



# **Land Value Capture and Transit Oriented Development as a Way of Funding Railway Systems: The Case of Hong Kong Rail + Property Model**

**Report for the “Inclusive and  
sustainable smart cities in the  
framework of the 2030 Agenda for  
Sustainable Development” Project**

Franco Jauregui-Fung

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Draft version

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## Abbreviations

A-S-I	Avoid-Shift-Improve
BCG	Capital Group
BIIC	Beijing Infrastructure Investment Corporation Limited
BJMTR	Beijing MTR Corporation Limited
BMZ	German Federal Ministry for Economic Cooperation and Development
BOT	Build-Operate-Transfer (BOT)
CDA	Comprehensive Development Area
CEPA	Mainland and Hong Kong Closer Economic Partnership Arrangement
COMET	Community of Metros
EBIT	Earnings before Interest And Taxes
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
FAR	Floor Area Ratio
GBA	Greater Bay Area
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HKD	Hong Kong Dollar
HKPR&M	Hong Kong Property Rental and Management Businesses
HKSC	Hong Kong Station Commercial Businesses
HKSSM	Hong Kong Stock and Security Market
HKTO	Hong Kong Transport Operations
IDOS	German Institute of Development and Sustainability
JD	Joint Development
JV	Joint Venture
KCR	Kowloon-Canton Railway
KCRC	KCR Corporation
LAC	Latin America and the Caribbean
LegCo	Legislative Council
LDC	Land Development Corporation
LRT	Light Rail Transit
LVC	Land Value Capture
MLRT	Macao Light Rapid Transit
MRT	Mass-Rapid Transit
MTR	Mass Transit Railway
MTRC	MTR Corporation
MTRCL	MTR Corporation Limited
PPP	Public-Private Partnership
PRC	People's Republic of China
PTA	Public Transport Authority
R+P	Rail + Property
SAR	Special Administrative Region (SAR)

SEZ	Special Economic Zone
SOE	State-Owned Enterprise
TDM	Transport Demand Management
TDR	Transfer of Development Rights
TDS	Territorial Development Strategy
TOD	Transit-Oriented Development
TSC	Transport Strategy Centre
UIS	Urban Improvement Scheme
URA	Urban Renewal Authority
USD	United States Dollar
XRL	Guangzhou-Shenzhen-Hong Kong Express Rail Link

# 1 Introduction

Railway systems are essential in high-density urban areas in emerging economies to provide better services to their citizens and reduce the negative effects from ongoing private motorisation. However, cities and their transit agencies struggle to finance these systems due to the high upfront-investment costs and continuous maintenance and network expansion, especially when transit is conceived as mere infrastructure works. Nevertheless, when transit planning is integrated with land-use planning in favour of transit-oriented development (TOD) strategies that generate dense, mixed-use areas around transit stations, land value capture (LVC) can be generated as a positive loop in which the value of land surrounding the stations is created, realised, captured and reinvested to cover part of the capital costs to finance transit infrastructure.

In Hong Kong, the Mass Transit Railway Corporation (MTRC) has successfully implemented its metro system through its Rail+Property (R+P) model, a public-private cooperation with a government-led approach. Under this development-based LVC mechanism, the MTRC does not receive subsidies from the government, but is granted the development rights as the main entity for master planning, property development and management. In this way, the MTRC receives revenues from other sources outside transport operations, such as residential and commercial development, property leasing and management, consultancy services, etc. However, this model raises the question about its replicability in other contexts that do not present the same particular conditions as those in Hong Kong. For this reason, this study will delve into the background of the R+P model and the MTRC to learn from this innovative mechanism to finance transit infrastructure and provide liveable and mixed-use areas.

This research is structured in four sections. First, a general overview about the need of railway systems is presented, including key concepts for transit financing. Then, this study will introduce the case study of Hong Kong metro within its local characteristics. In this section, the roles of the MTRC and the procedures of the R+P model will be explained. The following section will assess the co-benefits of this approach and its impact in the city, which will be followed by the question on the replicability of the model and policy recommendations. Finally, the future of the R+P model will be exposed and its recent criticisms. The study will close with final conclusions and remarks.

This study is one of the knowledge products from the research project *Inclusive and sustainable smart cities in the framework of the 2030 Agenda for Sustainable Development* carried out by the German Institute of Development and Sustainability (IDOS) and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Within the framework of the Big Push for Sustainability, this paper will introduce to the economic co-benefits of sustainable mass rapid transit solutions, within the field of LVC and TOD. IDOS would like to acknowledge the financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ).

## 2 The need of railway systems in emerging economies

The growth of gross domestic product (GDP) and income per capita, international trade, industrial relocation and development of the periphery in high-density, rapidly industrialising urban areas located in emerging economies have increased the need for longer motorised trips (ITF, 2019; Tiwari, 2005). As a consequence, rapid motorisation growth with a tendency towards private vehicle ownership in middle-income groups represents a threat towards the urban environment due to air pollution and traffic congestion. For years, governments have encouraged the use of these private modes through unsustainable investments, such as wide urban freeways and grade separated intersections that aim to increase the speed of private



motorised vehicles and remain as symbols of economic progress (Dimitriou, 2011; Tiwari, 2005). These road infrastructure works reflect governments' decisions that do not seek the benefit of the majority of citizens in emerging economies (Kenworthy, 2011), as transit users, cyclists and pedestrians still account for the largest shares of daily trips in the Global South (Jehanno, Niang, Ortiz, Laborde, & López Camacho, 2018; Tiwari, 2005), in contrast to Global North cities, where the share of private mobility is usually above that of transit. Furthermore, massive road designs influenced by Western roadmaps do not work in densely built environments, proper of urban areas in emerging economies.

Under this scenario, investment in public transport is not only necessary to reduce the negative environmental, economic and social effects of private mobility, but also to keep the current transit users away from shifting to private transport modes. In addition, dense urban areas with mixed land use in emerging economies are suitable to support transit investment (Kenworthy, 2011). Within the available public transport offer, institutional higher-order transit (also defined as fixed guided services or mass rapid transit - MRT) stands out due to its larger passenger capacity and high-quality service along a dedicated right-of-way, which makes it a reliable mode with fixed schedules and without the interference of road traffic. Therefore, higher-order transit is particularly suitable in densely populated areas with high travel demand.

However, the implementation of these systems is significantly challenging in emerging economies with consolidated urban fabrics that heavily rely on informal transit networks. Moreover, like many other sustainable urban projects, these infrastructure projects require investment that cannot always be recovered through operating revenues. As transit has been perceived as a welfare item in the budgets of regional governments, new higher-order transit based exclusively on general or consolidated revenue faces funding constraints due to the lack of strategic fund allocation, without exceeding governments' lending limits (McIntosh, Newman, Trubka, & Kenworthy, 2017). Apart from the high upfront investment cost, ongoing financing is needed to cover the operational costs and maintenance in order to ensure the longevity of these systems (AFD & MEDDE, 2014), while maintaining affordable fares that are accessible for the low income sectors that highly depend on transit.

Public-private partnership (PPP) agreements have been the preferred method by governments to deliver railway infrastructure, but PPPs have not been able to provide governments with value for money and private concessionaries with sufficient operating revenues (Li & Love, 2022). Fares alone cannot fully cover these costs and significant government subsidies are required to build, maintain, and operate most transit systems worldwide. Thus, some cities face the challenge to find financing sources (Salon & Shewmake, 2011), while others with already implemented systems struggle with large operating deficits and require numerous cross-subsidies (Murakami, 2012).

Despite these challenges, public investment in higher-order transit, particularly railway systems, has proven positive to reduce travel costs, guide the configuration of cities, reduce pollution and generate economic co-benefits (Cervero, 1998; Newman & Kenworthy, 1999). High-income status cities, such as Singapore, Tokyo and Hong Kong experienced economic development during the mid- to late-20th century when these surges were accompanied by substantial investments in MRT (Abiad, Farrin, & Hale, 2019). In addition, in contrast to other cities, these have found the way to achieve substantial profits through their private railway companies without much financial support from their governments (Murakami, 2012).

The increase of accessibility and reduction of travel times to main activity centres can lead to opportunities for trade and employment densification (Bartholomew & Ewing, 2011; Mohammad, Graham, Melo, & Anderson, 2013). Due to its permanent infrastructure, evidence shows that railway systems have direct impact on the land and property markets, as their stations can attract developers for long-term investment (Cervero, Hall, & Landis, 1990; Knaap, Hopkins, & Donaghy, 1998; McIntosh et al., 2017). Transit stations provide a higher positive effect on

commercial properties in comparison with residential ones within distances shorter than 1/4 mile. However, on a larger scale, this relative impact is reversed in favour of residential properties (Debrezion, Pels, & Rietveld, 2007) and in close relation with the development of densities (Bartholomew & Ewing, 2011). Moreover, although this may not be visible at the commencement of works, relevant increases of property and land prices are noticeable even before the completion of a new mass transit line (Yiu & Wong, 2005).

### **3 The relationship between land-use and transit planning**

Car-centric development does not only translate in massive road infrastructure, but also in the way urban areas are designed with housing, businesses, schools and shops located in different parts of the city, which creates the need for motorised trips. Therefore, land-use planning is particularly important for transport planning in rapidly growing and motorising cities. Together with transport policy, it is an essential tool for local governments to generate agglomeration economies with better matching of employment, share of knowledge and networking opportunities (Cervero, 2001; Fallah, Partridge, & Olfert, 2011). Land-use and policy planning can shape the urban form for better transit use, accessibility and social inclusion with environmental responsibility.

Unaware of this impact, poor land-use planning regulations promoted by policy makers, coupled with a chronic lack of housing finance, produce a development pattern through urban sprawl that is distant, dispersed and disconnected (Ardila-Gomez, Bianchi Alves, & Moody, 2021). Under this pattern, employment areas are located in the central areas, while peripheries end up as the housing areas for the low-income population. As a result, trips to access the labour market are long, radial and expensive, while other sustainable transport modes, such a walking and cycling, are not suitable to cover these distances. Being transit the only available option, this represents a very high share of the income of peripheral citizens, due to the lack of fair integration to cover the necessary multiple transfers (Ardila-Gomez et al., 2021).

The integration of land-use and transit planning can bring economic co-benefits for the local economy. Locations become more attractive to residents and businesses when they have easy access and this added value has a direct impact on the land/property prices of such locations. However, research shows that public transport alone is not enough to promote development and other factors are also necessary: the overall rate of urban growth and demand for development; relative ease of land assemblage in the station area, as well as zoning incentives and constraints; and at what extent the station is integrated within the urban fabric (Salon & Shewmake, 2011). To comply with these factors, efforts by policy makers and city planners are needed. In return, transit investment will offer trade-offs in terms of land value capture (LVC) and transit ridership (and thus transit dependence and reduction of car use per capita). With the right land-use planning policies, growth can be channelled along transit corridors in favour of a more dense, mixed and compact development (Salon & Shewmake, 2011).

Nevertheless, although both sectors are shaped by the government, these face significant challenges for policy making: (1) they require an enormous scale of intervention and mobilisation of resources, (2) their management is divided among different levels of governance, and (3) long-term planning actions exceed traditional election periods (LSE Cities, ICLEI, & GGGI, 2013). This situation is worsened in the Global South due to the lack of appropriate development schemes for local transit and planning agencies (Suzuki, Cervero, & Iuchi, 2013). As a result, urban forms usually end up being consequences of transport infrastructure works, instead of pairing both sectors (Gakenheimer, 2011).

## 4 Key concepts for transit financing and property development

Due to the direct impact of transit infrastructure in the land and property markets, governments can take advantage of this added value through different land-use strategies and financing mechanisms. This section will summarise some key concepts that play a key role when planning and implementing a new transit line.

### 4.1 Transit-oriented development (TOD)

Following the three dimensions of sustainability (economic, social and environmental), there are three primary principles to reduce greenhouse gas (GHG) emissions from the transport sector with a focus on the mobility needs of people instead of the infrastructure for private vehicles (Bongardt, Stiller, Swart, & Wagner, 2019; Dalkmann & Brannigan, 2010). This approach is defined as the Avoid-Shift-Improve (A-S-I) Framework and is a means to structure policy measure to reduce the environmental impact of the transport sector and improve life quality in cities. The A-S-I Framework is divided into the three following principles according to their hierarchy. The Avoid principle gathers transit-oriented and compact development strategies that can contribute to the reduction of motorised travel needs and trip lengths. This improves the efficiency of urban mobility systems. Mixed-use urban areas where residential, work and leisure needs are covered reduce the need for travel to other parts of the city, and therefore the use of motorised modes. This is achieved with urban development policies, integrated transport and spatial planning and travel demand management (Bongardt et al., 2019).

