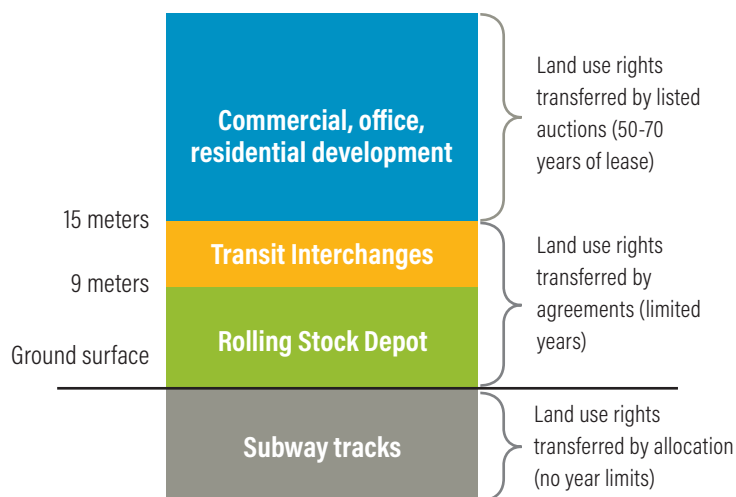
5.4 Other Enablers

5.4.1 Creating an Effective Mechanism for Coordination

Rail + property joint development involves multiple key players and stakeholders (Figure 11), such as the municipal development and reform commissions, planning bureaus, land-resource bureaus, financial bureaus, and transportation commissions, as well as the participation of metro companies. Therefore, the success of R+P development hinges to a large extent on an effective mechanism for cross-departmental coordination. The special institutional setting in Shenzhen is favorable to collaborative actions.

One unique yet favorable condition in Shenzhen is that the planning bureau and land-resource bureau have been merged into one department since 2009. Such an arrange-

Figure 10 | Vertical Division of Land Use Rights



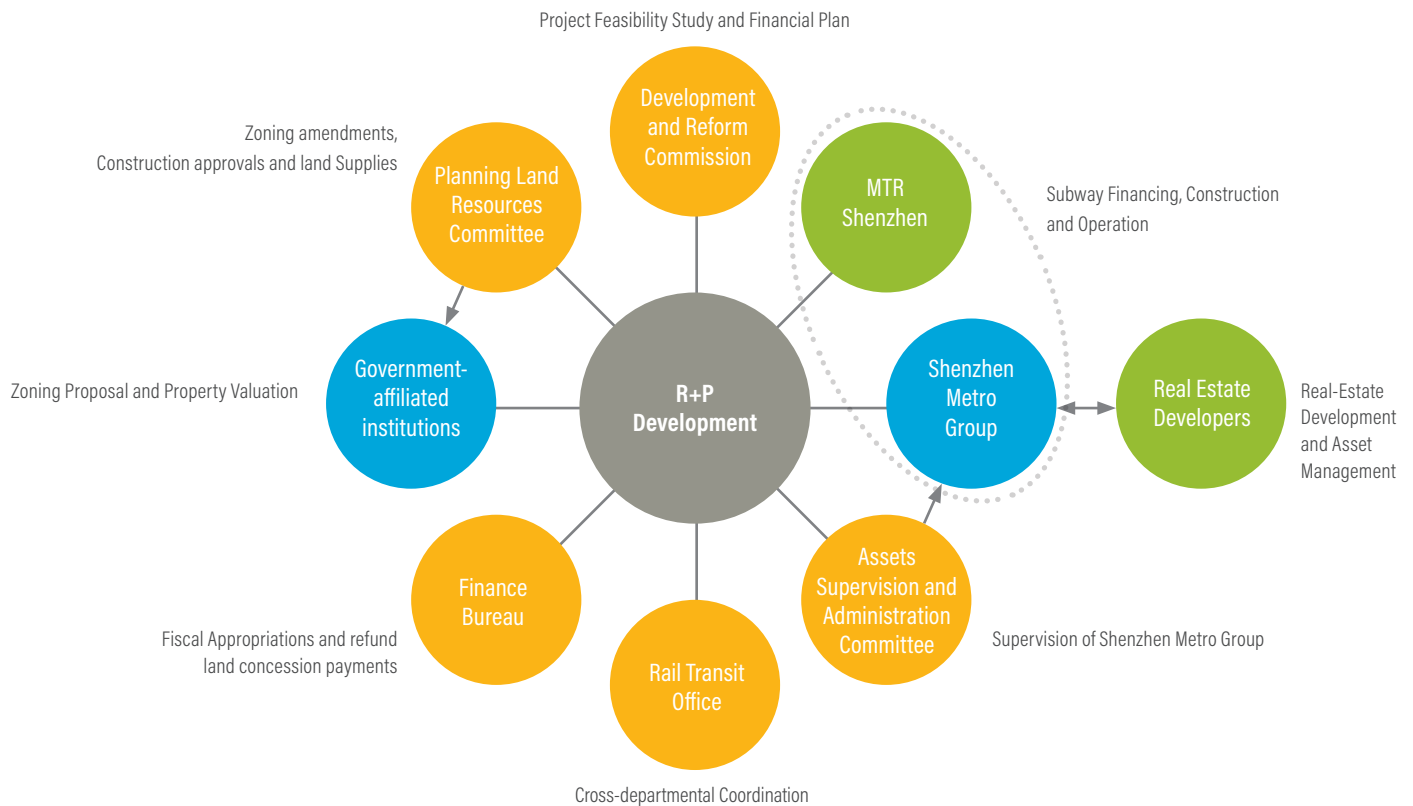
ment facilitates goal alignment and integrated decision making, and avoids sectoral silos commonly seen between the planning and land-resource bureaus in many Chinese cities.

