Available online at www.sciencedirect.com

ScienceDirect

Transportation Research Procedia 00 (2018) 000–000

Transportation Research Procedia

www.elsevier.com/locate/procedia

World Conference on Transport Research - WCTR 2019 Mumbai 26-31 May 2019

Can value capture fund public transport infrastructure in China?

Xinning Wang[a]*, Imran Muhammad[a], Wai Hong Kan Tusi[b], Sophie Sturup[c]

[a]*School of People, Environment & Planning, Massey University, Palmerston North 4442, New Zealand*
[b]*Business School, Massey University, Palmerston North 4442, New Zealand*
[c]*Department of Urban Planning and Design, Xi'an Jiaotong-Liverpool University, Suzhou 215123, China*

Abstract

Because of rapid urbanization and continuous economic growth, public transport infrastructure is in great demand and conventional public sector investment is insufficient. Therefore, various countries have been exploring innovative funding models for building transport infrastructure, including China. Successful public transport infrastructure can improve accessibility and amenity and provide an opportunity for agglomeration economies to emerge in the surrounding area. This phenomenon can increase the value of land or property, which needs to be captured for building transport infrastructure. This research reviews the concept and characteristics of value capture (VC), as well as the underlying factors making VC work. Furthermore, the research reveals the situation of VC in China from the perspectives of land use policy, transport funding, and institutional framework. This research aims to identify the prospects of VC in China and key institutional challenges that VC can face during the implementation stage.

Peer-review under responsibility of WORLD CONFERENCE ON TRANSPORT RESEARCH SOCIETY.

Keywords: Value capture; transport funding; land use policy; institutional framework; China

1. Introduction

Public transport infrastructure is in a great demand because of rapid urbanization, especially in developing countries (Pojani and Stead, 2015). It is estimated that countries invest US$1-$2 trillion per year in transport infrastructure to meet the world's demand for mobility and connectivity, and will rise at a stable annual rate, averaging about 5% between 2014 and 2025 (The World Bank, 2015). Hence, traditional government funding (e.g. fares, government funding, and subsidies) are not enough to meet this demand and innovative funding models are needed (Medda, 2012; Imran and Pearce, 2013; Verma and Ramanayya, 2014).

* Corresponding author. Tel.: +64 (06) 356 9099 ext. 85961
E-mail address: x.wang7@massey.ac.nz

Peer-review under responsibility of WORLD CONFERENCE ON TRANSPORT RESEARCH SOCIETY

Public transport infrastructure in urban areas can improve accessibility and amenity and provide an opportunity for agglomeration economies to emerge in the surrounding area (Suzuki et al., 2015). Such public transport investment may increase the value of the surrounding lands and properties, which needs to be captured for building or extending public transport infrastructure (Modelewska and Medda, 2011; Cervero and Kang, 2011). The value capture (VC) mechanism has the ability to become an innovative funding method for future public transport infrastructure (Cervero and Murakami, 2009). However, VC is a complex process, which needs negotiation and collaboration among the public and private sectors and the community, and it should be carefully planned in the local context (Salon and Shewmake, 2011).

China has undergone rapid urbanization and economic development since the reform and opening-up policy in 1978 (Chen et al., 2013). This growth has generated continuous demand for urban public transport development (Mu and Jong, 2012), and the existing funding sources (e.g. government funding, public private partnership) are not enough to build new or extend old infrastructure (Sun et al., 2017). Therefore, the Ministry of Transport (2017) in the 13th Five-Year Plan (FYP) for Modern Comprehensive Transportation System suggested that the increase in land value from the transport improvements should support the construction and operation of transport infrastructure. Regardless of this direction, China has to devise VC mechanisms in the local context.

This paper aims to identify the prospects of VC in China and the key institutional challenges VC can face during the implementation stages. To achieve this aim, the primary question is to explore what the underlying factors that make VC happen are in China. The second section reviews the idea of VC, transport infrastructure's impact on land value, and the underlying factors that make VC work. The third section investigates the transport investment needed and the current methods of transport funding to identify the funding gap and the demand for VC in China. Moreover, this part explores the role of existing land use policies and the administrative structure in making VC happen in China. The fourth section discusses the potential opportunities and challenges for implementing VC in China and plans for future research work. The final section summarizes the work of this paper and proposes the future study.

2. Value Capture

2.1. The idea of value capture

VC can be defined as a mechanism by which the public sector can recoup part or all of the cost of high-quality public transport systems by capturing the incremental value increases in nearby land and property, which is used for construction and operation of public transport infrastructure (Smith and Gihring, 2006; Jillella and Newman, 2016). VC is not a new idea, and the concept of VC can be traced back to Henry George's land reform concept in the late 19th century in the US (Batt, 2001). Henry George considered that gains in property values happened as a result of nearby public investment (Fainstein, 2012). Following the concept of Henry George, many authors have argued that the state should benefit from the increased value of private lands if the land value increase is a result of public actions such as change of land use regulation, an increase in the urban population, and political priorities (Ingram and Hong, 2012; Suzuki et al., 2015) (see Fig. 1). For example, the construction of a railway leads to value being added in nearby properties, and population growth results in the growth of real estate prices, the increased value at least could be shared between landowners and the government.