One of the Avoid strategies is transport demand management (TDM), which involves measures that shape citizens' travel decisions in favour of more resource-efficient modes (Ardila-Gomez et al., 2021; Hickman, Fremer, Breithaupt, & Saxena, 2011). TDM represents a cost-effective alternative to increasing capacity as it reduces private vehicle travel demand and associated costs, and redistributes traffic in space or time to the actual road capacity, while rewarding active transport and transit users. The benefits of TDM also include the reduction of the environmental impact of transport, improvement of urban public health, strengthening of communities and more prosperous and liveable cities (Hickman et al., 2011; SLoCaT, 2018). In car-oriented cities, particularly with higher income, TDM measures are oriented to shift car use towards transit and active mobility. In already transit-oriented cities, generally lower-income cities, TDM should be paired with planning and investment policies to keep users in transit and avoid their shift towards private car use (Ardila-Gomez et al., 2021).

Among the different TDM measures, transit-oriented development (TOD) is a concept used for smart growth development policies. It refers to dense, mixed-use urban development centred around or located near mass-transit facilities, which aims to create vibrant and connected communities and eliminate the need for some motorised trips. TOD approaches include urban compactness, pedestrian- and bicycle-friendly areas, public spaces close to transit stations, and stations designed as community hubs. In this way, railway significantly contributes to TOD and leads to reduce congestion, urban space requirements, local and global pollution, while reducing car ownership, and improving more walking, cycling and transit use (SLoCaT, 2018; Thomas et al., 2018). Benefits of TOD in metropolises in emerging economies include climate change mitigation actions. TOD also represents an active response against urban sprawl (Kidokoro, 2019), and the costs associated to it (investment in road infrastructure, longer motorised trips, consumption of non-urbanised land, etc.). In fact, prosperous railway implementation followed by the revitalisation of the urban environment brings as a consequence the decrease of automobile dependence and increase of economic growth (Newman & Kenworthy, 2015).

Local governments can encourage the implementation of TODs through land-use laws, integrated active transport and transit systems, housing and spatial plans, and new mobility services near residential developments (SLoCaT, 2018). TOD policies play a major role in the development of transit-oriented cities, as their strategies direct towards urban sustainable development through dense urban areas served by transit systems and local access to jobs and services (Kidokoro, 2019). Yet, it is still a challenge for cities to align transit, land-use, infrastructure, and economic planning at all the TOD scales (metropolitan, network-wise and local) (Ollivier, Ghate, Bankim, & Mehta, 2021).

## 4.2 Rail villages

Railway stations can positively change the immediate environment when strategies are implemented to allow mixed-use neighbourhoods. These areas served by a station surrounded by clusters of offices, residential buildings and commercial floor areas are known as rail villages (Bernick & Cervero, 1997; Tang, Chiang, & Yeung, 2004). These villages are characterised by their high-density and mixed-use living mode (Shelton, Karakiewicz, & Kvan, 2011; Xue & Sun, 2018; Xue, 2016). Xue and Sun (2018) have identified the following factors determining the formation and effectiveness of rail villages.

1. **Building type:** the agglomeration of diverse building types, from shopping malls to residential estates, benefits people who work and live in the rail village and has a positive impact on its walkability;
2. **Rail village area:** the connection between areas of destination and the station determines the accessibility to the station and willingness of users to walk to it. The area varies between 500 and 1,200 metres;
3. **Catchment radius:** the urban design and urban elements define the radius and pedestrian route, and how enjoyable it is to walk the first and last mile;
4. **Floor area of train stations:** it is oriented towards train operations, including interior shops for passengers' convenience;
5. **Floor area of buildings in catchment area:** it determines the amount of people and variety of activities it can accommodate;
6. **Building users and ridership:** it determines the effectiveness of the railway system and village;
7. **Development ratio:** it reveals the actual impact of the station on the surrounding neighbourhood and it is calculated by the total floor area of the rail village divided by the station's floor area. The resulting value indicates the efficiency and land-use density. The larger the value, the more efficient the rail village.

## 4.3 Land Value Capture (LVC)

Capitalisation effects can contribute to TOD to the degree that they are both mutually reinforcing. Transit and planning corporations benefit from this relationship due to the increase in ridership, but also because of the revenue produced by the increase of land and property prices (Cervero, 2004). The capture of the increase of land value around transit stations can produce a feedback loop for financing transit infrastructure, as well as enhancing the public realm and supporting inclusive housing (Salat & Ollivier, 2017). LVC consists of the appropriation of the value produced by public sector intervention (e.g. the provision of transit infrastructure) and private sector investment for local reinvestment to generate greater benefits for the private sector, while

preserving public good (Huxley, 2009). In other words, transit projects that are beneficial for the common good, and the private sector, can be financed by direct and indirect contributions from the beneficiaries to cover part of the capital cost or operation expenses in exchange for more benefits that surpass the original investment (Abiad et al., 2019; NIUA, 2020a). A loop is generated in which value is created, realised and captured for reinvestment.

LVC finance optimises local governments' resource management as one of the prime mechanisms to generate value from private lands and properties located close to a public infrastructure project. Value capture instruments can be business rate supplements, capital gain tax, tax increment financing, congestion charge, special assessment charge, air rights sales, and others (NIUA, 2020b). Contributions can also be in-kind within the same development site or scheme. LVC divides the cost of urban development between both sectors, while liberating the public sector from the burden of the upfront-investment cost. On the other hand, the benefits for real estate from TOD translate in the increase of property prices because of the high densities, mixed-use and walkability scores around transit stations, which determine the liveability of these areas (Salat & Ollivier, 2017). However, this can also lead to displacement of landholders or informal occupants of valuable land in favour of TODs (Abiad et al., 2019).

For the development of LVC from mass transit, cities need to comply with certain conditions, such as strong economic growth, expanding population, rising incomes and increasing motorisation and congestion, which produce land value appreciation near transit stations. These conditions are typical of urban areas in emerging economies (Godfrey & Zhao, 2016; Salon & Shewmake, 2011), where real-estate market is less rigid and more profitable, especially in densely populated areas with high transit ridership (Sharma & Newman, 2017; Vadali, Aldrete, & Kuhn, 2013).

The impacts of railway are significant to study from a policy standpoint for the following reasons: (1) to measure benefits and support a better phasing in against disputes and citizens' and stakeholders' rejection; (2) to provide evidence for financial arrangement opportunities and joint development (JD); and (3) to contribute to new forms of transit infrastructure financing through different LVC schemes (Cervero, 2004).

Abiad et al. (2019) suggest five LVC-related mechanisms for successful transit financing:

1. **Value capture through the mainstream taxation system:** identifies potential tax take increases, as a consequence of the expansionary effects of major transit projects, in order to generate repayment streams on a long basis or provide upfront funds for infrastructure projects;
2. **Special fees and levies:** involves special fees and charges on specifically defined beneficiaries according to the estimated benefits to receive, as a fee-for-service to improve transit outcomes;
3. **Auction of development rights:** places development opportunities and values associated with a new transit facility or line to sale via open auction;
4. **A comprehensive TOD and urban renewal agency (with value capture capabilities):** this authority would be in charge of delivering value capture and transit infrastructure, as well as urban renewal;
5. **Direct property-rail agency as developer:** this authority would be in charge of developing and trading property holdings associated with stations and corridor-scale projects on a commercial basis, in order to allocate (at least part of) the perceived profit to transit infrastructure funding.

These mechanisms are complementary and mutually supportive, as it occurs in renowned Asian examples, such as Singapore, Tokyo and Hong Kong to generate an intense funding

contribution and promote sustainable urban development (Abiad et al., 2019; Suzuki, Murakami, Hong, & Tamayose, 2015).

Apart from taxes and fees, there are development-based instruments for LVC through the selling or leasing land, development and air rights. These schemes allow governments, transit agencies, developers and landowners to explore development opportunities of station areas and jointly share the increments in land values, while promoting economic competitiveness, sustainability and social equity (Suzuki et al., 2015). Development-based LVC is significant for transit financing and investments in TOD, without substantial fiscal distortion that can generate public opposition due to additional taxes. Apart from direct revenues from incremental land value increases, development-based LVC can also produce long-term revenues from higher transit ridership, retail and leisure facilities, parking and residential estates. In addition, development-based LVC can be more efficient in cities in the Global South with inadequate property tax systems (Salon & Shewmake, 2011; Suzuki et al., 2015). However, this mechanism is only successful when the government owns the land around the stations or has the capabilities to purchase it at predevelopment prices. A feasible alternative is through PPPs to finance transit, when cities can be competent business partners to the private sector (Salon & Shewmake, 2011). Nevertheless, the number of cities that have integrated LVC with PPPs to successfully finance railway infrastructure is still limited (Li & Love, 2022).

## **5 Hong Kong as a case study with a successful LVC model**

Urban railway has showed its relevance for sustainable urban development and economic growth in the early 20th century in cities like New York and London (Sharma & Newman, 2017). However, since the second half of the century, East Asia has taken the lead in the transformation towards sustainable mobility with major transit investments that have impacted the land development in their urban areas. As a result, car ownership has significantly decreased, while transit ridership has become substantially higher, in comparison to Global North cities (Salon & Shewmake, 2011). As previously mentioned, Singapore, Tokyo and Hong Kong have been able to finance extensive, long-range railway investments through self-sufficient LVC mechanisms through their metro corporations. In return, these cities have experienced transformational urban growth and economic performance (Abiad et al., 2019). These approaches have become references for other Asian local governments as an additional funding source to international donors (Musil, 2020).

In the case of Hong Kong, their mass transit railway (MTR) is managed by the MTR Corporation (MTRC), which has successfully conducted a LVC model on a long term through transit infrastructure and land development (Cervero & Murakami, 2009; McIntosh et al., 2017), and involving the private sector in land development around railway stations to cover the cost of the infrastructure investment (Hui, Ho, & Ho, 2004). This model is called Rail + Property (R+P) and, as a result, the MTR has a total length of 240.6 kilometres (excluding high speed rail) and ninety seven MTR stations and additional sixty eight light rail stops (MTR Corporation Limited, 2021). The impact of the R+P is such that about 42% of households, 43% of the employed population and 75% of commercial and office floor areas are located within a 500-metre radius from a station, which is an acceptable (and healthy) walking distance (Xue & Sun, 2018; Yin, 2014). In this way, stations form rail villages as building clusters due to commercial interests and transit users' behaviours and acceptance (Bernick & Cervero, 1997; Tang et al., 2004; Xue & Sun, 2018).

This section will present how Hong Kong has been able to combine development-based LVC mechanisms with TOD strategies for sustainable finance and urbanism.

## 5.1 Urban and mobility characteristics of Hong Kong

The Hong Kong Special Administrative Region (SAR) is known as one of the most leading and international financial centres with a very complex and sophisticated multimodal transit network that covers railway systems, light rail, buses and ferries. Understandably, transit ridership is the highest in the world, with 90% of daily trips carried out in transit and MTR accounting for almost half of those trips with 4.7 million daily trips (MTR Corporation Limited, 2022h; Ollivier et al., 2021). The mean journey time in transit is about forty three minutes (Lo, Tang, & Wang, 2008), comparatively shorter to that of other cities with railway systems. In addition, the fare rate is calculated based on the distance travelled and is quite affordable in comparison with other systems. For trips with an average of forty four minutes, a single journey ticket costs twenty six Hong Kong dollars (HKD) (equivalent to 3.31 USD) (Hongkong.net, 2018). As a result, car ownership is one of the lowest in the world, with 105.6 private vehicles per 1000 people (Statista Research Department, 2022). This figure is significantly lower to that of other cities with a similar GDP per capita (46,323.9 USD in 2020) (World Bank, 2022).

Hong Kong has a total area of only 1,104 km<sup>2</sup>, but only one-third of such area is built-up due to its hilly topography and distribution among islands and reclamation of territories (Lo et al., 2008). As a consequence, Hong Kong registers one of the highest densities in the world with 26,100 people per km<sup>2</sup> (Ollivier et al., 2021), way above other metropolises like London or Tokyo. The evolution of the metropolis started after the Second World War with the increase of the population density and a high demand for housing. The growth of the city was accompanied by new town development policies linked to the implementation of a transit system with the opening of the Kowloon-Canton Railway (KCR), today known as the East Railway (Yin, 2014). During the late 1960s, “high-density new towns” continued the transit-oriented approach served by the MTR, creating a polycentric structure supported by railway. By the end of the 20th century, the high-rise and high-density development had already extended following the MTR network. Stations were surrounded by dense housing estates, urban services and employment centres (Yin, 2014).