Second, the mayoral office, different municipal departments, and metro companies sometimes have divergent interests and visions as to whether to pursue R+P projects and how land should be developed around station catchment areas; the right to make final decisions is retained by the mayor's office. This helps to avoid sub-optimal outcomes due to piecemeal decision making, departmental silos, and inter-district competition. However, the centralized decision making runs the notable risk of power abuse and is greatly subject to individual mayors' understanding of R+P.

Third, the city DRC was appointed as the lead agency with responsibility for approving the construction and funding of metro system as well as establishing the financial arrangements for R+P projects. In addition, a stand-alone urban rail office, which directly reports to the mayor, was set up to coordinate the communication and negotiation among government agencies, research institutions, and metro companies.

Lastly, R+P development in Shenzhen is empowered by the augmented capacities of local government-affiliated research institutions. Unlike many Chinese cities, Shenzhen has deliberately cultivated multiple governmental think tanks to support and advise on R+P financial arrangements and site plans, enabled by increased government spending on research and proactive talent acquisition.

Figure 11 | Key Players and Responsibilities in Shenzhen's R+P Development Ecosystem



5.4.2 Improving Operational Capabilities of Project Companies

R+P development represents not only a new frontier for local governments, but also an entirely new business portfolio for metro companies. Life-cycle financial planning, risk allocation among different business partners, and market-oriented operation and asset management all pose challenges to the metro companies. To overcome these challenges, Shenzhen Metro Group takes a progressive pathway to augment its capacity.

In the short term, through partnering up with established developers, consulting companies, general contractors, and asset managers, the company compensates for its staffing and skill deficiencies, successfully distributes risks among different project partners, and reduces its risk exposure to related market fluctuations (Figure 12). However, owing to concern for the potential loss of state-owned assets (particularly the large amounts of land assets at low costs), the Shenzhen city government has placed certain limits on developers authorized to cooperate with the Shenzhen Metro Group; in practice, this means that state-owned real estate developers are the only partner option.

Figure 12 | Risk-Sharing with Various Business Participants in R+P Development



Source: Asian Urban Development Center (2010).

In the long term, Shenzheng Metro Group will continue to expand its business offerings and technical capabilities. In fact, it has gradually grown from a subway construction company to a comprehensive organization that incorporates construction, operations, property development, and asset management. Yet, compared with Hong Kong's MTR Corporation (Table 10), there is still room for growth.

LINGERING CHALLENGES WITH SHENZHEN METRO GROUP

Although Shenzhen Metro Group has made proactive efforts to improve financial performance, expand business portfolios, and reduce risk exposures, the company still faces a number of challenges.

Focusing on Quality and Sustainability

R+P projects do not offer quick wins. For R+P projects to be successful, the metro company has to align corporate goals to maximize profitability with the city's overall socio-economic objectives. In Hong Kong, it took over ten years for the MTR Corporation to achieve break-even between the expenditures on metro construction (as well as operation and maintenance costs) and property development earnings (Tang et al. 2004); this was made possible only by MTR's long-term financial planning. In particular, the metro operation and maintenance funding gap is princi-

pally recovered by the recurrent revenues from leasehold which include in-station retailing revenues and leases from MTR-owned properties, whereas new lines' capital investments are largely recouped by the upfront sales revenues streaming mostly from residential developments. However, in Shenzhen, the short-term needs to capitalize the upfront profits of property development and bridge the rail transit projects' funding gaps has resulted in a strong preference for saleable properties, such as residential units, in project portfolios. Yet, the lack of long-term commitments to for-sale properties, compared to leasehold properties (such as commercial and office assets), might weaken the quality and profitability of R+P projects. Moreover, the over-emphasis on efficiency and short-term gains instead of long-term quality and financial planning also underscores the potential lack of patience, social commitments, long-term strategy, and risk management within the metro companies.

Optimizing Corporation Governance

The lack of a well-functioning corporate governance system, compared with Hong Kong's MTR Corporation, has hampered the Shenzhen Metro Group in its efforts to become more business-oriented. Unlike MTR, the current large holdings of valuable land assets near subway stations

Table 10 | **A Comparison of Business Offerings by the Shenzhen Metro Group and MTR Corporation**

BUSINESS OFFERINGS		SHENZHEN METRO GROUP	MTR CORPORATION*
Subway Construction	Planning New Subway Lines		✓
	Supervising Construction of Subway Lines	✓	✓
	Maintenance of Subway Equipment	✓	✓
Subway Operations	In-station Retail Shops		✓
	Consulting for Operations related Services		✓
Property Development	Participation in urban plans and design; organization of joint projects with developers	✓**	✓
	Asset management of properties owned by the metro company	✓	✓
	Asset management of properties not owned by the metro company		✓

Notes: *not including subsidiary companies;

**independent development limited to small-scale projects; large-scale development is carried out through partnerships.

by Shenzhen Metro Group prevent the company from diversifying its shareholding structure. In the absence of private investors, the company needs to rely on self-discipline and internal incentive structures to be cost-conscious and profit-oriented. However, such mechanisms are yet to be institutionalized while, at the same time, government intervention in the corporation's operations is still commonplace. For example, under the close monitoring and supervision of Shenzhen National Resources Committee and the Audit Bureau, internal incentive structures and human resources management do not usually reflect actual project performance. To the extent that Shenzhen Metro Company is business oriented, it is the result of the vision and management style of individual managers rather than a sustained corporate governance mechanism.

6. SUMMARY AND RECOMMENDATIONS

6.1 Preconditions of R+P Development

There is no one-size-fits-all funding mechanism that can provide sufficient, sustained sources of funds for urban rail transit projects. Despite the fact that R+P is a powerful financing tool to unlock land values and enable transit-oriented development in China, it also carries a number of risks that could undermine the financial wellbeing of metro projects. Being risk-conscious and taking precautions against potential macroeconomic, real-estate market, and institutional risks from the very beginning are essential for both the public and private sectors.