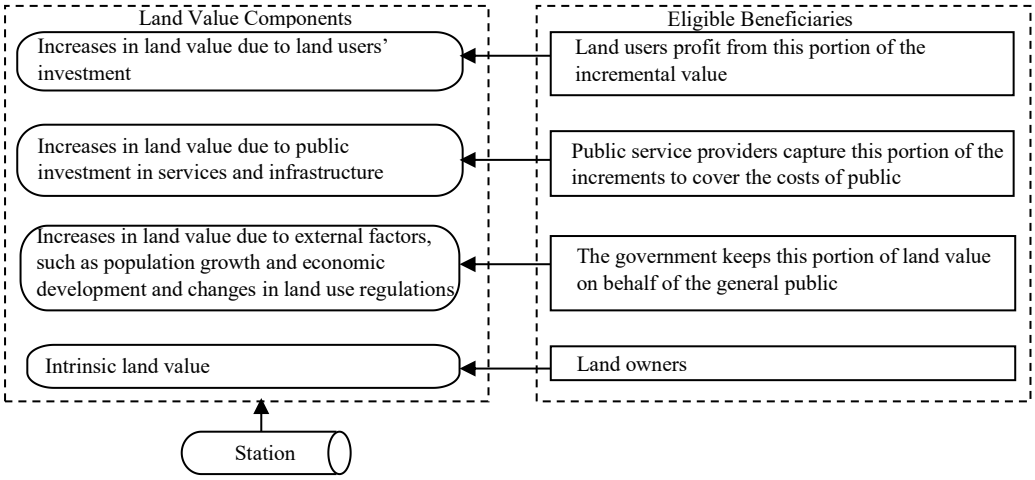

Figure 1 The relationship between beneficiaries and land value (Hong and Brubaker, 2010: 168)

In addition, Suzuki et al. (2015) distinguished two forms of VC: development-based VC and taxation-based VC. Development-based VC is the type of VC that uses direct land and property transactions to capture the increases in value by selling or leasing land or property, air rights, joint property development, land readjustments, and urban redevelopment schemes (Salon and Shewmake, 2011). In this case, transport agencies and private developers plan the land near railway stations, bus stops, or airport terminals for future development of high-density properties such as residential, commercial, and offices. Hong Kong and Japan both have the best practices for this VC instrument. Taxation-based VC refers to charging or levying taxes or fees on existing development located in "transit investment benefitting areas" to capture the land and property value increases (Walters and Rosengard, 2012). In this situation, the tools such as tax increment financing, special assessments, land or property taxes, betterment tax, etc. often are used (Chapman, 2017). This kind of method is more suitable for a country that has a legislative or regulatory history to support taxation such as the US and Australia (McIntosh et al., 2017).

2.2. The transport infrastructure's impacts of land and property value

Many studies have demonstrated a positive link between proximity to railway stations and bus stops and land value (e.g. Cervero, 1997; Cervero and Duncan, 2002; Gibbons and Machin, 2005; Cervero and Murakami, 2009; Sue and Wong, 2010; Sharma and Newman, 2018). However, there is some indication that proximity to public transport infrastructure such as railways stations may reduce land value, probably because of noise, pollution, and congestion (Carey and Semmens, 2003; Debrezion et al., 2006). In addition, the increase in land value is caused by greater accessibility, which creates more intensive use of land (Reisi et al., 2016). Similarly, public transport infrastructure is often built in response to increases in population and demand for access to other destinations from a location, and when this is provided, this increases the utility of that land for the population that is already there (Acheampong and Silva, 2015). Usually, there are three benefits of transport investment leading to the land value increases, which we describe below (Cervero, 1997; Baker and Nunns, 2015).

First, accessibility refers to "the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)" (Geurs and van Wee, 2004). Giuliano (2004) argued that householders and businesses prefer to locate themselves in higher accessibility areas that provide a wider range of travel possibilities. Therefore, accessibility can improve economic goals (i.e. workers, customers, and suppliers), social goals (i.e. access to jobs, healthcare, education, and shopping), and environmental goals (i.e. energy savings and emission reductions) (Handy, 2002). In this case, the improved accessibility is capitalized to the land value and is reflected as higher purchase or rent prices for properties. For example, a new

metro line linking a central business district (CBD) and dwelling areas can raise the value of dwellings close to the stations because of the improved accessibility to more employment opportunities.

Second, amenity refers to the high quality of place or life, including being attractive, convenient, desirable, comfortable, and enjoyable (Handy, 2003). Amenity implies the direct feelings related to using the public transport infrastructure. For example, travelers prefer to enjoy their travel with quality stations and stops, as well as good air quality and excellent services. Amenity improvements also bring land value increases. For example, a study of Australia showed that there is a 22% difference in property value with high transit amenity compared with properties with low transit amenity in Perth and Brisbane (Mclntosh et al., 2011). Conversely, public transport infrastructure has, to a certain extent, negative impacts such as noise and air pollution, affecting amenity for the public (Baker and Nunns, 2015). Nevertheless, these problems could be avoided or controlled within a reasonable range by transport planning. For example, if a metro line is designed to cross residential or office areas, property values will not be negatively affected if the design can ensure that it not only reduces noise and air pollution but also increases accessibility for passengers.

Third, transport improvement can contribute to agglomeration benefits, leading to more clusters and higher density of employment by increasing the effective density of access to the labor market, increasing information exchange, and promoting industrial specialization (Chatman and Noland, 2011). The development of public transport infrastructure reduces the travel time and cost, and the distances between origins and destinations, as well as making learning, communication, and sharing easier for companies (Song et al., 2012). This increases the labor force willing to work that leads to improvements in productivity, wages, and company revenue. Furthermore, agglomeration is capitalised into land value, this will be visible in office rents (Drennan and Kelly, 2010). Agglomeration causes high rents for property proximity to transport infrastructure, especially in CBDs. Although higher rent fees may result in higher costs, many companies still would like to pay the higher rents near transport system in CBDs in order to enjoy the benefits of the central location (Song et al., ibid).

Therefore, there is a positive feedback loop between transport infrastructure benefits (accessibility, amenity, and agglomeration) and land value increases, making VC possible. However, the public transport infrastructure is a necessary condition for increasing the land value, but it is not a sufficient condition (Banister and Berechman, 2001). For example, a legislative and institutional environment that supports a particular land use policy, the city's economic environment, and funding availability for transport investment will all affect the accessibility, amenity, and agglomeration to be capitalized in increased land values.