The high density of Hong Kong, without the possibility to expand the urban area, demands an efficient use of land resources and an efficient transport system to promote mobility and economic development. At the same time, such high density has been essential to support mass transit (Lo et al., 2008). On the other hand, such land scarcity is also translated in high prices of land property and a prosperous real estate market. The average income from land sales has represented over three-quarters of all funds for capital works, while land and property tax and rental income and transactions have contributed to about 20% of the inland revenue. This has allowed to maintain low tax rates (Lo et al., 2008). Due to Hong Kong’s regime, all lands are public-owned (with the exception of St John’s Cathedral), which enables the government to lease or grant land to public entities (Ollivier et al., 2021). This has significantly supported the MTRC, which has played an essential role to shape the urban area in favour of compact development along highly populated and densely constructed corridors at an early stage of development (Aveline-Dubach & Blandeau, 2019).

## 5.2 Evolution of the MTR

The development of the MTR has been successful due to three factors: (1) land-use policies in favour of compact, high-density development; (2) transport policies that have prioritised the development of higher-order transit facilities; and (3) government actions to facilitate the financial viability of the transit service through the integration of transit and property development (Lo et al., 2008).

The first railway in Hong Kong was the KCR, which was developed in the early 20th century and operated by the KCR Corporation (KCRC). It covered the continental part of Hong Kong, the

New Territories and the Kowloon peninsula. During the 1960s, new discussions about building a new metro network started, when Hong Kong was still under British mandate, following the development of the metro networks in Tokyo and Seoul and as a solution to traffic congestion and as a fast commuting link between Kowloon peninsula and Hong Kong Island. The government also thought of the metro as a system that would compete with buses, which were the main transit mode (Musil, 2020). Consequently, the MTR Corporation was created in 1972 as a dedicated company in charge of operating and maintaining the metro network and without a unionised staff (Musil, 2020; World Bank, 2017).

For the construction of the metro system a Japanese consortium received the award in 1973, but withdrew a year later due to the peak of the oil crisis and its inability to comply with the agreed estimated construction costs (Musil, 2020). As a result, the MTRC was assigned the construction works and received an initial investment for a twenty-kilometre stretch (Ollivier et al., 2021). Additionally, it was allowed to gain development rights around the areas surrounding the stations as a way to face the upfront costs (Musil, 2020). In 1975, the Mass Transit Railway Corporation Ordinance gave the MTRC the status of a statutory corporation to meet the financial viability requirements and serve the government's transport policy without receiving public subsidies (Aveline-Dubach & Blandeau, 2019). The ordinance allowed the MTRC to acquire, hold and dispose property movable and immovable according to what the corporation considers suitable, as well as to improve, develop or modify any property. This became the institutional framework for the MTRC to act as developer and site manager and not only as a traditional railway corporation in charge of operating and maintain the metro network (Musil, 2020).

In 1979, the Hong Kong government published its first White Paper on internal transport policy, which favoured an integrated transit system that prioritised railway over other modes, which were defined as feeder modes. This policy banned direct competition along the rail lines by other modes in order to assure rail ridership and secure the return of the rail investment (Lo et al., 2008). It also forced bus companies to align their fares with those of the metro (Aveline-Dubach & Blandeau, 2019). This allowed the development of the MTR, which initiated operations in the same year (Yin, 2014) and has been considered as the backbone of urban transit, despite competition from some private bus companies that still operated along the same lines during the 1980s (Tang & Lo, 2008). Moreover, the MTRC became the only company authorised to cross stretches of water, which represented a comparatively benefit due to the geographic characteristics of Hong Kong's territory (Aveline-Dubach & Blandeau, 2019).

Despite this framework, the first line was not built with property development, as the MTRC did not have the necessary expertise (Musil, 2020). The MTRC obtained its first development rights in 1986 through pre-rail site values to develop the land above and around the stations. These developments were sold at market prices to real estate developers, while the public leasehold system also let the MTRC negotiate a share of these assets to the highest bidder in the form of income-producing properties. This allowed the MTRC to receive a "front-end" payment for the land and at the same time a "back-end" share of revenues and assets in-kind (Aveline-Dubach & Blandeau, 2019; Cervero & Murakami, 2009; Murakami, 2012). Through this mechanism, the MTRC was relieved from acquiring land on the open market with comparatively low transaction costs and incentivised the maximisation and internalisation of the co-benefits from the smooth implementation of railway and property co-developments (Murakami, 2012; Suzuki et al., 2015; Tang et al., 2004).

In this way, the two following metro lines were conceived as the urban lines with the development of housing estates around stations (Musil, 2020). The second phase of property development took place in the 1990s with high-rise buildings that now are part of Hong Kong's architectural landmarks and contributed to the consolidation of Hong Kong as an international financial hub. This second generation of property development also included shopping malls, offices and hotels (Musil, 2020; Ollivier et al., 2021). In 1996, the Territorial Development Strategy (TDS), the highest hierarchy of town plans, was enacted to provide a long-term



framework on land-use, transport and environmental issues for the planning and development (Ollivier et al., 2021). The third generation added TOD principles consciously to ensure a better articulation of the triple functionality of stations (technical, economic and urban). The developments of this generation allowed a complete integration between transport and urban (housing, commercial and leisure) functions (Cervero & Murakami, 2009; Musil, 2020; Yin, 2014).

The R+P model allowed the MTRC to break even in 1988, even when operation income were still reporting losses (Musil, 2020). Together with the financial industry, the real estate industry has played a dominant role in the growth coalition (Aveline-Dubach & Blandeau, 2019). Nevertheless, after the Asian financial crises of 1997 and the transfer of sovereignty over Hong Kong from the United Kingdom to the People's Republic of China (PRC), the MTRC and the R+P received some adjustments (Musil, 2020). To face the rising public deficit, large public facilities were privatised and some monopolistic sectors in public utilities were deregulated, which resulted in a shift of power in favour of business elites, as property groups took advantage of the situation to diversify their growing big conglomerates (Aveline-Dubach & Blandeau, 2019). The MTRC was partly privatised and, in 2000, it was listed on the Hong Kong Stock Exchange to broaden its access to capital sources to pressure the managers to become more entrepreneurial under strong market discipline and for the financing of new infrastructure (Murakami, 2012; Musil, 2020). As a result, 23% of the shares were offered to private investors (World Bank, 2017), while the Hong Kong SAR administration remained as the largest shareholder (Ollivier et al., 2021).

Two years later, the government cancelled all public land sales and postponed the MTRC's property projects to stabilise the crisis of the local property market. This limited the MTRC's access to new land (Musil, 2020). In 2007, the MTR Ordinance merged the MTRC with the KCRC, whose management and operations had been in decline since the 2000, into a single major holding company, the MTRC Limited (MTRCL) in order to achieve fare reductions and a better integration of the metro network (integration of rates, rotation of rolling stock, etc.) (Aveline-Dubach & Blandeau, 2019; Murakami, 2012; Musil, 2020). In this way, the MTRC received the operation rights over the East and West rail lines, the Ma On Shan line, light rail, intercity passenger services and bus services for an initial period of fifty years. Additionally, the MTRC also acquired certain property development rights, investment properties and property management rights from the KCRC. These additional property interest have increased the land bank and the investment property portfolio of the MTRC for larger property development potential and rental income (MTR Corporation Limited, 2021).

All these measures allowed Hong Kong to create an environment with financial flexibility and development control that ensures public interest in TOD (Ollivier et al., 2021). Between 1980 and 2005, the financial returns have amounted to nearly 2.33 billion USD (Cervero & Murakami, 2009). Between 2000 and 2012, property development accounted for 38% of the MTR's corporate income, while related businesses (e.g. commercial and property lease management) represented 28% and railway operations 34% (Suzuki et al., 2015). However, it was between 2000 and 2007 when property development was produced more net profits than railway operations. From 2008 to 2010, property development represented less than half of the overall net profits (Murakami, 2012).

Regardless of this situation, the MTRC has completed development around thirty three stations, generating a hundred thousand housing units and more than two million m<sup>2</sup> of commercial floor areas in 2015. Due to its role as asset manager, the MTRC manages more than ninety six thousand housing units, thirteen shopping malls and five office buildings that are equivalent to 764 thousand m<sup>2</sup> of commercial and office space (World Bank, 2017). For this reason, although the property development segment has been seriously declining, due to a lack of land grants and expensive land premiums, the property related activities are still significant sources of income and above that of transport operations. Property-related activities have generated almost twice the amount of investment made by the MTRC to build the metro lines. In this way,

the government also wins from the sale of land premiums, property taxes and from yearly dividends as the majority shareholder of the MTRC (Cervero & Murakami, 2009; Murakami, 2012; Musil, 2020).

### 5.3 MTR Corporation

The MTRC operates the integrated railway network formed by the MTR-built and owned metro railway lines and the regional rail lines acquired to the KCRC under a service concession arrangement. The MTRC is listed on the Hong Kong Stock Exchange with a market capitalisation of 267.9 billion HKD (34.5 billion USD) as of 31 December 2020 (MTR Corporation Limited, 2021). The fare revenue growth has allowed the MTRC to successfully contain the operating costs, which comprise staff costs, energy costs, repairs and maintenance, and other expenses, with profits from property development as one of the most important shares of the overall return on investment (MTR Corporation Limited, 2021).

Musil (2020) summarises the characteristics of the MTRC as it follows:

1. It operates its activities under to concept of **prudent commercial principles** to earn enough revenues and repay its debts, meet operating costs and, eventually, make profits. In case the executive requested the MTRC to act in an opposite way to the prudent commercial principles, it would be compensated;
2. It operates as an **independent company** with clear purposes and responsibilities, instead of as a public service provided by the government. Yet, the government has strict control and has the authority to appoint the board and chairperson;
3. It has a very **high degree of autonomy** to set up the ticketing fare structure, develop property and deal with financial issues (e.g. issuing stocks, dividends and reserve funds).

This structure is translated in the corporation's efficiency, competitiveness and profit. Unlike other transit corporations around the world, it is actually a profit-making organisation, whose net profit was recorded of about 2 billion USD in 2015 and rank the MTRC and Hong Kong as reference for innovative financing (Sharma & Newman, 2017).

Apart from its roles as railway operator, real estate development and manager of the rail villages (Xue & Sun, 2018), the MTRC also develops a role as master planner and urban developer with the private sector through joint land development around and above stations (Suzuki et al., 2015). The rail operator acts as a master planner by identifying the development sites around and above the stations, preparing the layout plans together with the relevant authorities, and negotiating with the government on land premium prices. It is also an intermediary between developers and public bodies by conducting tenders and awarding contracts to developers, setting technical standards, and enforcing quality control. In collaboration with city planners, the MTRC prepares layout plans and negotiates with the government on land premium prices (Musil, 2020; Tang et al., 2004; World Bank, 2017). Moreover the MTRC has defined parameters of station area planning from the start of the discussion of the extension or construction a new rail line. Such parameters are summarised by Ollivier et al. (2021) as it follows: (1) transit alignment, (2) station locations, (3) land values, (4) density potential, (5) financial returns, (6) long-term planning objectives, and (7) land-use mix based on market demands and zoning constraints.

In return, the city benefits from a compact urban form, high density along corridors and efficient transport with high ridership levels (Tan et al., 2004). The MTRC's multi-directional approach and multiple roles that align with the interests of multiple stakeholders in different project phases allow its success as it is an optimal way to minimise transaction costs, maximise flexibility and market efficiency and take advantage of the returns from development (Musil, 2020; World Bank,

2017). This approach also resembles a solution much closer to the context of other emerging economies (Newman & Kenworthy, 2015; Sharma & Newman, 2017).

The MTRC is also involved in further businesses, such as station advertising, telecommunication services within the railway network and railway operation and rail consultancy services in Mainland China and overseas (MTR Corporation Limited, 2021; Ollivier et al., 2021). Therefore, the portfolio of the MTRC consist of two categories exposed in the following Table. Recurrent businesses and property development businesses are then referred to as underlying businesses (MTR Corporation Limited, 2017a).