REAL-ESTATE MARKET RISK

The second- and third-tier Chinese cities that have a weak real-estate market or are experiencing a cyclical downturn should carefully investigate the feasibility and timing of introducing the "Rail+Property" model. Even in cities with relatively strong real estate markets, caution is needed to decide reasonable volumes of housing supplies and phasing of property development. Given the market risk, cities should cautiously manage expectations regarding the amount of revenues that may be generated from R+P schemes to recover the costs of metro project. They should make realistic assumptions about market trends, and develop contingency plans and seek alternative funding sources to complement the R+P scheme in case of a downturn in the market cycle.

POLITICAL RISK

The success of R+P development depends on support from municipal governments. In reality, it is fairly likely that state-owned metro companies may be uninterested, or that lack of coordination among vested interests creates deadlocks and stalls implementation. Such problems can only be resolved through interventions from the top. Therefore, the political leaders' determination to pursue R+P throughout the project cycle, undeterred by the risks and barriers, is an essential element to guarantee success.

CAPACITY RISK

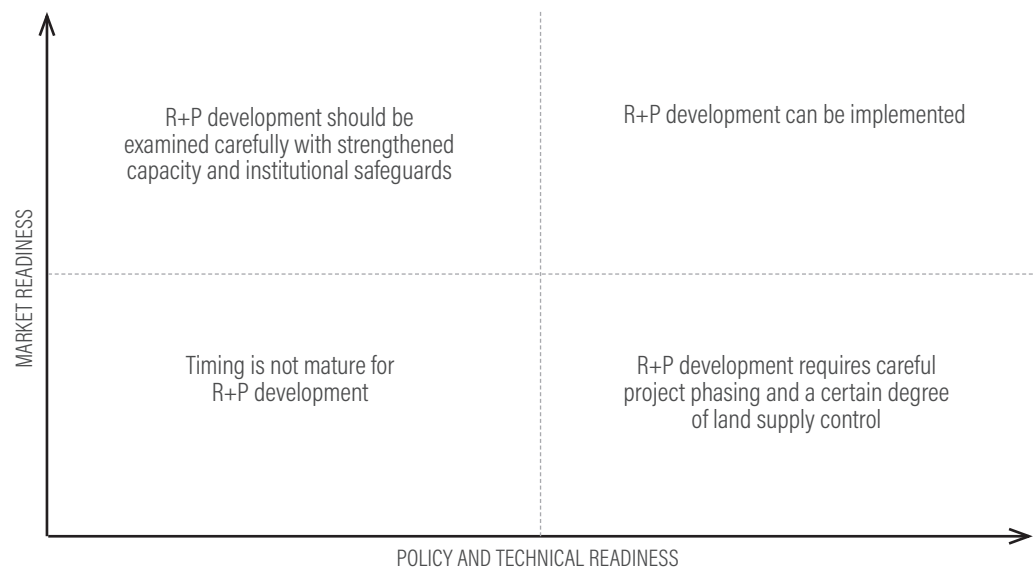
R+P development is a completely new realm of operation for local governments and companies. Given its technically complicated nature, it would be premature to introduce R+P development when governments and project companies still do not fully understand R+P schemes, or lack knowledge and skill sets about the real estate market, urban planning, and financing approaches related to R+P. Equally important is the external support. Currently, no mainland Chinese cities can undertake R+P development independent of external technical support. Assistance from consulting firms on subjects from market surveys to project design proposals is essential to augment local capacities and ensure project quality. However, restricted by fiscal budgets or the lack of attention to important technical details, not many second- or third- tier cities can afford or are willing to join forces with external consulting firms.

However, it is notable that R+P developments do not have to meet the market, policy, and capacity conditions completely to be ready. Rather, the case-by-case evaluation of R+P projects' feasibility is still necessary in certain circumstances (Figure 13).

6.2 Goal Setting for R+P Development

R+P development is a means, not an end in itself. Therefore, treating R+P development as a quick win to ease local municipalities' fiscal difficulties without appropriate risk control measures in place would compound government's long-term financial burdens. Furthermore, the over-emphasis on R+P development's financial merits may pull the focus away from the social, environmental, and economic implications of R+P projects that are of equal importance. Therefore, cities need to establish holistic goals for R+P projects (Figure 14).

Figure 13 | Matrix to Evaluate the Project Readiness of R+P Development



Note: When recouping land values to fund subway projects appears to be infeasible, it does not necessarily affect a city's ability to pursue TOD developments around subway stations.

Figure 14 | Social, Environmental, Economic, and Financial Sustainability Goals for R+P Development

SOCIAL SUSTAINABILITY	ENVIRONMENTAL SUSTAINABILITY	FISCAL SUSTAINABILITY	ECONOMIC SUSTAINABILITY
<ul style="list-style-type: none">■ Improve community services■ Provide affordable housing■ Improve transit options for low-income groups	<ul style="list-style-type: none">■ Increase ridership on public transit and decrease motor vehicle emissions	<ul style="list-style-type: none">■ Fully mobilize public and private capital■ Reduce dependence on public investment■ Increase efficiency of public investment■ Reduce risk of government debt	<ul style="list-style-type: none">■ Achieve efficient and compact use of land■ Promote economic growth and create jobs

6.3 Streamlining R+P Implementation Processes

Since R+P development bundles the formerly isolated project cycles of rail transit provisions and property development, its successful implementation rests on a reformed official process that synthesizes urban transit plans and land-use plans, coordinates the timelines of metro construction and property development, and fosters collaboration between the public and private sectors (Figure 15).