2.3. How value capture works

Value capture is a complex process and thus it is necessary to explore the underlying factors that can make value capture happen. Specifically, an institutional and legal framework must be created, and agreed to by the relevant stakeholders. In addition, the process is related to the multiple actors involved; in addition, the question of how the value is to be captured, by whom, and in what amounts must be part of the negotiations in the partnership between or among all the actors. Only when these factors work together can value capture happen in the local context.

2.3.1. Legal and institutional framework

The appropriate legal and institutional framework is needed for VC to work as the prerequisite (McIntosh et al., 2017). This may include the related government regulations and policies, relationship between urban planning, transport planning, the land administration system, taxation regulations, and government structure and roles (Suzuki et al., 2015). The local community is one of the key stakeholders, the increase in land value resulting from the community action should be returned to the community (Furtado, 2000). For example, the UK uses planning agreements to secure community benefits, including asking developers to make contributions to local affordable housing for the local community. On the contrary, if there is an imperfect institutional framework, community participation will be restricted due to the limitation of information sharing and communication between the government and the local community (Edwards et al., 2013). Hence, it leads to the government not getting support from the public and making injudicious decisions about the way to capture the increase in land values or the location of transport improvements.

Generally, different levels of government play their own roles in the VC process. For example, in Sao Paulo, Brazil, the federal government is responsible for formulating standards for urban planning and transit-oriented development projects in cities. The state and city governments are responsible for rail transit and integrated transport networks across metropolitan areas, while local agencies control part of the urban transport system and land use planning in local level (Suzuki et al., 2015). In the US, VC is administered at the state, regional and city levels, and the federal government is in charge of offering the federal capital share for the costs of construction and land acquisition; thus, the federal government has an indirect implementation role in VC. However, federal policies and plans may affect the costs and zoning plans of transport systems, which are critical to whether VC happens (US Government Accountability Office, 2010). In fact, there is no one size of legal and institutional framework that fits all in VC strategies, and we must analyse specific VC models on a case by case basis.

2.3.2. Actors in value capture

Apart from the support of the legal and institutional framework, VC also requires the various stakeholders to work together and share the benefits of the increasing in land value arising from the benefits of transport investments (Suzuki et al., 2015). In order to capture the land value rise, it is necessary for all actors to know their roles and responsibilities. In general, the relevant actors in VC may include national governments, provisional governments, local governments, transport agencies, developers, landowners, local communities, land banks, etc. They must establish cooperation and operate with perceived benefits to achieve VC. For example, private developers can benefit from the improvements in accessibility and potential customers in the form of higher residential sale or rent prices, whereas governments and transport agencies can benefit from the sharing the construction costs of public transport infrastructure and lease revenues (Medda, 2012). In fact, the opportunity for VC to happen is strongly related to the partnership between the public and private sectors. The public sector may play roles as enablers, planners, policymakers, and collaborators to make sure VC, from planning to the implementation, is reliable and transparent (Ascher and Krupp, 2010). The private developers usually undertake the responsibility of sharing the costs and risks with the public sector because of the profit revenues. In addition, the community is willing to participate in the process of VC, which is a significant factor for the success of VC (Jillella et al., 2015). The opinions of citizens concerning transport issues or feelings about the transport infrastructure are essential to help determine the process of VC (Smolka, 2012). They can provide more ideas to the government to help them deliver effective public transport infrastructure and services to the community. Especially, the state-owned land banks are effective for capturing the increased land value if there are legal and institutional mechanisms to guarantee that the land banks can obtain the increased land value or the land banks have the preemptive right of land (OECD, 2017). For example, in Germany, the landowners are obliged to sell lands to the land bank for the large land developments. The selling price must correspond to an estimate of the land's unplanned development prospects, thus the increased part of land value belongs to the public authority. The only exception to this rule is the situation where the landowners are willing and able to develop lands by themselves. Under the circumstance, the landowners are required to pay the compensations to the public authority in response to an increase in the land value that expected to be developed. However, due to the high legal and institutional demand of land bank, not all countries create the specific land bank to help the land premium recovery, although they are willing to adopt the land banking institutions such as China (Xia et al., 2015). Therefore, identifying the key actors in the local VC projects is vital due to the different countries have the different institutional mechanisms.

3. Value capture in China

3.1. Urbanization and Transport Development in China

China’s first- and second-tier cities have undergone rapid urbanization since China’s reform and opening-up policy in 1978 (He et al., 2016). From 1978 to 2016, the Chinse urban population increased from 173 million to 793 million, with an annual growth rate of 1% (National Bureau of Statistics of China, 2017). At the same time, the built-up urban area in China has expanded from 7438 km2 to 52,761 km2. Moreover, this rapid urbanization has supported economic growth in China. China has maintained 7% economic growth on average over the last two

decades and currently accounts for 14.9% of the global GDP and ranks as the second-largest economy in the world (World Economic Forum, 2017).

Furthermore, urbanization and economic growth have encouraged the citizens to travel longer distances, thus increasing motorization (Wang, 2010). In Chinese cities, the average speed of cars on main roads is around 10–15 km/h on a weekday. Traffic congestion also generates the air pollution, and the World Bank study illustrated that in China's large cities, car usage accounts for about 50% of total CO2 emissions (Darido et al., 2014). To address motorization and environmental issues, the Ministry of Transport (2017) published the Suggestions on Prioritizing the Development of Urban Public Transport, emphasizing investment in the urban public transport network in cities across China. This document identifies the priority development of public transport system such as rapid transit buses and railway-based transit systems in many cities. To date, 34 cities in China have opened railway-based transit systems, comprising 165 railway lines 5033 km long. Among these, the urban metro lines make up 3884 km (Xinhua News, 2018). Moreover, the 13th FYP calls for construction of a further 2500 km of metro lines by 2020, and the total mileage of metro systems completed will reach over 6000 km in entire country.

3.2. Transport funding

Traditionally, the central government has invested in urban transit systems in Chinese cities. In recent years, the central government has promoted innovative ways of investment in public transport (Zhao and Cao, 2011), which includes attracting market-oriented investment and a mix of government and market-oriented investment (Su, 2014).