**Table 1: MTRC portfolio**

(i) Recurrent businesses	(ii) Property development businesses
Hong Kong transport operations (HKTO) Hong Kong station commercial businesses (HKSC) (includes advertising, telecommunication and retail) Hong Kong property rental and management businesses (HKPR&M) Mainland China and international business Other businesses (project management for government, miscellaneous businesses, consultancy businesses and the Ngong Ping 360 gondola lift on Lantau Island)	In Hong Kong and Mainland China

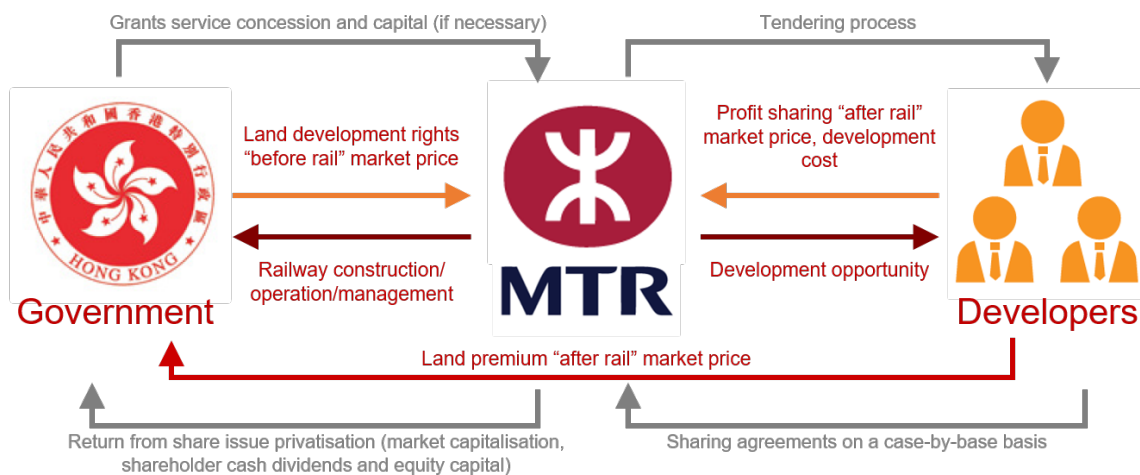
Source: Author, based on MTR Corporation Limited (2017a, 2022a); World Bank (2017).

### 5.4 Procedures of the Rail + Property (R+P) model

The R+P model acts as the MTRC business and infrastructure strategy and has facilitated a continuous, reliable, and steady rate of the delivery of railway infrastructure in the last thirty years (Abiad et al., 2019). The model benefits both the MTRC and the government, as it has allowed the success of the corporation without the burdening of public financing to invest and manage capital-intensive infrastructure (Cervero & Murakami, 2009). Although the MTRC does not receive subsidies from the government, it receives substantial institutionalised support through land grants and rezoning (Abiad et al., 2019). Due to the regime of the Hong Kong SAR, the government owns all the land and leases it to the private sector on a fifty-year lease, which can be renewed once for the same period (Ollivier et al., 2021).

The R+P is based on the articulation of four key elements: policy, process, project, and organisation (Tang et al., 2004). This combination has had a double LVC approach, as it enables the MTRC to (1) create land value through integrated urban and transport planning; and (2) capture such value by receiving land development rights from the government at “before rail” market prices and co-develop the acquired land with private developers at “after-rail” market prices in an intelligently phased manner (Abiad et al., 2019; World Bank, 2017). The MTR benefits from the collection of passengers within high-dense areas and development and owning of property with added value due to its close location and easy access to metro stations (Musil, 2020). Figure 1 summarises the framework of the R+P model.

**Figure 1: Framework of the R+P model**



Source: Author, based on Li & Love (2022); MTR Corporation Limited (2017b); Suzuki et al. (2015); Tang et al. (2004).

The R+P operates on a line by line basis, in the way that it considers market conditions, finances the gap for the infrastructure construction and manages future operation and government requirements. The MTRC provides advice to the Transport and Housing Bureau, which issues and updates a railway development strategy on a regular basis. After the approval of the publishing of the strategy, the Chief Executive in the Executive Council of the Hong Kong SAR requests the MTRC to proceed with the preliminary planning and metro line design. This stage also includes negotiations on the scope, costs and implementation programme, as well as the identification of the sites to develop after a rezoning plan is approved (World Bank, 2017). On a following stage of the procedure, the MTRC, together with external assessors, determines the financing gap for the new line that could not be recovered through future operating revenues. Once this is approved, and all parties agree with the R+P proposal, the MTRC is granted exclusive development rights for the specific sites. These rights define the location of the buildings, allowed uses and plot-ratio densities. The transfer of development rights is realised at the "before-rail" market price. In order to protect the public interest from granting too much land, any excessive capital grant is reimbursed to the government with interest (World Bank, 2017).

After the land is acquired, the MTRC acts as a landlord and subdivides and leases the land to private developers, selected from a list of qualified bidders, through public auctions (Xue & Sun, 2018). The selection of the private developer is based on the attractiveness of the proposal, experience, management capabilities and financial health. This has also allowed the preference towards large property groups and the elimination of smaller competitors (Aveline-Dubach & Blandeau, 2019). Potential developers are also allowed to certain extent to recommend and negotiate site modifications to the R+P proposal, which has allowed them to influence metropolitan projects. As the land is not sold to private developers, the MTRC partners with them instead and remains in full control of the land and leases of the units (World Bank, 2017). The built property values will increase in the following years due to its proximity to the metro network and its integration with the station. This increase in values is then captured by the MTRC to reinvest in new infrastructure and balance the maintenance and operation costs of the network (Ollivier et al., 2021).

It is also important to mention that the R+P model, as other LVC schemes, is influenced by macro-economic factors, which represent high risks for their success (Li & Love, 2022). To minimise direct risks, developers must cover all development costs and assume all project risks. In compensation, the MTRC negotiates with developers three mechanisms for gaining benefits: (1) profit sharing in agreed proportions from the property sale or lease (after development costs deduction); (2) sharing of assets in-kind; or (3) receiving upfront payments case-by-case. The selection of one of these mechanisms depends on the evaluation of the market conditions and

long-term value of the development. In addition, the MTRC also engages several developers per station area (up to thirteen developers) to manage risks and address various market needs (Suzuki et al., 2015; World Bank, 2017).

## 5.5 Main agencies involved

Urban development and transit policy in Hong Kong require the work of three key actors: (1) the MTRC, which acts as the constructor and operator of the railway, property developer, property investor and manager of the commercial businesses within, above and surrounding the stations; (2) the Hong Kong SAR government, which gets a large share of its income from land ownership and related taxes; and (3) the business sector, formed by real estate groups that have the control over the majority of Hong Kong's urban production and earn revenue streams from their real estate holdings (Aveline-Dubach & Blandeau, 2019).

For the successful implementation of the R+P model, Ollivier et al. (2021) has listed the main agencies that worked together with the MTRC:

1. Land Development Corporation (LDC): since its foundation in 1988, it has negotiated with owners to acquire land in a fair and reasonable way before applying to the Secretary for Planning, Environment and Lands for compulsory land resumption;
2. Urban Renewal Authority (URA): it replaced the LDC in 2001 as the statutory body for the undertaking, promotion and facilitation of urban renewal, in favour of improving the living conditions of residents in old districts;
3. Hong Kong Housing Society: it is the second largest public housing provider in Hong Kong since its foundation in 1948. As a major urban renewal agent, it acquires dilapidated buildings under the Urban Improvement Scheme (UIS) of 1974 to redevelop them into modern housing blocks.

## 6 Co-benefits of the R+P model

The R+P has been essential for the successful implementation of the MTR network and has positively impacted the city from a station area scale to a metropolitan scale. These co-benefits have contributed to the support of railway transit by the State, despite its laissez-faire political position (Aveline-Dubach & Blandeau, 2019; Tang & Lo, 2008). The co-benefits of the model are divided into four categories.

### 6.1 Financial impact

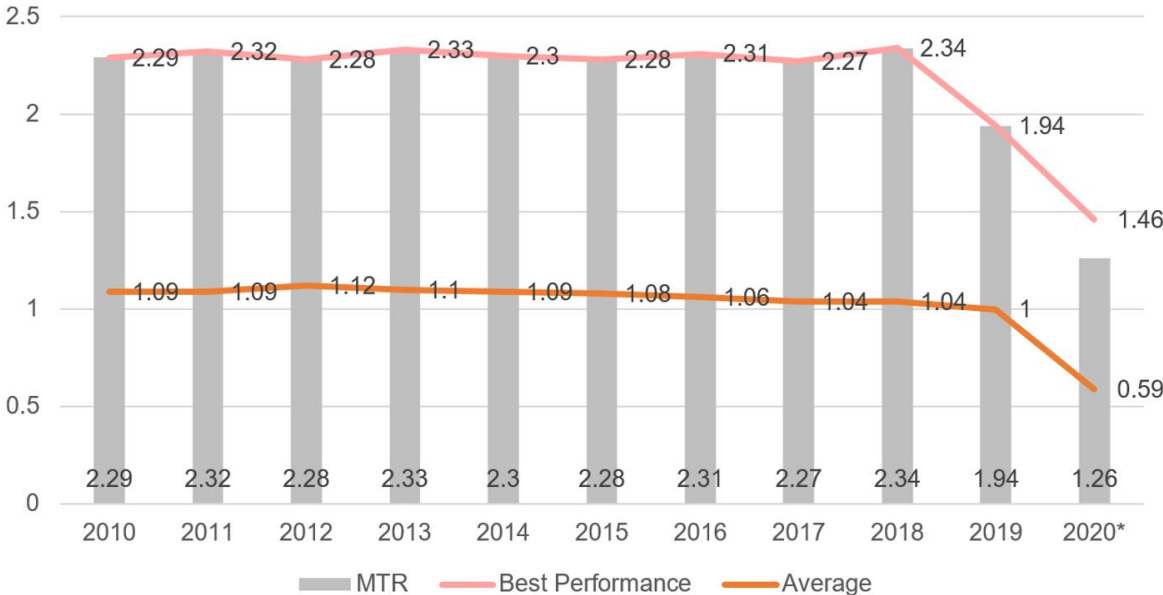
Like in other traditional railway companies, fare revenue from MTR ridership alone has not been enough to pay for capital depreciation, financing and operating costs, despite the high ridership levels (Lo et al., 2008). Therefore non-fare revenue from property development, station commercial business and property rental and management business has enabled the economic sustainability of the system. The development rights granted by the government minimise public spending on transit infrastructure in exchange of a long-term railway construction model (MTR Corporation Limited, 2017b). Furthermore, the MTRC's debt servicing capability has also improved with reduced debt ratio (World Bank, 2017). As the government is the majority shareholder, it receives a large amount of cash dividends, plus the land premium revenues. Although these are the only direct financial benefits, these are quite substantial for the government (Musil, 2020). Railway consultancy services have also become an additional recurrent revenue (Lo et al., 2008).

Between 1980 and 2005, the government received an estimated of 140 billion HKD (18 billion USD) in net financial returns (at a nominal value). This is calculated based on the difference between the earned income, which was 171.8 billion HKD (22 billion USD), from land premiums, market capitalisation, shareholder cash dividends, and initial public offer proceeds, and the value of injected equity capital, which was comparatively lower (32.2 billion HKD or 4.2 billion USD) (World Bank, 2017).

Hong Kong is also part of the benchmarking platform by the Community of Metros (COMET), which is jointly owned and steered by their members and is facilitated by the Transport Strategy Centre (TSC) at Imperial College London. The platform aims to compare performance and improve world standards in the industry through the measurement across six categories, including growth and learning, financial performance and environmental performance. The MTRC participates to benchmark its railway performance for further improvement (MTR Corporation Limited, 2016, 2022h). The COMET benchmarking collected data has grown in the last years. In 2010, the platform included data from railway systems in twelve other cities apart from Hong Kong: Beijing, Guangzhou, London, Mexico City, Madrid, Moscow, New York, Paris, Santiago, Shanghai, Sao Paulo and Taipei (MTR Corporation Limited, 2012). In 2012, the benchmarking added Berlin (MTR Corporation Limited, 2014), and Delhi and Singapore in 2014 (MTR Corporation Limited, 2016). In 2020, COMET merged the NOVA benchmarking group into the COMET group, which increased the platform to forty two metro systems in thirty nine cities, including the previously mentioned and also Buenos Aires, Rio de Janeiro, San Francisco, Vancouver, Barcelona, Brussels, Istanbul, Oslo, Bangkok, Bangalore, Dubai, Kuala Lumpur, Sydney, Seoul and Shenzhen (MTR Corporation Limited, 2022h).

The benchmarking exercise has exposed how the MTR financially outperforms all other metros, which is measured by capacity provision and utilisation. Figure 2 shows that the MTR has registered the highest financial performance in total commercial revenue (fare and non-fare wise) per operating costs between 2010 and 2019 (MTR Corporation Limited, 2016, 2018c, 2022h). For 2020, revenue dropped significantly due to the Covid-19 pandemic, but figures were still above the average (MTR Corporation Limited, 2022h).

**Figure 2: Total commercial revenue per operating cost (MTR and COMET selected cities)**



\*Due to the larger number of metro cities included in 2020, performance may not be fully comparable with previous years.

Source: Author, based on MTR Corporation Limited (2016, 2018c, 2022h).