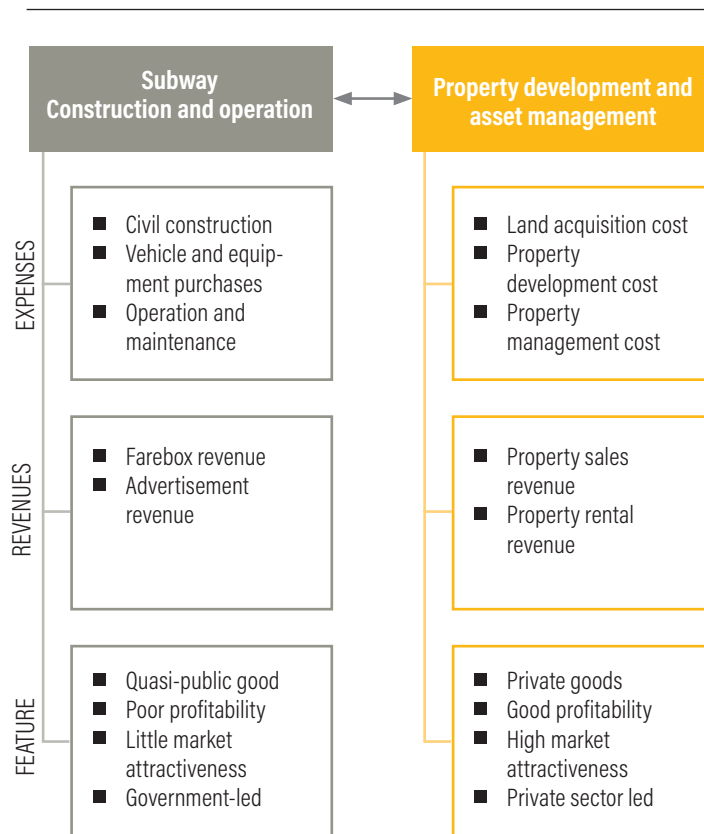
Furthermore, actual R+P projects may not proceed through the order of phases outlined in this report. Rather, project financing, land-use planning, metro project construction, and development proposals for individual property development projects may all take place concurrently. Figure 16 outlines a general process of R+P development based on the standard urban rail transit implementation procedure in China and the specific R+P experience offered by Shenzhen.

R+P development can be distinguished from the conventional property development process in China, in two distinct ways.

First, under the conventional development model, detailed project development proposals are often drafted after the developers have already won the bid for land-use rights, to avoid unnecessary costs. However, given the complex nature of R+P projects, a relatively thorough project development proposal (including detailed site plans) is needed at the early stage of the project, usually prior to the amendments of zoning ordinances. Such development proposals are helpful for the metro company and the government to define project boundaries (like planning parameters), pinpoint potential risks, better estimate the costs and cash flows, build common ground, and avoid unnecessary zoning changes.

Second, since the metro company (sometimes with its joint-venture developers) is by default entitled to property development for R+P projects, the recipient of land-use rights is already determined once the metro company is chosen. This means that the official public tendering process to award land-use rights is a mere formality. The tendering procedure and rules set up by the metro company to select developer partners will become influential. Therefore, the exercise of government oversight and the establishment of access to information and transparency at this very stage will be important to create level playing fields for competition, avoid land corruption, and improve the quality and efficiency of R+P project implementation.

Figure 15 | Integration of Rail Transit Provision and Property Development under R+P



6.4 Improving Safeguards

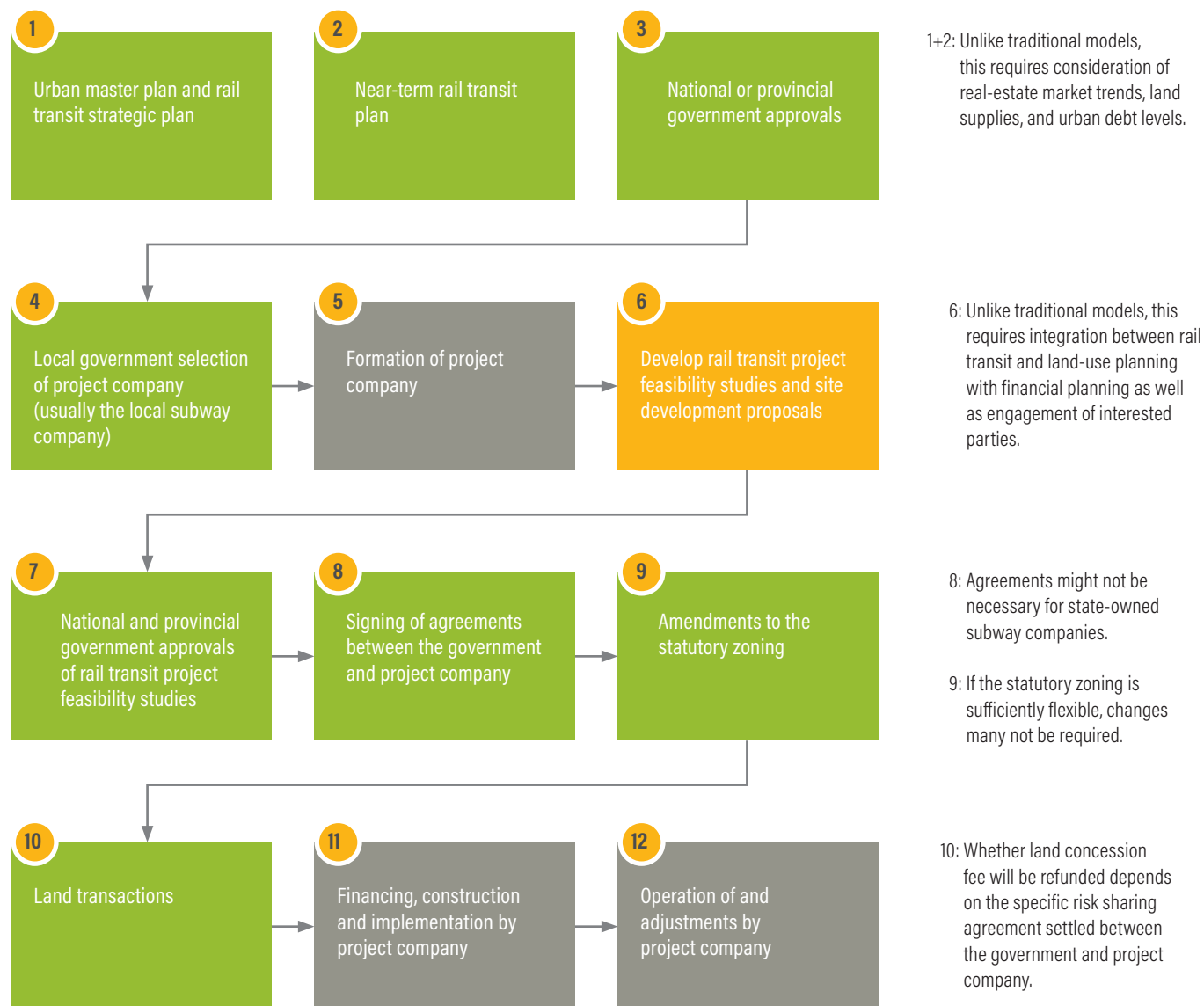
Successful implementation of R+P development requires systematic and comprehensive reforms of safeguard measures covering funding arrangements, planning and land transaction policy, and institutional mechanisms. Reforms are necessary at both the national and local levels to ensure the long-term effectiveness of R+P projects. Safeguard measures in the three areas noted are discussed below.