Under the traditional approach, the government is the main actor who invests in transport infrastructure. The advantage of this approach is that it protects social benefits of transport projects (Dong et al., 2016). However, this approach is based on the assumption of unlimited government funding being available, which promotes a lack of competition and generates low efficiency for completing and operating the project (Qin, 2016).

Regarding market-oriented investments, companies (private or state-owned) are responsible for project financing, construction, operation and debt servicing through loans, stocks, and bonds (Su, 2014). This funding model is beneficial for alleviating any shortages of government funds. For example, the Beijing Dongzhimen Capital Airport Express Rail Project is funded, built, and operated by the China Railway Electrification Group Corporation, the Capital Airport Group Corporation, Beijing Capital Highway Development Co., Ltd., Beijing Rail Transit Construction Management Co., Ltd., and Beijing Oriental Culture Economic Development Group Co., Ltd. However, if companies excessively pursue short-term visible benefits, this may conflict with the interests of the government and society (Ho, 2006).

Regarding mixed government and market-oriented investment, the government does not lose the initiative or ownership of the transport project, and it can also share the benefits and risks with the private sectors (Ke et al., 2011). This model facilitates the introduction of market competition mechanisms, which can effectively reduce construction and operating costs, thus ensuring service levels and operational efficiency (Cao and Zhao, 2011). The method can be seen as a public private partnership (PPP). In China, funding through PPPs reached 395.73 billion Yuan for the transport field (The Ministry of Finance, 2016), but this funding is still insufficient to address the needs of transport construction. Moreover, PPPs have not significantly changed the situation where the funding source relies on the government in China. The proportion of government investment is still more than 50% in many transportation projects (Sun et al., 2017). For example, the Beijing Metro Line 4 was funded by both the Beijing City Government (70%) and the Hong Kong Mass Transit Railway Corporation (30%) (Chang, 2013). Moreover, to a certain extent, the PPP model may solve the shortage of capital investment for a transport project; however, the operational loss of the project still relies on the local government subsidies.

Therefore, it is worthwhile to explore innovative ways for funding public transport projects in China. Recently, the Ministry of Transport (2017) pointed out that based on previous funding sources, a sound capture mechanism for the value added by the development of urban transport land (VC) should be established. Hence, the income from the rise in land value can be used for the construction and operation of public transport infrastructure. For this, several studies have shown that there is a land value increase associated with transport improvements in China (e.g. Tian, 2006; Xu et al., 2016; Deng et al., 2016; Zhang et al., 2016).

3.3. Land use and related policy in China

Land use and related policies are critical in VC approach because they are related to land value rises and how to recoup the increased land value (Bartholomew and Ewing 2011). In China, the land use system has experienced continuous reform. This provides the implicit possibility of developing VC in China.

3.3.1. The dual land system

VC is dependent on the notion that land accrues value and that this value can be monetized and thus captured (Jillella et al., 2015). Before the economic reform and opening-up policy of 1978, the Chinese government adopted a dual land system: urban land was state-owned and rural land was collectively owned by local farmers and villagers (Yang and Wu, 1996). Specifically, stated-owned companies, governments, schools, joint ventures, etc. could use the state-owned land free with an unlimited period and the Constitution banned land transactions; thus land had no commodity attributes and no value (Liu et al., 2014). For the collectively owned land in rural areas, if the state intended to change it as state-owned land, the government provided compensation to the farmers and villagers, including the granting of urban residency licenses, medical insurance, high-quality schools, retirement plans, etc. (Ding, 2003).

3.3.2 The commodification of land

The land use system in China began to change after 1978. First, because of the opening-up policy, direct foreign investment increased and thus the demand for land use rose (Jiang et al., 1998). For example, in the early 1980s, the Chinese government established four special economic zones (Shenzhen, Zhuhai, Shantou, and Xiamen) to attract foreign investment. The central government developed the land use rights system and allowed foreign investors to use land by leasing (paying up-front fees to rent land) for a specific period. In 1986, the central Chinese government established the Department of Land Administration (now called the Ministry of Nature Resource), which is responsible for land policy reform, land allocation and expropriation, land development monitoring, comprehensive land use planning, land law implementation, and other related work (Ho and Lin, 2003). In 1987, the Shenzhen City Government conducted the three state-owned land transactions through a process of bidding, auction, and negotiation. In 1988, Article 2 of the Constitutional Amendment (National People's Congress, 1988) was passed and stated that "The land use rights can be transferred in accordance with the provisions of the law." This revision of the constitution was a historic breakthrough because it indicated that land use rights have commodity attributes and can be transferred to the market (Yuan, 2004). In the same year, the State Council also announced the Land Management Law, as a legislation helping land use rights reform. The Land Management Law was formulated in accordance with the Constitution, which mainly aims to support land management, develop land resources, use land rationally, and promote land sustainability. This law states that the right to use state-owned lands and collectively owned lands can be transferred, and the state can implement a payment mechanism for using the state-owned land (Tian and Ma, 2009).

In 1990, the State Council announced, “The Provisional Regulation on the Granting and Transferring of the Land Rights over State-Owned Land in Cities and Towns”. This regulation identified the method of granting land use rights. The granting of land use rights refers to the state as the land owner who gives land use rights to land users for a specific period of years through bidding, auctions, tenders, or listing (Ding, 2004). The local government often represents the central Chinese government in signing contracts with buyers or renters. Moreover, the maximum period of land use rights is determined according to its purpose as follows: (i) 70 years for residential lands; (ii) 50 years for industrial lands; (iii) 50 years for lands used for education, science, culture, hospitals, and sports; (iv) 40 years for business lands used for tourism and entertainment; and (v) comprehensive or other land use for 50 years (Ministry of Nature Resource, 2006). Specifically, the transfer of land use right means the land user transferring the land use rights (including by sale, exchange, and donation) and the rights and obligations specified in the contract shall be transferred accordingly (Walker, 1992). Thus, although land is not ‘owned’ indefinitely in China in the way that it is in other countries (such as Japan), where there is a thriving land-use market that allows people-based transactions (e.g. apartments or factories). Arguably, increased land value arising from transport infrastructure

improvements will accrue to the land user, who will be able to sell the residential or business use of the land for a higher price.