## 6.2 Ridership increase

The high quality of the MTR and good connectivity of the system have also influenced in the passenger volume. The R+P model has accommodated high-quality, highly-dense rail villages that heavily depend on transit (World Bank, 2017). Attractive, diverse developments with emphasis on private housing units clustered around MTR stations have also influenced in this ridership impact (Ollivier et al., 2021; Tang et al., 2004), as real estate properties generate transit dependence and increase the fare revenue, which in turn supports better service quality that leads to still higher levels of patronage (Lo et al., 2008). In 2018, the MTR registered 5.88 million daily trips, which accounted for 49.3% of franchised transit, whereas in 2021 this figure decreased to 4.75 million daily trips, with a share of 47.3% of franchised transit (MTR Corporation Limited, 2022h), still high metro ridership levels despite the effects of the Covid-19 pandemic. This confirms the positive synergy between property development and transit ridership. Additionally, the R+P allows the MTRC to operate on a self-sustaining basis while also maintaining fares at an affordable level (MTR Corporation Limited, 2016), which also contributes to high patronage.

## 6.3 Co-benefits on the urban environment

Since the late 1990s, development has integrated TOD strategies (high-density and compact city, mixed uses and walkability) in a more physically comprehensive manner than seen in the 1980s (Ollivier et al., 2021; World Bank, 2017). This type of development has brought people physically closer to the stations, providing maximum convenience and time efficiency (MTR Corporation Limited, 2017b). This better land utilisation has prevented urban sprawl, contained traffic congestion, and reduced automobile pollution and energy and fossil fuel consumption (Aveline-Dubach & Blandeau, 2019; Musil, 2020; Tang & Lo, 2008). The MTR has been essential to create a compact configuration without occupying road space through the physical segregation between railway and pedestrian space, which creates a safer and healthier living environment, and reduces road traffic and traffic accidents (MTR Corporation Limited, 2017b).

The urban impact of the R+P is particularly important considering the geographical characteristics of Hong Kong with mountains and water bodies. The network has also improved the connectivity from the mainland area to the Hong Kong Island, and the new towns that are separated by mountains. This has also avoided higher expenses costs in road infrastructure to detour the mountains. The good connectivity provided by the MTR has also accelerated the decentralisation of the urban area and promoted the development of the fringe area (Yin, 2014).

## 6.4 Reduction of carbon emissions

Energy generated from non-renewable fuel sources represents the most relevant input for the operation of MTR network. Railway operations and property business accounted for 79% and 21% of the MTRC energy consumption, respectively (MTR Corporation Limited, 2022g). According to the COMET benchmarking platform, the total energy consumed per passenger km between 2016 and 2019 has been equal to the average of registered in other cities (0.08 megajoules per passenger km), whereas CO<sub>2</sub> emissions per passenger km still are above average for the same years (51.66 CO<sub>2</sub> grams per passenger km, in contrast to the average of 39.64 grams per passenger km) (MTR Corporation Limited, 2022h). Nevertheless, considering the high transit ridership and very low car ownership in Hong Kong (105.6 cars per 1000 people) (Statista Research Department, 2022), the MTR has an overall positive impact to reduce carbon emissions. Emissions have significantly reduced between 2019 to 2021 in all sectors of the corporation due to the Covid-19 pandemic (MTR Corporation Limited, 2022h).

Furthermore, the MTRC has completed a carbon reduction study in compliance with the Hong Kong's Climate Action Plan 2050 to develop a long-term decarbonisation roadmap for the operation and development of the railway and property businesses in Hong Kong through the analysis of the carbon footprint, review of feasible technical solutions and global industry best practices, and assessment of their applicability to its own operation. Following the study, the MTRC is planning to set carbon reduction targets for the railway network and property portfolio for 2030 and with the aims at achieving carbon neutrality by 2050 in line with the Paris Agreement (MTR Corporation Limited, 2022g).

## 7 Replicability of the Hong Kong model

Development-based LVC is convenient to efficiently connect value creation and capture without introducing new taxes or increasing existing ones that can produce public opposition (Li & Love, 2022; Suzuki et al., 2015), while paying and prioritising the needs of different groups of citizens who depend on transit (Yen, Mulley, & Zhang, 2020). However, development-based LVC requires a high degree of coordination between public and private sectors to negotiate, adjust land use and share revenue, which leads to elevated transactions costs. This is very time consuming, as both sectors have to set appropriate policies to ensure the implementation of a project before its start. Lack of coordination and communication between public and private sectors can threaten the stakeholders' expectations and therefore contribute to the failure of a project (Li & Love, 2022).

The Hong Kong model remains as a successful and innovative approach that goes beyond the field of transport and integrates railway operations with real-estate and commercial opportunities. Tang et al. (2004) have identified four key elements that grant the success of this "transit LVC" model:

1. **Public policy** in favour of transit and land-use integration through land grants;
2. Forward-looking **planning, management and control procedures** that ensure an efficient approach from start to completion of the projects;
3. **High-quality real estate projects** that are attractive to tenants, shoppers, and transit users;
4. **Organisation** through an entrepreneurial entity with a multi-directional approach with multiple roles, multiple stakeholder coordination and balance between investors' financial interests and societal goals.

Apart from these elements, an institutional framework has been vital for the effectiveness of the model, together with the following key principles pointed out by Suzuki et al. (2015):

1. **Master plans and policy documents** that highlight the importance of the MTR network as the backbone for urban development;
2. A **public leasehold system** that controls land supply, attracts the private sector and ensures public interests around new lines;
3. The **Comprehensive Development Area (CDA) zoning** with special floor area ratios (FARs) around strategic stations to attract private investment with some degree of flexibility for developers to negotiate and design;
4. **Property development rights** granted at a "pre-rail" market price to allow the MTRC to cover the capital and running costs and perform multiple functions at lower transaction costs;
5. The **progressive granting of development rights** from small parcels above stations to large-scale, high-quality rail villages and business centres;



6. The government and MTRC are **protected** from **market and development** risks, as private developers cover land premiums and face project risks for higher financial returns;
7. **Clear rules for sharing costs** and profits among public agencies, the MTRC and private developers, easing project uncertainties and public opposition;
8. **Personalised development parameters** for stations according to specific characteristics of locations, market demand and socioeconomic conditions;
9. The MTRC remains as an **asset manager** after the project completion to capture the upfront profits and maximise management-related recurring revenues from the long-term business portfolio.

However, R+P projects are much more complicated than stand-alone metro projects or real estate projects for two reasons. First, due to financial reasons, as they require high investment. While the construction costs are difficult to estimate, but manageable through benchmark, profit from real estate development is a higher challenge to estimate due to real estate market trends. The second reason is political, as they require high levels of coordination among different government agencies, which can be affected during different government periods (Yang, Zhu, Duan, Zhou, & Ma, 2020). Therefore, it is necessary to highlight that the success of the MTRC is also framed by strict rules and the government system, as the corporation answers to the authorities (Musil, 2020). Although other cities have developed different LVC mechanisms, Hong Kong represents a unique case study due to a series of specific characteristics:

1. Urban characteristics, such a limited available land, solid economic systems and high population density, which allows better railway services due to shorter headways and closer station spacing that enable a positive loop that attracts more ridership (Aveline-Dubach & Blandeau, 2019; Lo et al., 2008; MTR Corporation Limited, 2016; Musil, 2020);
2. The close relationship between the government and the MTRC due to specific institutional arrangements that have facilitated the tools to enable accurate and solid coordination between public and private stakeholders (Li & Love, 2022; Musil, 2020; Yang et al., 2020).

## 7.1 In Mainland China

This questions the possibility of replicating the R+P model elsewhere. The PRC central government's encouragement to involve the private sector in metro construction has benefited the MTRC to expand in Mainland China, as the only oversea metro corporation in charge of construction and operation of metro lines (Yang et al., 2020). As a result, the MTRC operates lines in Beijing (Metro Line 4, Daxing Line, Line 14, Line 16 and Line 17), Shenzhen (Metro Line 4) and Hangzhou (Metro Line 1 and Line 5 project), and also in Macao with the operation and maintenance of the Macao Light Rapid Transit (MLRT) Taipa Line (MTR Corporation Limited, 2022f). The MTRC has attempted to export the R+P in Mainland China, but only in Shenzhen special economic zone (SEZ) it has been able to implement the model above the depot of the Line 4. The development Tiara has a gross floor area of over 206,000 m<sup>2</sup> (MTR Corporation Limited, 2021). It is not a coincidence that Shenzhen is the only city in Mainland China with MTRC R+P projects, as its SEZ is one of the friendliest cities for foreign businesses in the country (Yang et al., 2020).

In 2016, the MTRC signed a cooperation framework agreement with the Chinese state-owned enterprise (SOE) Beijing Infrastructure Investment Corporation Limited (BIIC) and Beijing MTR Corporation Limited (BJMTR), joint-venture company between the MTRC (49% shareholding) and two SOEs: Beijing Capital Group (BCG) (49% shareholding) and BIIC (2% shareholding). This agreement aimed to jointly conduct preliminary studies on the integrated development of selected existing station and depot sites along the metro lines operated by the Beijing MTRC

and other rail-related property development projects in Beijing (MTR Corporation Limited, 2017b). Other cities have also been approached by the MTRC, such as Shenyang, Tianjin and Chengdu. However, the local market and municipal regulations end up greatly benefiting domestic players and state-owned metro companies over foreign private competitors, while the MTRC has also expressed its concerns on the overall profitability of R+P projects in China. Consequently, none of these attempts succeeded (Musil, 2020; Yang et al., 2020).

At the same time, Chinese cities have pursued to develop their own version of R+P models independently, including the cities where the MTRC decided not to develop due to high financial risks. As of 2019, over twenty cities out of thirty five Chinese cities with metro systems have implemented some sort of R+P projects through their local SOEs (Yang et al., 2020). For example, the Shenzhen government, due to its proximity to Hong Kong and eagerness to implement similar TOD policies, has executed its own R+P model through its own state-owned transit agency, the Shenzhen Metro Group (Aveline-Dubach & Blandeau, 2019; Wang, Samsura, & van der Krabben, 2019; Yang et al., 2020). Shanghai has seen in the partnership between its railway operator Shentong and the SOE developer Greenland an alternative to the R+P (Musil, 2020).

Despite the similarities between Hong Kong and Mainland China (e.g. state ownership of urban land), there are still several barriers for transit agencies to develop property in Mainland China due to institutional barriers, such as fragmented and unsupportive planning regulations that rigidly separate transit and land-use development, limited LVC instruments and inefficient governance (Wang et al., 2019). This prevents transit companies from obtaining land-use rights for property development. Furthermore, foreign private investors fall under greater disadvantage in comparison to local SOEs. According to the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA), the MTRC is considered a special oversea investor, which can form a joint venture (JV) with local investors to fund, build and operate metro lines (Yang et al., 2020). However, JVs for larger metro systems must be reviewed and approved by the State Council of China, which can be time consuming and uncertain for local governments. As a result, JVs are dropped in favour of local SOEs, despite the comparatively advantage and expertise of the MTRC to finance metro lines through R+P projects (Yang et al., 2020).

Another issue for the MTRC is the lack of support for risk control in Mainland China, as such region is not regulated by the Hong Kong Stock and Security Market (HKSSM), where the MTRC is listed. As a result, the MTRC requires a higher amount of land than local SOEs to reduce risk of business loss. On the contrary, Chinese SOEs do have local government support and are willing to take greater risks and have it easier to negotiate contracts with the local government for their own R+P projects. In addition, state-owned metro corporations are not under market pressure to gain profits, and receive operational subsidies (Yang et al., 2020).

The MTRC keeps looking for opportunities for R+P developments in Mainland China. In 2021, the corporation has found three local JV partners in Hangzhou to jointly secure the land-use rights for TOD in one of the stations. The MTRC has become the TOD advisor for the development of one area through JV with subsidiaries (MTR Corporation Limited, 2021, 2022d). As well, it continues to explore TOD cooperation opportunities in the Guangdong–Hong Kong–Macao Greater Bay Area (GBA). However, the continuous barriers in Mainland China may lead to the MTRC to continue to pursue rail-only projects, as these require less approval requirements (Yang et al., 2020). In order to gain support from local property developers in Mainland China, the MTRC is also inviting them to participate as tenderers in projects located in Hong Kong (Musil, 2020).

## 7.2 Overseas

The World Bank has also been a loud advocate of the R+P for Asian cities that aim to modernise their transit systems and solve urban issues with limited financial resources (Suzuki et al., 2015). Nevertheless, most of these cities lack the necessary land and transport policies and a

regulatory and institutional framework that enables the creation of a single and autonomous entity with multiple roles, as it is the case of the MTRC (Musil, 2020). Another necessary condition is a healthy real estate market. However, something that makes this model unique is that Hong Kong has the ownership of the lands of the territory, which is not case in cities driven by free market policies and speculative practices and a strong presence of the private sector. Even if a transit company is able to gain property grants, there is also the risk that economic profit may be seen as the main target, and other equally important aspects of the R+P model (urban renewal, TOD strategies for diverse, mixed and lively neighbourhoods) may be neglected. A for-profit only vision also implies the risk of eviction and gentrification with newcomers in redevelopments (Musil, 2020). Moreover, the integration of land-use and transport planning still remains a main challenge for Global South cities, without appropriate development schemes for local transit and planning agencies (Suzuki et al., 2013).