6.4.1 Funding Arrangements

ESTABLISH GUIDING PRINCIPLES FOR R+P FUNDING ARRANGEMENTS

It is necessary for local governments to issue documents specifying guiding principles for funding arrangements for R+P projects to guide concrete actions, manage market expectations, and balance conflicting interests emerging from R+P projects. In particular, the guiding principles need to tackle two contradictory goals. First, it is imperative for local governments to recognize that the inherent profit-seeking nature of R+P projects is to some extent

Figure 16 | Complete Project Cycle of the R+P Scheme in China



desirable (e.g., to maximize potential land-value increases, minimize subway projects' outstanding expenditures, reduce the reliance on government funding), and that low expected returns on investments or deficits resulting from unwise funding arrangements are unlikely to entice state-owned enterprises and private players to willingly participate and deliver high-quality R+P projects. On the other hand, R+P projects also have public service features, including enabling more commuters to switch from cars to mass transit, fostering community development and social inclusion, and reducing the projects' impacts on the environments (such as air pollution and loss of green space). Therefore, funding arrangement principles that

incentivize metro companies (and attract well-established developers) while not jeopardizing the public interest must be stated clearly at the outset of projects to avoid unnecessary transaction costs to either government or metro companies.

DETERMINE THE MODES AND SCALE OF GOVERNMENT INVESTMENTS

The accurate, impartial estimation of the funding gap in metro projects (taking account of lifecycle costs) is key to determining the scale of government's land equity investments and the intensity of land development (as well as associated planning parameters).

The conventional practice by Chinese cities of using projected total capital investment as a rough proxy for the funding gap will not only lead to government overspending and inefficient usage of capital, but also erode the profitability of R+P projects. Therefore, it is important to estimate the funding gap of project investments precisely to ensure that land granted to the metro companies will not be more than what is required to bridge the funding gap⁷. Moreover, precise estimates of funding gaps would also serve to incentivize project companies to improve efficiency of project delivery and maximize revenues.

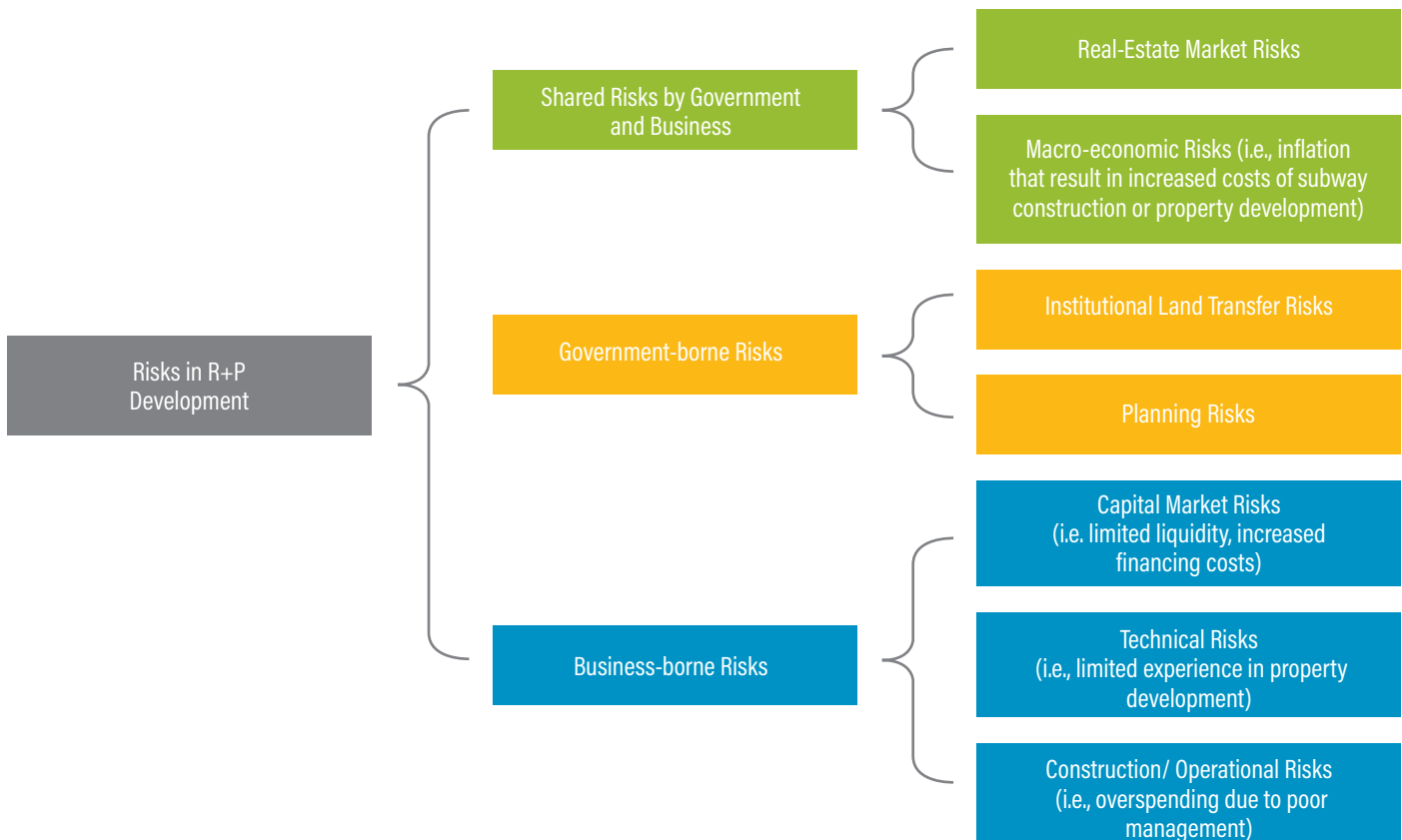
Although funding metro projects through R+P confers numerous benefits, it is not the only option. When station catchment areas are inappropriate for R+P property development due to limited land availability, complex land ownership structures, difficulties with redevelopment and removal of existing infrastructure, or development restrictions imposed by historical areas, other funding alternatives such as direct government investments or PPP should be considered.