In 1993, the State Council approved “The Provisional Act of Land Value Increment Tax on State-Owned Land”, which specifics that the land value increment tax only levies in the situation of transferring the state-owned land use rights but does not impose a tax on granting the land use rights (Chen, 2007). Generally, granting lands means the new user does not need to pay the land value increment tax, whereas the land value increment tax is imposed on the transfer of lands for compensation in the market (The State Council, 1993). Moreover, if property developers convert the real estate they develop for personal use or for commercial use such as leasing and mortgage, is free of the land value increment tax if the ownership does not change. In addition, under joint investment to develop real estate, one of the parties (usually the government) takes the land as its capital or share to be invested in the real estate project, then the project is exempted from land value increment tax. This simplifies complex land acquisition procedures and also cuts the costs for the transport agency in the process of value capture. For example, Shenzhen’s latest urban railway construction plan attempted to use this way as a kind of value capture for building the railway (Shenzhen City Government, 2016).

In addition, in the mid-1990s, the concept of land banking was introduced in some Chinese cities. The city government set up the stated-owned land banking authorities to obtain lands for the urban development and supply lands. The first land banking center was established in Shanghai city in 1996. To date, more than 2000 land banking institutions have been built in China (The Ministry of Nature Resource, 2016). Usually, the land banking authorities are owned by the City Department of Nature Resource (there are differences in the name of the localities, but they are the same in administrative functions). However, the operation of land banking mechanism depends on the administrative documents of city governments, and there is no legal framework at the national/provincial level to regulate the land banking so far (Huang, 2004).

After 2001, land use rights in China entered the stage of market-based prices. The State Council (2001) promulgated the "Notice on Strengthening the Management of State-owned Land Assets” and pointed out that to ensure the openness and fairness of transactions involving land use rights, city governments must vigorously promote the bidding and auction of land use rights. Later, the Ministry of Land and Resources (2002) issued the regulation of "Bidding, Auction, and Listing for Granting State-owned Land Use Rights" and the State Council (2007) issued Property Law. Both regulations stated that commercial, tourist, residential, recreational facilities, etc. should be sold by bidding, auction, or listing. Importantly, these two legal documents have directly impacted land acquisition in China (Sun et al., 2017). In principle, this regulation can prevent corruption in land lease areas and become a measure to improve the investment environment, thus leading to a fairer and more reasonable land transfer price and reducing human disturbance factors to curb corruption (Chen and Song, 2010).

Importantly, although the landowner is the state in China, the role of the community cannot be ignored. Many scholars argue that the increase in land value is attributed to community interventions rather than land owners’ actions and should be recouped by the public sector and used for public purposes (Smolka and Furtado, 2001; Doherty, 2004; Alterman, 2011). In other words, the community has a right to share the increase in land value in the process of value capture. Therefore, the “Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform” in the Third Plenary Session of the 18th CPC Central Committee put forward the notion that "establishing a distribution mechanism for increment land value that needs to consider the State, collective and individual, and rationally improves personal income"(CPC Central Committee, 2013). It is believed that the rational and equitable distribution of land interests should follow the actions of those who have led to the creation of increased land value, thus making sure the increase in land value is attributed to society for citizens to share, as well as ensuring the land and funds needed for urban construction.

3.4. The General Institutional Framework in China

Traditionally, the State Council is the highest administrative organization of the central government. The State Council is responsible for planning national economic activities, approving and managing urban and rural construction projects, and allocating the tasks to the lower level of governments (Li et al., 2016). With regard to capturing value from transport infrastructure, land use, and funding issues, the following ministries and administrations are involved: the National Development and Reform Commission, the Ministry of Finance, the

Ministry of Transport, the Ministry of Nature Resource, the Ministry of Housing and Urban–Rural Development, etc. At the provincial and city levels, there is a similar administration framework: the Provincial/City Development and Reform Commission, the Provincial/City Department of Finance, the Provincial/City Department of Transport, the Provincial/City Department of Nature Resource, and the Provincial/City Department Housing and Urban-Rural Development, etc. Fig. 2 indicates the general administrative structure of constructing a transit transport system in China.