On the hand, the MTRC has expanded beyond Asia to build and run railway lines, such as in the United Kingdom (London Elizabeth line and South Western Railway), Sweden (Stockholm Metro, Stockholm-Gothenburg Intercity Express Service, Stockholm commuter rail and Mälardalen Regional Traffic) and Australia (Melbourne's metropolitan rail service and Sydney Metro North West Line and Sydney Metro City & Southwest) (MTR Corporation Limited, 2022f), but it has only performed as a railway operator. Some of these railways (including those in Mainland China and Macao) are operated by 100% owned subsidiary companies that are wholly owned by the MTRC. In other cases, the lines are franchised through JVs with some percentage of shareholding allocated to the MTRC (between 30% and 60% of shareholding) (MTR Corporation Limited, 2022f). This adds additional revenue sources for the corporation, apart from those in Hong Kong.

### **7.3 Other development-based LVC world examples**

Apart from Hong Kong, other cities also offer examples of joint development, with Japan as another highlighted case of JD through land adjustment mechanisms. These are used to integrate irregularly formed properties into fully serviced urban neighbourhoods and sale "extra" land to fund railway systems. As in-kind support, the government allows land consolidation and acquisition, which contributes to efficiently assemble the right-of-way of new lines and land parcels for development (Sharma & Newman, 2018). Unlike Hong Kong's approach, development has a wider coverage beyond individual properties. In the last decades, additional strategies have been added to face economic downturns, such as strategies to infill urban development around stations (Sharma & Newman, 2018). Under the Japanese context, where land is privately owned, development is market oriented, which proves that the private sector can promote TOD when it can maximise profits (Yang et al., 2020). Suzuki et al. (2015) have also identified LVC lessons for specific transit projects in Western cities. New York City has established programmes with transferable development rights (TDRs) for the densification of commercial activity on and around Grand Central Terminal. The public transport authority (PTA) of Washington Metropolitan Area has used JD programmes between local government and private developers for TOD projects. In London, JD was also used to redevelop the King's Cross rail yard.

In the case of emerging economies, some Indian cities have also used development-based LVC mechanisms, as its public sector has high land ownership. Delhi has developed a government-led approach but has struggled due to its multi-layered governance system and several agencies within its wide territory, while Hyderabad has used PPP to promote real-estate development around its metro stations (Suzuki et al., 2015). In addition, Mumbai is one of the few Indian cities with existing legislative provisions for LVC through the Maharashtra Regional and Town Planning Act of 1966. However, the first metro line was not financed using LVC mechanisms, despite the impact of the line on the surrounding property prices has been such that it extends beyond the 500-metre radius (Sharma & Newman, 2018). In the case of Bengaluru, its metro corporation has

been working on a TOD policy and exploring several LVC mechanisms, but has found obstacles due to the size of its plots, strict zoning regulations and reduced buildable rights, and a disjointed institutional structure that results in dispersed decision-making among several government agencies (Dhindaw, Kumaraswamy, Prakash, Chanchani, & Deb, 2021).

In the case of Latin America, Smolka (2013) has studied the use of air rights sales in São Paulo as LVC mechanisms to finance local infrastructure investment in cities where the land is not publicly owned. Nevertheless, these certificates of additional construction potential, applicable only to designated urban areas, have rarely financed TOD investments and have also led to downzoning and negative impacts against urban densification. These experiences show that, although there are opportunities to apply development-based LVC, institutional and regulatory frameworks, and lack of expertise and resources, or interest, can undermine the success of these mechanisms (Suzuki et al., 2015).

## 8 Policy recommendations

Despite the challenges to simulate similar conditions as those of Hong Kong, there may be some recommendations for policy makers that aim to apply similar co-development models. According to Murakami (2012), there are three important considerations for a successful implementation:

1. **Railway investment timing** during periods of rapid growth of urban areas to capitalise the greater accessibility benefits and increase private investment opportunities;
2. **Long-term property stewardship** during periods of slow growth to manage transit-supportive property packages and gradually enlarge net profits on commercial businesses. This allows to analyse market profiles, update development strategies, and provide value-added services;
3. An **updated spatial strategy** to encourage value added business interactions and regenerate greater land premiums around stations.

As well, a long-term vision that supports transit use is necessary. To achieve this, master plans are vital for the identification of railway as the backbone of urban development and the location of important nodes within the city. Along with metropolitan master plans, sector and local master plans are also needed in compliance with the different levels of governance (local, metropolitan and national) and across different urban planning, land administration, transport, economic development, and housing departments. This contributes to a shared common vision in favour of the increase of transit ridership and TOD and against automobile-dependent developments. Outdated land-use plans and inconsistent regulations discourage transit agencies and private developers from exploring opportunities in and around stations (Suzuki et al., 2015).

### 8.1 LVC mechanisms

The R+P model has shown the importance of an autonomous transit agency as a single body with multiple functions (planning, designing, land acquisition, construction, operation and asset management), which go beyond the traditionally view of transit agencies as purely engineering-oriented. To achieve this, a diverse corporate portfolio is needed that includes a wide range of professionals, including real estate experts and urban planners (Suzuki et al., 2015). As well, updated and digitalised land-use maps and real estate valuation are necessary to allow governments and the private sector to plan LVC initiatives (Sharma & Newman, 2017).

For the selection of the suitable LVC mechanism, this would depend on (1) the government's authority to track the value of land and to levy land taxes to implement tax-based LVC; (2) the

government's ability to assemble and acquire land at a favourable price to implement LVC strategies based on land sales or leases; or (3) the government's capability to act as a savvy business partner in land development to consider JD and commercial leasing through their transit agencies (Salon & Shewmake, 2011). Regarding land acquisition, under market freehold systems, local governments that do not own land can suitable alternatives for development-based LVC through mechanisms such as land readjustment and vertical development opportunities (e.g. the sale of air rights to private developers in densely built-up areas). Moreover, FAR distribution can be used as a market incentive (Suzuki et al., 2015).

## 8.2 TOD mechanisms

Local governments can take advantage of TOD mechanisms to allow even higher density, which will therefore translate into higher demand and ridership (Ardila-Gomez et al., 2021). For the use of TOD to finance new railway systems, the World Bank (2017) suggests the application of the following approaches:

1. **Financial sustainability approach** through rail investments that can achieve a targeted return rate;
2. **Market-driven approach** through the comprehensive planning of development along each line, with multiple stakeholders and the definition of the scale and location of the based on market demand and institutional capacity;
3. **Risk management approach** through PPP arrangements that transfer a large part of commercial risks to the private developers.

The ideal station catchment range depends on the acceptable distance travelled by transit users within a manageable walking time, which is subject to the walking habits and urban environment of each city. For example, some cities may have a radius zone of two kilometres for the influence of transit benefits, while others TODs set a radius between 400 and 800 metres (Xue & Sun, 2018).

## 8.3 Additional policies

In addition to TOD mechanisms, other complementary TDM strategies and institutional arrangements can ensure the successful implementation of development projects (Ollivier et al., 2021). As well, flexible land-use regulations are essential to increase the supply of built space and attract private investors, while avoiding economic inefficiency and loss of welfare (Ardila-Gomez et al., 2021).

In the case of Hong Kong, additional strategies, such as car registration fees and transit first policies, have contributed to shape the territory as one of the most transit-oriented urban areas worldwide (Ollivier et al., 2021). The control of car ownership through high fuel tax and high registration taxes from 35% to 100% of the vehicle cost have contributed to maintain low car ownership levels in comparison to other cities with similar GDP (Lo et al., 2008). The following tables summarise the set of policies and regulations in favour of transit use in combination with property development and TOD implementation.

**Table 2: Key enabling policies and legal framework in support of transit and property development**

Policy: land development	Key features
Grant of exclusive property development rights of the station areas to MTRC in exchange for its commitment to provide and improve MTR as an essential transport mode	Incentive-based approach to encourage the corporation to plan and develop sites in a financially viable manner by internalising benefits from R+P development; Eliminates land banking and acquisition associated costs
Established MTRC as an independent corporation with government as a major shareholder to strengthen the role of the PTA as the single entity to serve as the master planner, property developer and manager, and generate revenues to sustain the transit service	Government’s commitment to remain as the majority shareholder of the MTRCL after the privatisation for at least 20 years and own no less than 50% of shares and votes of the MTRCL; Lower transaction costs with single entity as opposed to multiple agencies
Permit JVs in real estate development with private sector investment in TODs	
Use of TDR combined with commitment to encourage redevelopment of existing areas rather than allowing for suburban development	

Source: Ollivier et al. (2021); Tang et al. (2004)

**Table 3: Policies that support transit use and TOD implementation**

Policy	Key features
Limiting private car ownership and usage	Initial registration tax ranging from 35% to 100% of the vehicle cost  High fuel tax
Transit service coordination and protection (1980s)	White papers on transportation policy  Prohibited direct competition by other transit/feeder modes along rail routes
Service proliferation and competition (1990s)	Railway Development Strategy, which set out development plans for 4 new rail lines or extensions  White papers on transportation policy
Service rationalisation and consolidation	Transit interchanges as required component of new railway stations to facilitate intermodal feeder services  Increase the proportion of rail-based transit journeys from 33% in 1997 to 40–50

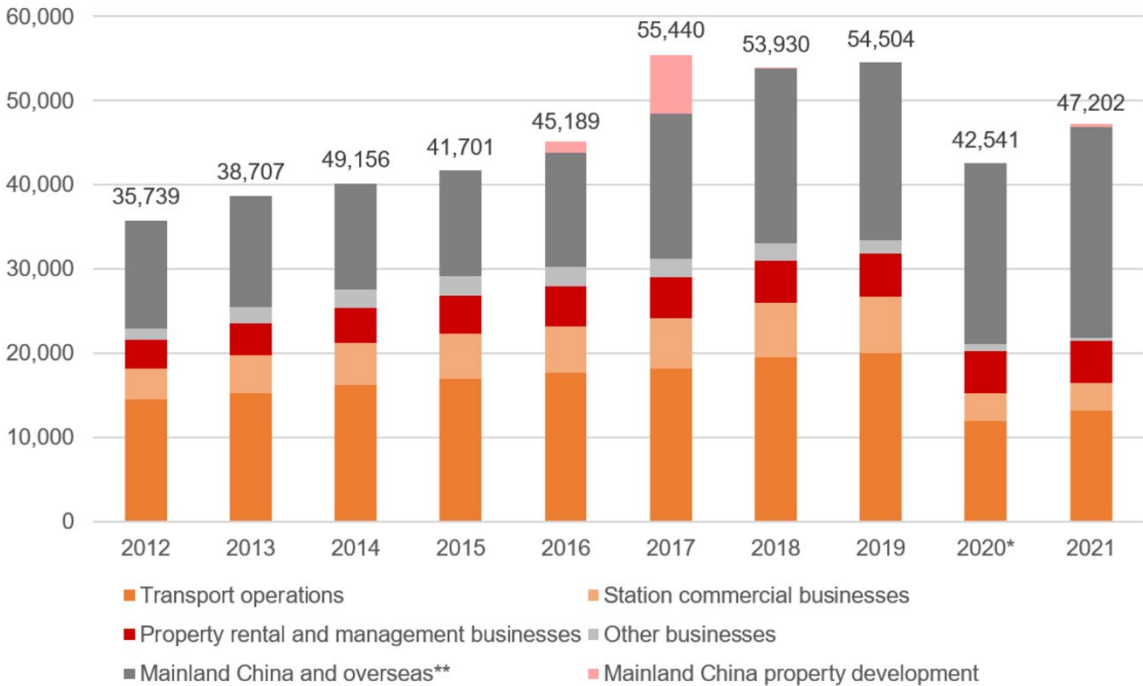
Source: Lo et al. (2008); Ollivier et al. (2021); Tang et al. (2004)

Finally, cities should also aim to integrate their transit systems, from mass transit technologies to buses, feeders and informal transit services that fulfil the first and last mile gap to ensure user satisfaction and promote the shift in favour of transit use as a competitive and attractive transport mode. Multimodal transport planning should achieve the three levels of integration: physical (infrastructure for easy transfer), informational (available timetables and schedules) and fare-wise (affordable for multiple trips) (Ardila-Gomez et al., 2021; Nag, Manoj, Goswami, & Bharule, 2019).