ESTABLISH REASONABLE RISK-SHARING MECHANISM

R+P projects are a risky undertaking. In addition to the risk of ridership demands, R+P projects are also complicated by the real-estate market risk and institutional risks (especially the risk associated with land transactions). The success of R+P projects therefore depends on government's and the project company's ability to identify and allocate the potential risks to the party that is capable of controlling those risks. Figure 17 lists potential risk factors associated with R+P projects and identifies the main party best able to bear the risks.

Market Risk: While scenario analysis is commonly used, it remains difficult to predict property revenues accurately. Moreover, although metro companies are best positioned to bear the associated risks of market fluctuations, a full transfer of the market risk to the metro companies (and the developer partners) might raise the cost of capital substantially. To reduce the risk premium, it would be desirable to cap the level of risk borne by the metro companies

Figure 17 | **R+P Development Risk-Sharing Mechanism**



and allow for certain risk-sharing mechanism with governments. For example, when the market is stronger than expected, it would be advisable to increase the government share of dividends derived from property development. If the market is weak, governments might also consider increasing subway projects' capital investments or using other forms of compensatory measures. Such a flexible risk-sharing mechanism, that is contingent on market conditions, will be important if governments are to tap into the long-term property gains and avoid setbacks. This was the case with Shenzhen No. 6 Line, when government gave up R+P development because, with a booming land market, land-concession incomes from directly auctioning off the land plots on the open market provided a more efficient short-cut to recover the subway capital investments and even generate extra municipal revenues, compared to the piecemeal land concession payments from the R+P method and the perceived profit windfalls that would accrue solely to the metro company.

Institutional Risk: Institutional risks, especially land transaction and zoning adjustment risks, are most efficiently borne by governments (Box 6). The exposure of metro companies to the full institutional risks, which they do not usually have the resources to control—as often seen in R+P in Chinese cities—might compromise the efficiency and quality of R+P projects and discourage metro companies from achieving value for money. If governments are unable to eliminate institutional risks, because of vested interests or capacity constraints, they should negotiate with the company regarding the conditions under which compensation will be provided. For example, when costs are incurred due to project delays and lost market opportunities, in the course of zoning adjustments or obtaining approvals, it would be appropriate for governments to provide some degree of compensation.

Specific steps for arranging funding for R+P projects are summarized schematically in Figure 18.

6.4.2 Planning and Land Transaction Policy Safeguards

Besides funding arrangements, Shenzhen's pilot experiences also indicate that the local urban planning and transit planning framework should be improved to allow for market-responsive planning and pro-TOD zoning codes. Specifically, the following actions need to be taken by local planning agencies and legislative branches.

Box 6 | Institutional Risks of Different Land-Use Rights Transaction Models

Direct Government Capital Investment. The advantage of this option is that the associated institutional and market risks are the lowest among all alternatives. However, it fails to recoup land value appreciation from improved transit accessibility or enable efficient and compact TOD development.

Land Auctions with Special Terms (or combined with land concession fee refunds). The advantage of this transaction scheme is that it taps into R+P development, whereas the metro company has to bear large upfront institutional and financial risks. Therefore, the model is suitable for individual, ad-hoc projects, but not for large-scale implementation throughout a city.