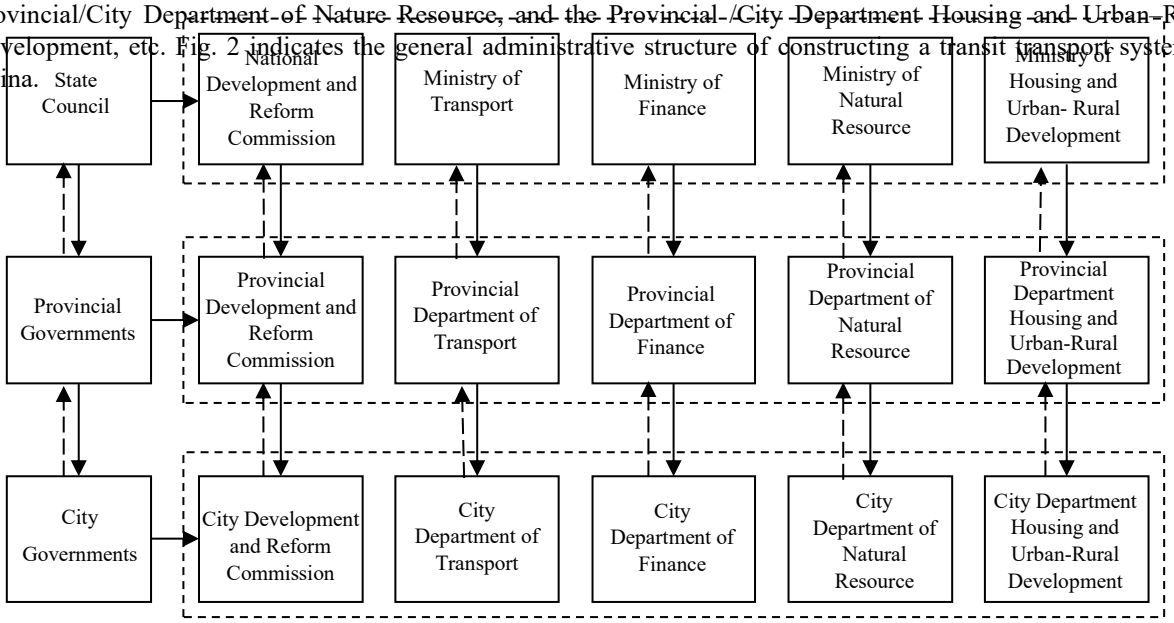

Fig. 2. General administrative structure of the building transit transport system in China

In addition, in terms of VC, the 13th FYP identified VC as the national development direction. Specifically, the 13th FYP for Urban Public Transport pointed out that the future direction of public transportation development should promote the comprehensive development of lands around public transport infrastructure, establish a VC model for the increased land value, and guarantee that the income from land value rises are used for building public transport infrastructure and make up for operational losses (Ministry of Transport, 2017a). Furthermore, the 13th FYP for Modern Comprehensive Transportation System Development (Ministry of Transport, 2017b) stated that according to the Urban Master Plan and the Urban Transport Plan, public transport infrastructure and the surrounding spaces are encouraged to be comprehensively used; for example, an integrated combination of transport infrastructure and commerce, business, exhibitions, and leisure. Hence, the VC (e.g. joint development) could be promoted by establishing an urban complex building and an industrial complex zone relying on a comprehensive transport hub. Indeed, VC has obtained a highest level of support in China's top-down political system.

Furthermore, the Urban Master Plan and the Land Use Plan help to identify the location of public transport infrastructure and properties at the local level, which is important for ensuring that VC can happen (Suzuki et al., 2015). The two plans in many Chinese cities such as Beijing, Shenzhen, Chengdu, Shanghai, Dalian, etc., should be approved by the State Council. Importantly, the two plans offer suggestions for land acquisition and land parcel utilization (Zhang et al., 2007) and thus the city government and the local transit agency will be able to choose a suitable location for maximizing land value in the future.

4. Discussion

This paper attempts to answer whether VC can be suitable to fund urban public transport infrastructure in China. This study shows that VC has a potential to become an innovative way to fund urban public transport infrastructure in China. China has experienced rapid urbanization and economic development, leading to dramatically increasing

demand for urban transport infrastructure. However, the existing funding methods in China are not enough to undertake the construction and operation of public transport infrastructure. Therefore, it is worth exploring a new funding method for the development of public transport infrastructure in China. Many empirical studies and transport projects have shown that the urban transport infrastructure brings a significant land premium in areas surrounding the public transport infrastructure in China; thus the VC method may be a viable means of funding that could be implemented. However, there are some institutional challenges affecting the implementation of VC in China, and these will need to consider the specific local circumstances.

Firstly, China's political power needs to support development-based VC in the current institutional framework. This because the governments, either at the central or the local level, have greater flexibility in intervening or directly participating in the land and real estate market because the land belongs to the state (Zhao et al., 2012). One issue is often discussed: whether the increased land value will flow to the community in practice. Because the landowner is the state, the central Chinese government monopolizes the land market, so the situation that the government directly sells the land to obtain land leasing fees once only often occurs. It implies that the government deals with the future increases in land value by itself. Fortunately, the central Chinese government has begun to focus on this issue since the Third Plenary Session of the 18th CPC Central Committee in 2013 and put forward regulations to ensure that the increase in land value must be attributed to the community. However, how to guarantee that land interests are retained for the community in China should be explored further. This may include the establishment of trust and communication between the government and the community in the process of VC in China. In this situation, the government would have more chances to discover the opinions of the community, which could increase the legitimacy of VC in China.

Secondly, it is important to devise a transparent, open and fair process of VC (McIntosh et al., 2017). Governments and transport agencies must determine which of the potential land uses are in the best interests of the community and examine detail building and site plans. A well-designed urban master plan and land use plan can help achieve these aims. China has a complex administration structure, policy formulation process, and land acquisition process, so it is necessary to establish a formal land transaction process rather than maximizing benefits for private developers. If there is no transparent and fair process for implementing VC, it is inevitable that some actors such as private developers or politicians will take opportunities to seek profits in the process. Especially, there is the lack of legal supervision for land banking institutions in China. Hence, the corruption maybe happens in the procedure of land acquisition. In fact, the key reason for undertaking land transactions by bidding, auctions, and listings is to increase transparency and fairness. To a certain extent, it effectively prevents and avoids corruption and promotes fair market competition. If cooperation among the governments, transport agencies, and developers can maintain the principle of fairness and transparency, this can protect the benefits of the public and private sectors, as well as the interests of the community. Therefore, in the process of VC, how these actors cooperate to negotiate and assign benefits to enable VC for funding transport projects that facilitate the demands of each actor in context is worth investigating further.

Thirdly, if VC as a new and innovative funding source for transport project be adopted in China, a legal and institutional framework and political support must be provided to support VC (McIntosh et al., 2017). A great deal of time and resources are needed to support this practice. These measures may include legislation or revision of existing regulations and new types of institutions and professional capabilities to implement VC mechanisms, especially political support for these changes (Suzuki et al., 2015). In China, the State Council and the Ministry of Transport have already called for using VC as a funding m for transport projects. At the same time, private developers also prefer to choose the existing legislation and institutional framework can offer an environment that protects them. For example, the private developers prefer to choose Shenzhen as a partner in the long-term since the economic reform and opening-up, because the State Council has put the power of determining land use in the hands of the local government of Shenzhen. Shenzhen attracts a lot of foreign and domestic investment that cooperate in building transport infrastructure though VC. From this, it can be seen that at least in some special local areas, VC is effective under the current legal and institutional framework.