## 9 The future of the R+P model

The R+P model has contributed for years to the MTRC’s revenue. However, other additional sources today represent higher shares of the total revenue from recurrent businesses (HKTO, HKSC, HKPR&M, Mainland China and international business, and other businesses). Figure 3 shows the increase of the revenue produced by businesses in Mainland China and overseas due to railway operations, property rental and management subsidiaries (MTR Corporation Limited, 2017b, 2022e, 2022h), even during 2020 when the Covid-19 pandemic affected transit patronage worldwide (as it can be seen in HKTO). The largest shares of revenue for businesses abroad come from the performance from Melbourne metropolitan rail network, followed by patronage in Shenzhen Metro Line 4 (MTR Corporation Limited, 2022a).

**Figure 3: Total economic value generated by MTRC between 2012 and 2021 (in million HKD)**



\*Without considering the economic value retained from prior years and reinvested in 2020 (3,923 million HKD)

\*\*Includes railway, property rental and management subsidiaries

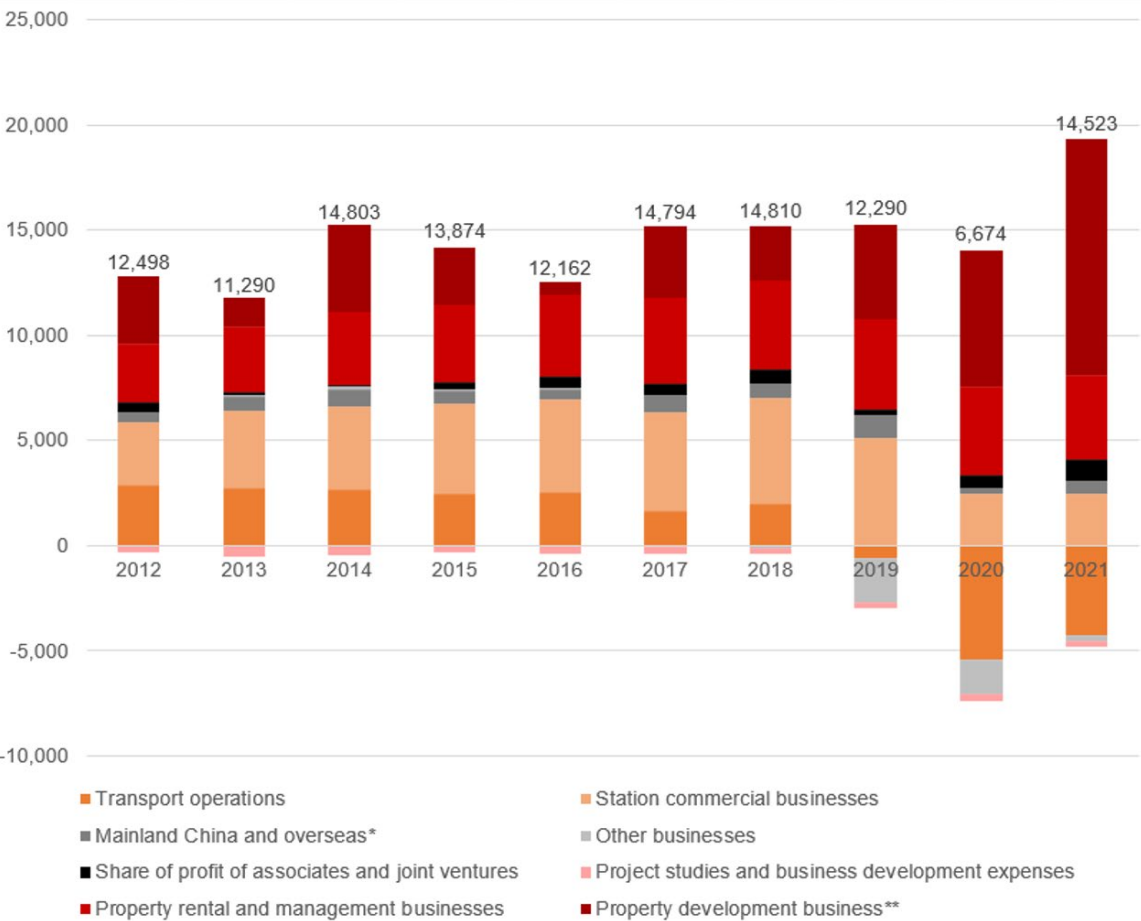
Source: Author, based on MTR Corporation Limited (2017b, 2022e, 2022h).

When net income is analysed, Figure 4 shows the total amount of earnings before interest and taxes (EBIT) in the last ten years. Earnings from recurrent business have accounted for the largest amount of the net income between 2012 and 2019, in comparison to those from property development. However, Hong Kong property rental and management businesses have represented between 30% and 35% of recurrent businesses EBIT between 2012 and 2018, while in 2019, it even accounted for 55%. EBIT from HKPR&M businesses have continued to steadily increase from 2,764 million HKD in 2012 to 4,264 million HKD in 2019 (MTR Corporation Limited, 2022e). This owes to the active strategy to increase income from retail and advertising spaces inside trains and stations, telecommunications services (e.g. installation of mobile phone networks to offer passenger access to Wi-Fi services), and management of property rentals outside the stations (shopping malls and offices) (Aveline-Dubach & Blandeau, 2019). When LVC returns consider both HKPR&M and property development businesses, these have contributed to between 30% and 60% of the total net income, depending of the year (Figure 5). Because of the significant decrease of income from property development between 2012 and

2016 due to the reduction of land development activities in Hong Kong, some authors have suggested that the MTRC has shifted its model from a developer to more of a property manager (Aveline-Dubach & Blandeau, 2019; Li & Love, 2022; Murakami, 2012; Yang et al., 2020).

However, property development earnings have recovered after 2016 and considerably increased from 3,411 million HKD in 2017 to 11,226 million HKD in 2021 (MTR Corporation Limited, 2022a). This recovery is due to the finalisation of long-term projects that the MTRC held during the previous decade and also sires obtained after the merging with the KCRC (Aveline-Dubach & Blandeau, 2019). In 2017, most of the property development profit derived from profit recognition developments at Tiara in Shenzhen and sundry income sources in Hong Kong (MTR Corporation Limited, 2018a). Within Hong Kong, the development of the long-term project around the LOHAS Park station and Wong Chuk Hang station areas, which includes residential building, retention ownership of shopping malls and retail areas, has become the main source of earnings in the following years (MTR Corporation Limited, 2018b, 2019, 2022c). These earnings have allowed the MTRC to bear the losses from recurrent businesses during 2020 and 2021 due to the Covid-19 pandemic, particularly from transport operations in Hong Kong (Figure 3 and 4).

**Figure 4: Total EBIT of MTRC between 2012 and 2021 (in million HKD)**

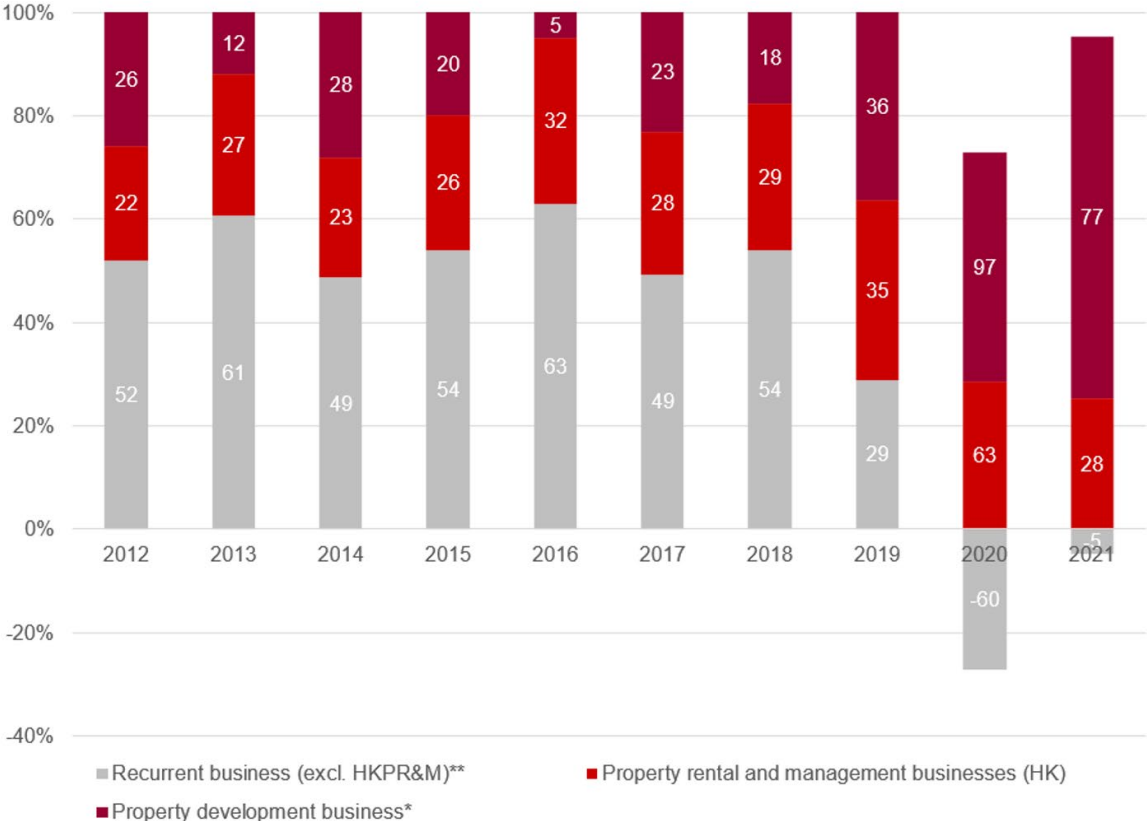


\*Includes property rental and management businesses and station commercial businesses  
 \*\*In Hong Kong and Mainland China

Source: Author, based on MTR Corporation Limited (2017a, 2022a, 2022e).



**Figure 5: Recurrent business vs. property development EBIT between 2012 and 2021 (percentage)**

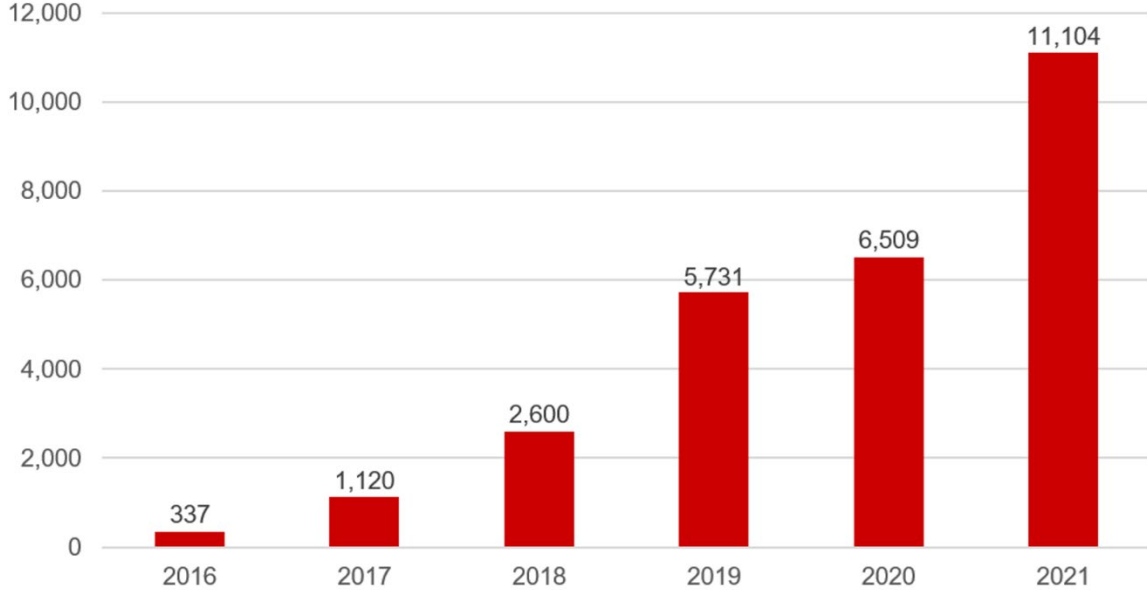


\*In Hong Kong and Mainland China

\*\*Includes activities in Hong Kong and Mainland China

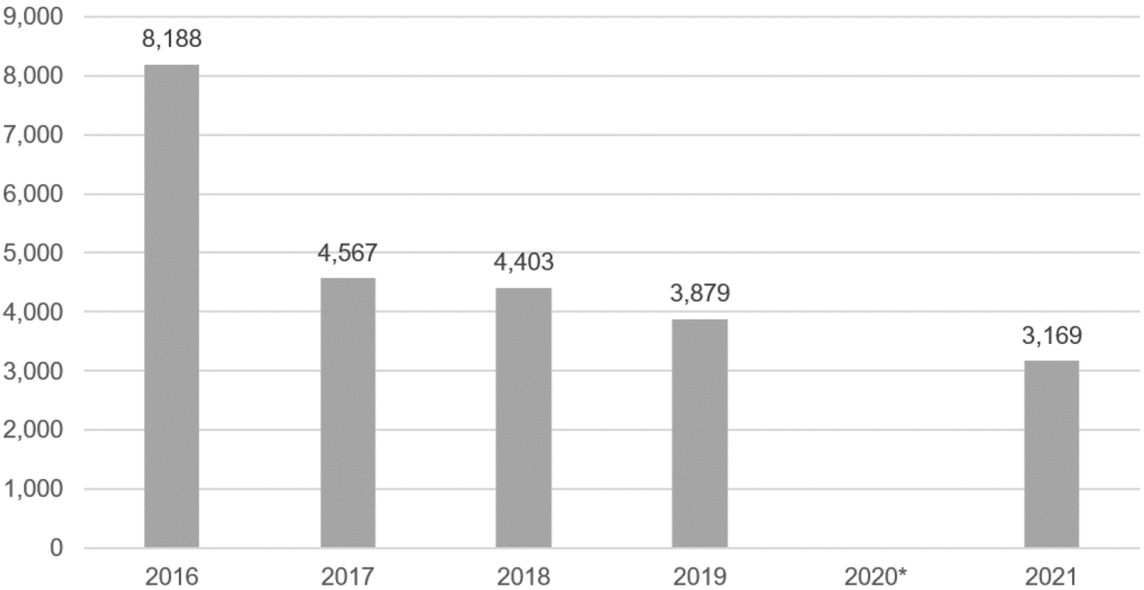
Source: Author, based on MTR Corporation Limited (2017a, 2022a, 2022e).