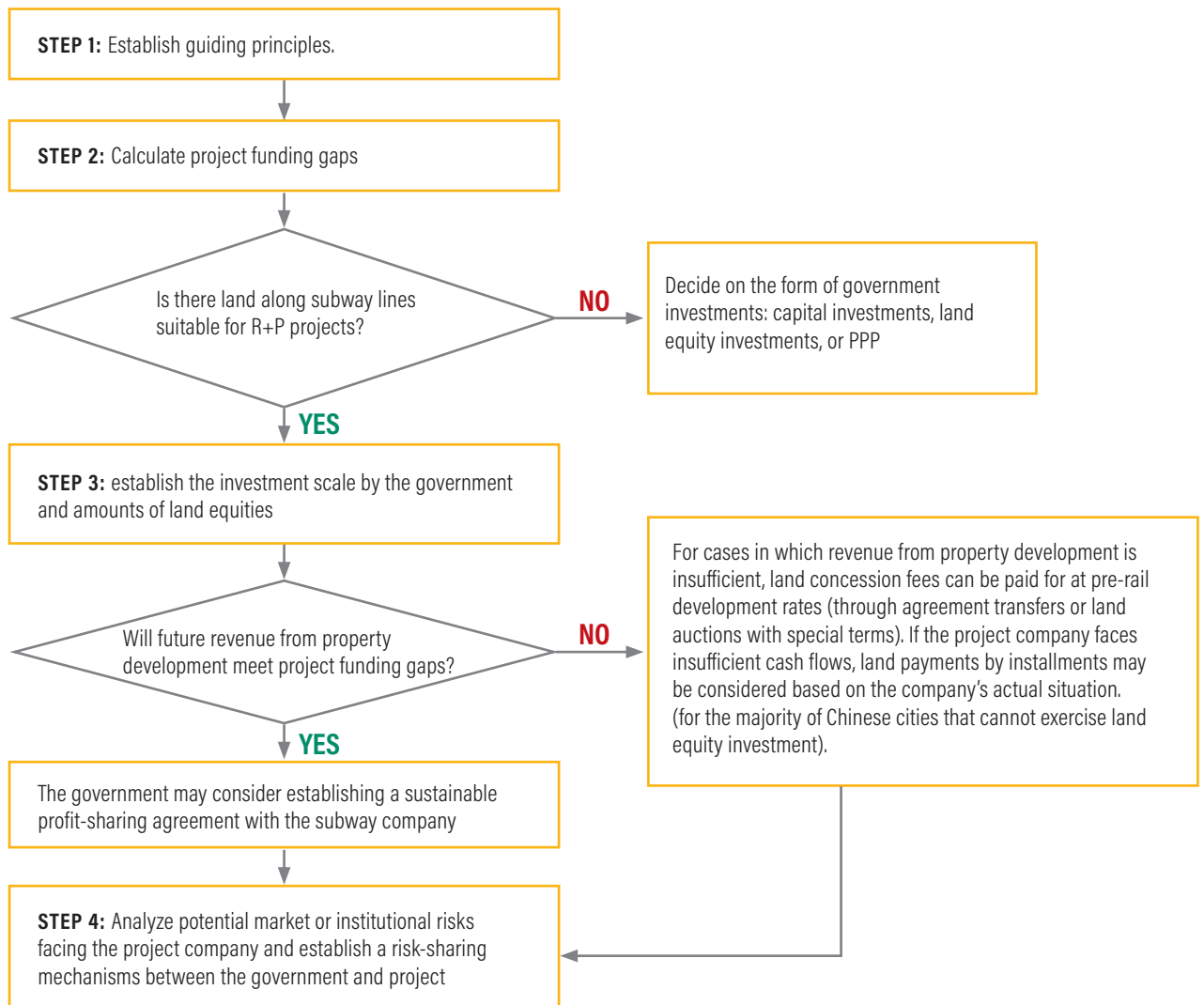
Land Equity Investments. The advantage of this option is that it taps into R+P development with reduced institutional risks. However, this transaction model only works for Shenzhen; it still confronts legal barriers in other Chinese cities, which limits the chances of replication.

Amend the existing planning process so that, when transit plans of all levels are developed, regulatory zoning plans can be adjusted appropriately for developable land adjacent to stations, or vice versa. This integration of urban rail transit plans and land-use plans will help to ensure that property development is compatible with future market demand, and that value creation potentials are maximized through up-zoning densities or adopting mixed uses.

Amend zoning codes to improve their flexibility. To avoid the lengthy procedure of zoning adjustments and curtail opportunities for abuses of power, measures such as providing guidance on the range of density variations or adopting the “Special Control Zone” land-use type for properties within transit station catchment areas will help increase the flexibility of the zoning.

Engage multiple key stakeholders (including government, business, the general public) in the planning phase to make sure that their interests and concerns are addressed and reflected in the final plans or design proposals.

Figure 18 | **Government Decision-Making Tree for Setting Up R+P Funding Arrangements**



Furthermore, Shenzhen’s innovative vertical division of land-use rights provides a viable option for local cities to solve the current land transaction barriers and ease R+P projects’ funding arrangements. By allowing the issuance of land-use rights according to land uses on different building floors, commercial, residential, and transit uses can be obtained separately, each of which is associated with different land-use rights, transaction prices, and planning parameters. This vertical separation of land-use rights, although requiring a more fine-grained land registration and management system, would foster mixed-used development above transit stations or rolling stock depots.

As a special economic zone, Shenzhen is expected—and given the unique freedom—to test out new ideas, some of which might even go beyond the scope of the current national legal framework, as in the case with land equity investments. However, not all Chinese cities have such privileges. This implies that if they are to replicate Shenzhen’s example, national legal and institutional barriers should be loosened in the following ways:

Allow for transactions of land-use rights for land in the transit station catchment areas at negotiated prices (e.g., pre-rail prices), or through government in-kind land equity investments, or allowing for land lease payments in installments;

Revise the national planning guidance to mandate certain feedback mechanisms between land use and transit plans so that when one plan is developed, the adjustment of the other would be triggered. Amend the current national land-use compatibility guideline to allow for compatible commercial developments on the land designated for transit uses.

6.4.3 Institutional Safeguards

Shenzhen’s experiences indicate that successful implementation of R+P development requires systematic and comprehensive reforms of institutional mechanisms at the local level.

CREATE EFFECTIVE INTER-DEPARTMENTAL COORDINATION

Most importantly, strong leadership in cities that can forge ahead on R+P projects and balance different conflicting interests among departments is the essential foundation for the success of R+P projects. Enabled by strong political will, coordination mechanisms can be established

that allow different departments and the private sector to co-devise solutions to institutional barriers. The multiple means that Shenzhen employs to ensure that stakeholders work across government silos and encourage equal dialogues with metro companies (and developers) to achieve alignment with market demand contain many lessons for other Chinese cities. Finally, strong external consulting services that complement local in-house expertise can also provide critical support for managing complicated urban development and rail transit projects (see Table 11).