Therefore, VC has a prospect in China because some underlying factors can be found for the implementation of VC in China (e.g. for the development of transport projects). However, what is lacking, is the guidance of a strategic framework and an understanding of how the public and private sectors and communities work together and contribute to making VC successful in the context of China. Next stage of this research will conceptualize

framework for understanding the problems and generating potential solutions, by taking Shenzhen and Chengdu as case studies. We argue that these two cities' different geographical locations and functions may allow us to see how VC can become successful in different local contexts in China.

5. Conclusion

This study reviews the concepts and characteristics of VC. Transport improvements can lead to the surrounding land value increases resulting from the improved accessibility, amenity, and agglomeration. In this situation, the increased land value needs to be captured. In fact, VC is a complex process that requires the involvement of various parties (e.g. governments, transport agencies, and private developers) and the availability of legislation and institutional frameworks. The study also investigates VC in the Chinese context and examines its prospects. China has faced challenges arising from the rapid urbanization and economic development such as motorization, urban expansion, and population growth. The urban public transport system can address these challenges to a certain extent. However, huge funding demand for building and operating the public transport infrastructure is a key issue, and the existing funding method is not enough in China. Thus, VC is considered to be a good alternative method of funding by raising revenue from increases in land value. In addition, the research explores land use policies, the administrative structure, and the method of policy formulation in China and discusses these factors that affect VC happen.

Further research is suggested to develop a framework to improve the understanding and acceptance of VC by bringing all actors together through case studies in China.

References

Acheampong, R.A., Silva, E.A. (2015). Land use–transport interaction modeling: A review of the literature and future research directions. Journal of Transport and Land use, 8(3), 11–38.

Alterman, R. (2011). Land-use regulations and property values: the windfalls capture idea revisited. In Brooks, N., Donaghy, K., Knaap, G.-J (Eds.), The Oxford Handbook of Urban Economics and Planning, 755-786, Oxford University Press, New York.

Ascher, W., Krupp, C. (Eds.). (2010). Physical infrastructure development: balancing the growth, equity, and environmental imperatives. Palgrave MacMillan, New York.

Baker, K., Nunns, P. (2015). Access, amenity, and agglomeration: What can we expect from rapid transit projects. Presented at 37th Australasian Transport Research Forum (ATRF). Sydney, 30 September-2 October 2015.

Banister, D., Berechman, Y (2001) Transport investment and the promotion of economic growth. Journal of Transport Geography, 9(3), 209–218.

Bartholomew, K., Ewing, R. (2011). Hedonic price effects of pedestrian-and transit-oriented development. Journal of Planning Literature, 26(1), 18–34.

Batt, H.W. (2001). Value capture as a policy tool in transportation economics: an exploration in public finance in the tradition of Henry George. American Journal of Economics and Sociology, 60(1), 195–228.

Cao, C., Zhao, Z. J. (2011). Funding China's Urban Infrastructure: Revenue Structure and Financing Approaches. University of Minnesota: Center for Transportation Studies, Minnesota.

Carey, J., Semmens, J. (2003). Impact of highways on property values: case study of superstition freeway corridor. Journal of the Transportation Research Board, (1839), 128–135.

Cervero, R. (1997). Transit-induced accessibility and agglomeration benefits: a land market evaluation. Institute of Urban and Regional Development, Berkeley, CA.

Cervero, R., Duncan, M. (2002). Transit's value-added effects: light and commuter rail services and commercial land values. Journal of the Transportation Research Board, (1805), 8–15.

Cervero, R., Kang, C.D. (2011). Bus rapid transit impacts on land uses and land values in Seoul, Korea. Transport Policy, 18(1), 102–116.

Cervero, R., Murakami, J. (2009). Rail and property development in Hong Kong: Experiences and extensions. Urban Studies, 46(10), 2019–2043.

Chang, Z. (2013). Public–private partnerships in China: a case of the Beijing No. 4 Metro Line. Transport Policy, 30, 153–160.

Chapman, J. (2017). Value Capture Taxation as an Infrastructure Funding Technique. Public Works Management & Policy, 22(1), 31-37.

Chatman, D.G., Noland, R.B. (2011). Do public transport improvements increase agglomeration economies? A review of literature and an agenda for research. Transport Reviews, 31(6), 725–742.

Chen, M., Liu, W., Tao, X. (2013). Evolution and assessment on China's urbanization 1960–2010: Under-urbanization or over-urbanization? Habitat International, 38, 25–33.

Chen, Y. (2007). Shanghai Pudong: Urban development in an era of global–local interaction. IOS Press, Amsterdam.

CPC Central Committee. (2013). Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform. Presented at the Third Plenary Session of the 18th CPC Central Committee, 12 November, Beijing.