**Figure 6: Property development profit from share of surplus and interest in unsold properties between 2016 and 2021 (in million HKD)**



Source: Author, based on MTR Corporation Limited (2017b, 2022h).

**Figure 7: Economic value retained for reinvestment between 2016 and 2021 (in million HKD)**



\*The economic value retained from prior years was reinvested in 2020 (3,923 million HKD)

Source: Author, based on MTR Corporation Limited (2017b, 2022h).

On the other hand, although the property development profit has continued increasing since 2016 (Figure 5), the economic value retained for investment has decreased in the last five years (Figure 6). This represents underlying business profit that is attributable to shareholders of the MTRC (before depreciation, amortisation and deferred tax) for the year retained, after the amounts distributed to stakeholders and invested in asset maintenance, renewal and upgrade of the Hong Kong railway system (MTR Corporation Limited, 2022g, 2022h). Yet, the diversification of earning sources by the MTRC, particularly from property-related activities, has allowed it to face the losses due to the lower levels of ridership during 2020, without the need of subsidies from the government. This contributes to reassure the success of the self-sufficiency of the model.

The reduction of the land reserves will become a problem for the MTRC in the future, as it may represent difficulties in the granting of new development contracts (Aveline-Dubach & Blandeau, 2019). Additionally, the R+P model has contributed to improve the quality of life index, which places Hong Kong as one of the top five liveable cities in Asia (Ollivier et al., 2021). However, the model has faced growing criticism due to its impact on the economic and social spheres in the territory.

### 9.1 Economic criticism to the model

The role of the MTRC as a listed, private corporation and developer with special rights and access to land without auctions questions the fair competition with other local developers, especially along the most valuable land plots located close to prime metro stations. This affects the property market in the territory, as other housing projects are not sold as fast as developments close to desired locations (Musil, 2020). This also leads to strong bias towards a high land price policy, which is worsened by the particular conditions of Hong Kong, where socio-professional constituencies are indirectly elected and based on specific professions, and have a strong influence in the unicameral parliamentary Legislative Council (LegCo). These constituencies include powerful family real estate groups, which raises concerns about lobbying

within the real estate sector (Aveline-Dubach & Blandeau, 2019). As the selection criteria for the granting of projects is led by financial strength and bidders' experience, these standards are only met by large local developers, which leads to oligopolies. As a result, recent projects, such as the Tai Wai station, are perceiving the participation of mid-sized competitors, as well as firms from Mainland China. The latter also due to the MTRC's interest in gaining partners for property development projects along Chinese metro systems (Musil, 2020).

The developments around Tai Wai station also represent a shift regarding the negotiation of premiums, as the current land premiums are limited compared to the situation before the 2010s, and therefore their prices are much higher. In this case, the MTRC agreed to cover 72% of the land premium costs in exchange for the full ownership of the built shopping mall, while the developers kept the ownership of the residential estates (Musil, 2020). However, lack of available land may put at risk the continuation of the R+P model and other traditional and internationally well-known funding schemes may be required for the development of new lines, such as capital grants by the government and service concessions. These alternative funding mechanisms have also been applied for the construction of the new Sha Tin-Central Link line and the West Island line extension (Musil, 2020).

Under the build-operate-transfer (BOT) mechanism to finance some of the new metro lines, the government assumes most of the infrastructure costs, while the MTRC only maintains and operates the lines for a fifty-year period (Aveline-Dubach & Blandeau, 2019). After the expiration of the defined concession period, the ownership of the infrastructure would be transferred to the government for free (Sang, Li, Lam, & Wong, 2019). One example of the implementation of the BOT mechanism was the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL), where the government wanted to maintain the ownership of the infrastructure due to the political issues regarding this strategic cross-border cooperation, as it connects Hong Kong to the high-speed train network in Mainland China (Aveline-Dubach & Blandeau, 2019; Musil, 2020). This mechanism was possible due to the consolidation of public finances, which was partly because of the considerable value earned by the MTRC (Aveline-Dubach & Blandeau, 2019).

## **9.2 Social criticism to the model**

Hong Kong is also facing challenges regarding the high cost of living expenses and housing (Ollivier et al., 2021). In this regard, the MTRC faces criticisms due to its lack of social consideration. The corporation has the authority to set the prices of the fares and the increases in the cost of tickets since 2009 have received criticism by civil society groups, such as the Public Transportation Affairs Alliance (Musil, 2020). Although the ticket fares are comparably more affordable than in other cities, the main criticism is due to the fact that, despite the fact that the MTRC does not receive subsidies from the government, it still receives support in form of land development rights, without the need to decrease or maintain fares. This reveals the profile of the MTRC as a private service with aims at making profit, rather than a public service. In its defence, the MTRC declares that its transport operations and other businesses are not related, and that its property profit is reinvested for new metro infrastructure (Musil, 2020).

Furthermore, Hong Kong has not been able to satisfy middle- and low-income households, while public housing is already occupied by half of the population. This questions the role of the MTRC, which only provides housing for the private sector, especially considering the scarcity of available buildable land in the territory. It has been proposed to encourage PPPs between the URA and the MTRC, but both agencies have different views regarding housing development. While the first redevelops old urban areas, the latter only aims at developments in connection to metro stations, which must generate enough revenues (Musil, 2020). This approach differs to those of state-owned transit agencies that are not under market pressure to gain profits. This is the case of Shenzhen Metro Group, which has been assigned to provide public housing by

the Shenzhen municipal government. This shows the willingness to invest in projects that would maximise social welfare (Yang et al., 2020).

As an effort to support the government and increase the housing supply, the MTRC has delivered in the last five years fifteen property development packages, which are currently in various stages of planning and construction and would deliver approximately twenty thousand residential units in the next six years (MTR Corporation Limited, 2019). Half of these apartments would be subsidised sale flats (MTR Corporation Limited, 2022c). The MTRC is also looking to develop property above existing rail facilities, with the development over our Yau Tong Ventilation Building as the first pilot. The tender was awarded in 2018. There are additional plans to develop the Siu Ho Wan Depot Site into a community with public and private housing and community facilities, but without assurance that the project will be commercially viable (MTR Corporation Limited, 2019).

There is also criticism regarding the planning of new metro lines, as the MTRC considers areas with a density under 31,500 people per km<sup>2</sup> as non-financially viable, as it expects to have a ridership with more than thirty thousand passengers per day, in contrast to other cities that only expect between five and ten thousand passengers (Musil, 2020; Tang, 2009). In this context, the R+P puts more interest in financial viability than social needs, as it would not finance projects in areas with lower densities, while other public transit agencies in other cities would not have another choice but to benefit non profitable areas as well.

In recent years, more aware residents have organised themselves to oppose against large-scale infrastructure development that would generate a negative impact in their communities. Growing public opposition and distrust towards metro projects have also created the need for better negotiation mechanisms between the government, the MTRC and the civil society, while residents are demanding more focus on social issues (Musil, 2020).

### **9.3 Future projects**

The MTRC keeps exploring potential development areas along their existing and future metro lines, such as the Tuen Mun South Extension, Kwu Tung Station and the Northern Link, and Hung Shui Kiu Station. In addition, the Chief Executive's 2021 Policy Address offers new development opportunities as part of the Northern Metropolis Development Strategy. This aims to foster Hong Kong's future urban and economic development through enhanced railway networks and more extensive connectivity with the GBA, especially new lines and extensions that would connect to areas in Shenzhen (MTR Corporation Limited, 2022b, 2022c).

## **10 Conclusions**

Hong Kong represents a unique case study due to the successful financing of its railway system through an innovative mechanism: the R+P model in charge of its transit corporation, the MTRC. The model has been able to articulate transit and land-use planning in favour of smart development-based LVC strategies and TOD policies to accommodate people close to metro stations. As a result, this model can be defined as "transit LVC." In return, the private operators receive a return of the investment from the increase of ridership and property development and management, while users benefit from a high-quality transit service and mixed, diverse and pedestrian-oriented rail villages around the stations. In this way, the model offers an opportunity for successful PPP arrangements within the transport sector to provide financially viable transit services. Additionally, the success of the model also owes to complementary measures in favour of promoting railway use, from the removal of competing bus services along the same metro routes to high registration taxes to control private car ownership.

Unlike other development-based LVC models applied in other countries, the R+P model has the advantage that the MTRC retains part of the ownership of the delivered developments around the stations. This has allowed the corporation to act not only as the intermediary between the government that grants the land and the private developers that acquire the development rights, but also as a co-developer in every stage of the planning, construction and delivery. Moreover, this mechanism enables the MTRC to gain additional long-term earnings from property management and rentals, and it has enabled it to diversify its sources of income. This has been significantly important during the Covid-19 pandemic, as earnings from property management and rentals, along with net income from property development, were able to compensate the losses from transport operations due to the low levels of ridership. This differentiates the MTRC from other transit agencies that only depend on transport operations and government subsidies to finance and maintain their transit systems.

However, the efficiency of the R+P model goes hand in hand with the unique environment that Hong Kong offers, which is characterised by (1) high density (that translates into high ridership levels); (2) a robust government regime that owns 99% of the land of the territory (that could be granted to the MTRC); (3) a flourishing real estate market, and (4) the knowledge to integrated land-use and transit planning policies through a transit corporation. This last characteristic has been particularly essential for the success of the programme, as the MTRC has developed a series of functions that are usually distributed among different government agencies and among different governance levels. As well, these above mentioned characteristics are so unique that have prevented the MTRC to successfully replicate its model in other cities, apart from Shenzhen, despite the fact that the MTRC operates several metro lines in Mainland China and overseas, such as in London, Stockholm and Melbourne. This questions the replicability of the model in other contexts.

Nevertheless, there are lessons that can be learnt from the Hong Kong model and could be applied to cities that aim to improve their urban mobility in favour of mass transit. In first place, development-based LVC represents a more feasible alternative to generate revenue than property fees and taxes that can generate public opposition and distrust. This is especially relevant in emerging economies that do not count with adequate property taxation schemes. Secondly, the MTRC highlights the importance of a transit agency that plays a variety of roles that are usually dispersed. To achieve this, a clear institutional framework is required to provide the autonomy to transit agencies to develop roles that go beyond those of traditional transport operations. This demands a set of skills and knowledge in different areas to enable the adequate integration between land-use and transit planning policies, and coordination across different governmental levels and with private and public stakeholders, as well as the strengthening of the local levels and urban governance. However, when coordination is successful, the R+P model also offers an opportunity to include the private sector through PPP arrangements for transit and property development. Finally, a long-term vision of the transit systems embedded in their local contexts is vital to assure the longevity of the systems and their agencies beyond different administration periods. This will also contribute to diversify income sources, discourage car-oriented developments in favour of transit usage, and guarantee the future maintenance and expansion of the network.

As a closing remark, it is also important to take a look at the current criticism to the R+P model in terms of the increase of the living costs and lack of accessible housing, as well as the profile of the MTRC as a private, for-profit corporation without social responsibility. This will allow to assess equally important aspects of transit systems that have a direct impact on the life of their users and citizens.

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