STRENGTHEN GOVERNMENT AND PUBLIC SUPERVISION

The efficiency of R+P development is affected not only by whether the metro company is state-owned or private, but more importantly by whether the government has put in place effective monitoring, performance evaluation, and incentive mechanisms for metro companies to break away from over-dependence on government funding, and to be business-savvy and cost-efficient while cultivating a sense of social responsibility. Such mechanisms include specifying quality and safety standards for R+P projects, strengthening financial oversight and market supervision of R+P projects, fostering information disclosure by both governments and metro companies, encouraging public scrutiny, and establishing performance-based rewards and penalties for metro companies.

Table 11 | Use of External Consulting Services at Different Stages of R+P Development

TASK CATEGORIES	LOCAL IN-HOUSE TEAM	NECESSARY TO HIRE PROFESSIONAL EXTERNAL CONSULTING SERVICES?
Estimation of project funding gap	Municipal government and metro company	Yes Third-party auditors are sometimes needed to provide independent evaluation of the funding gap
Establishing R+P funding arrangements	Municipal government, metro company, and planning agencies and institutes	Yes Third-party surveyors are usually hired to assess property values Consulting and design firms are also common go-to entities to carry out real-estate market analysis and develop site plans and designs
Reforming Land Transaction Policies and Planning Process	National and local Land Resource Agencies National and local Planning Agencies as well as local Planning Institute	No

APPENDIX: LISTS OF R+P DEVELOPMENT PROJECTS IN SHENZHEN

R+P Development Projects in Shenzhen (Phase II)

NO.	NAME	TYPE	AREA (HECTARE)	GROSS FLOOR AREA (TEN THOUSANDS SQ.M)	FLOOR AREA RATIO	USAGE	AFFORDABLE HOUSING?	LOCATION
1	Qianhai Railroad Depot	Railroad Depot	4719	141	4.5 vacant land without railway facilities 2.45 Structures built over railway facilities	Commercial area, residence	Yes	Qianhaiwan CBD (bi-center under construction)
2	Henggang Railroad Depot	Railroad Depot	28.3	72.82	5.34 vacant land without railway facilities 1.98 Structures built over railway facilities	Commercial area, residence, office buildings	No	
3	Shekou West Railroad Depot	Railroad Depot	13	30.6		Commercial area, residence	Yes	Urban Periphery
4	Longhua Railroad Depot	Railroad Depot	20.4	54.9		Commercial area, residence	No	Urban Periphery
5	Tanglang Railroad Depot	Railroad Depot	21.3	479	5.95 vacant land without railway facilities 1.28 Structures built over railway facilities	Commercial area, residence, office buildings	No	Urban Periphery
6	Shenzhen Univ. Station	Metro Station	1	9.8	10	Commercial area, office buildings, Hotels	No	City center
7	Shenzhen North Transportation Hub	Metro Station	3	7		Commercial area, office buildings, Hotels	No	

Source: Shenzhen Research Center on Public Land Planning and Development, 2013. Comprehensive Plan and Design of Seven Rail plus Property Development Project in Phase III.

R+P Development Projects in Shenzhen (Phase III)

NO.	NAME	TYPE	AREA (HECTARE)	GROSS FLOOR AREA (TEN THOUSAND SQ.M)	USAGE BEFORE PLANNING	USAGE AFTER PLANNING
1	Songgang Railroad Depot	Railroad Depot	42.09	65.84	Special administrated zone*	Commercial area, office buildings, residence, shared space for education + railroad
2	Shenwan Station	Metro Station	6.83	41.9	Multiple functions (state-owned non-transferred land)	Commercial area, office buildings, residence, shared space for education + railroad
3	Qianhai Transport Hub	Metro Station	20.01	12781	State-owned land with no prior construction	Commercial area, office buildings, residence, shared space for education + railroad
4	Shenynun Railroad Depot	Railroad Depot	1732	26.14	Land for picnic and gardening	Public greenbelt, sports, education, research + railroad
5	Shenynun Station	Metro Station	11.44	38.9	Public greenbelt, transport facilities, office building	Residence, office buildings, commercial areas, education
6	Antuoshan Parking Lot	Metro Station, Parking Lot	30.96	76.18	Residence, transport and schools	Residence, office buildings, schools, government and social groups, public greenbelt and railroad
7	TV Industrial Zone Parking Lot	Metro Station, Parking Lot	2729	101.8	Industrial use	Residence, commercial area

Source: Shenzhen Research Center on Public Land Planning and Development, 2013. Comprehensive Plan and Design of seven Rail plus Property Development projects in Phase III

Note: *The regulations on Special Administrated Zone stipulate that the statutory plan may define new or old urban areas whose renewal plan or development vision is unclear as Special Administrated Zones.

ENDNOTES

1. Based on the conditions of Chinese cities, we modify the process as proposed by Huxley (2009).
2. Auctions with special terms refer to placing conditions on bidders in an auction to the extent that there is only one company that meets said conditions and has a true intent to participate in the bidding process. This allows it to serve as a channel for providing land development rights to a specific party under the current land management framework.
3. Unlike other cities, the study on transport network and the urban rail transit strategic plan are included in Shenzhen's near-term railroad transport planning and railroad feasibility of railroad transport. The urban rail transit strategic plan mainly coordinates railroad transport and urban planning, land use and overall transport development. It also analyzes the relationship between railroad lines, stations, depots and land use, and then proposes recommendations for improvements.
4. In Shenzhen, the zoning regulations corresponds to the statutory plan.
5. Due to safety concerns related to the structure and operation of underground stations, the size and height of properties located above these stations is limited. Other limitations come from auxiliary services in existing urban areas.
6. Differences in location and use can result in variations in price from just below 1591 USD to upwards of 15917 USD per square meter (Figures converted from RMB to USD with the average exchange rate in 2015).
7. A more precise expression would be the present value of the funding gap in the life cycle of metro programs.

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