Darido, G., Torres-Montoya, M., Mehndiratta, S. (2014). Urban transport and CO2 emissions: some evidence from Chinese cities. World Bank Publications, Washington, D.C.
Debrezion, G., Pels, E., Rietveld, P. (2011). The impact of rail transport on real estate prices: an empirical analysis of the Dutch housing market. Urban Studies, 48(5), 997–1015.
Deng, T., Ma, M., Nelson, J.D. (2016). Measuring the impacts of Bus Rapid Transit on residential property values: The Beijing case. Research in Transportation Economics, 60, 54–61.
Ding, C. (2003). Land policy reform in China: assessment and prospects. Land Use Policy, 20(2), 109–120.
Ding, C. (2004). Urban spatial development in the land policy reform era: evidence from Beijing. Urban Studies, 41(10), 1889–1907.
Doherty, M. (2004). Funding public transport development through land value capture programs. Institute for Sustainable Futures, Sydney.
Dong, Z., Wang, M., Yang, X. (2016). Comparative study of China and USA public private partnerships in public transportation. Journal of Modern Transportation, 24(3), 215–223.
Drennan, M.P., Kelly, H.F. (2010). Measuring urban agglomeration economies with office rents. Journal of Economic Geography, 11(3), 481–507.
Edwards, M., Halligan, J., Horrigan, B., Nicoll, G. (2013). Public sector governance in Australia. ANU Press. Canberra, Australia.
Fainstein, S. (2012). Land value capture and justice. In: Ingram GK and Hong Y-H (eds), Value capture and land policies. Lincoln Institute of Land Policy, Cambridge, MA.
Furtado, F. (2000). Rethinking value capture policies for Latin America. Lincoln Institute of Land Policy. Cambridge, MA.
Geurs, K., van Wee, B. (2004). Accessibility evaluation of land-use and transport strategies: review and research directions. Journal of Transport Geography, 12(2),.127–140.
Gibbons, S., Machin, S. (2005). Valuing rail access using transport innovations. Journal of Urban Economics, 57(1), 148–169.
Giuliano, G. (2004). Land use impacts of transportation investments. The Geography of Urban Transportation, 3, 237–273.
Handy, S.L. (2002). Accessibility- vs. mobility-enhancing strategies for addressing automobile dependence in the U.S. (http://www.des.ucdavis.edu/faculty/handy/ECMT_report.pdf; Accessed 14 March 2019).
Handy, S.L. (2003). Amenity and severance. In David A. Hensher and Kenneth J. Button (Eds.), Handbook of transport and the environment, 117-140. Elsevier Science, Oxford.
He, C., Chen, T., Mao, X., & Zhou, Y. (2016). Economic transition, urbanization and population redistribution in China. Habitat International, 51(2), 39-47.
Ho, P. H. (2006). Development of public private partnerships (PPPs) in China. Surveyors Times. 15 (10), 1-5.
Ho, S. P. S., Lin, G. C. S. (2003). Emerging land markets in rural and urban China: Policies and practices. The China Quarterly, 175, 681–707.
Hong, Yu-Hung., Brubaker, D. (2010). Integrating the Proposed Property Tax with the Public Leasehold System. In Joyce Y. Man., Yu-Hung Hong (Eds.), China's Local Public Finance in Transition, , 165–90. Lincoln Institute of Land Policy, Cambridge, MA.
Huang, D. (2004). Land banking mechanism and its effects on city development in China. Centre of Urban Planning and Environmental Management. The University of Hong Kong Press, Hong Kong.
Imran, M., Pearce, J. (2013) Traditional and innovative ways of funding to public transport: A review of the literature, Presented at the World Conference on Transport Research, Rio de Janerio, Brazil, July 2013.
Ingram, G.K., Hong, Y.H. (Eds.). (2012). Value capture and land policies. Lincoln Institute of Land Policy, Cambridge, MA.
Jiang, D., Chen, J. J., Isaac, D. (1998). The effect of foreign investment on the real estate industry in China. Urban Studies, 35(11), 2101–2110.
Jillella, S.S.K., Matan, A., Newman, P. (2015). Participatory sustainability approach to value capture-based urban rail financing in India through deliberated stakeholder engagement. Sustainability, 7(7), 8091–8115.
Ke, Y., Wang, S., Chan, A.P.C., Cheung, E. (2011). Understanding the risks in China's PPP projects: Ranking of their probability and consequence. Engineering, Construction and Architectural Management, 18(5), 481–496.
Li, T., Yang, W., Zhang, H., and Cao, X. (2016). Evaluating the impact of transport investment on the efficiency of regional integrated transport systems in China. Transport Policy, 45, 66–76.
Liu, Y., Fang, F., and Li, Y. (2014). Key issues of land use in China and implications for policy making. Land Use Policy, 40, 6–12.
McIntosh, J., Newman, P., Crane, T., Mouritz, M. (2011). Alternative Funding Mechanisms for Public Transport in Perth: The Potential Role of Value Capture. Curtin University Sustainability Policy Institute, Curtin.
McIntosh, J., Newman, P., Trubka, R., Kenworthy, J. (2017). Framework for land value capture from investments in transit in car-dependent cities. Journal of Transport and Land Use, 10(1), 155–185.
Medda, F. (2012). Land value capture finance for transport accessibility: a review. Journal of Transport Geography, 25,154–161.
Ministry of Finance. (2016). China's infrastructure plan not another stimulus. (http://english.gov.cn/news/top_news/2016/05/15/content_281475349760514.htm; Accessed 15 March 2019). (in Chinese)
Ministry of Natural Resource. (2002). Bidding, Auction, and Listing for Granting State-owned Land Use Rights. State Council publication, Beijing.
Ministry of Nature Resource. (2016). Further explore and improve the land reserve system. (http://www.mlr.gov.cn/xwdt/mtsy/people/201607/t20160729_1413119.htm; Accessed 16 March 2019). (in Chinese)
Ministry of Transport. (2017). 13th Five-Year Plan for Urban Public Transport. State Council Publication, Beijing.
Ministry of Transport. (2017). Suggestions on Prioritizing the Development of Urban Public Transport. State Council Publication, Beijing.
Ministry of Transport. (2017a). 13th Five-Year Plan for Modern Comprehensive Transportation System. State Council publication, Beijing.
Ministry of Transport. (2017b). 13th Five-Year Plan for Urban Public Transport. State Council publication, Beijing.
Modelewska, M., Medda, F. (2011). Land value capture as a funding source for urban investment: The Warsaw metro system. UCL QASER Lab, London.

Mu, R., Jong, M. (2012). Establishing the conditions for effective transit-oriented development in China: the case of Dalian. Journal of Transport Geography, 24, 234-249.
National Bureau of Statistics of China. (2017). China statistical yearbook 2016. China Statistics Press, Beijing.
National People's Congress (1988). Constitutional Amendment of the People's Republic of China, 1988. Law Publication, Beijing.
OECD. (2017), Land-use Planning System in the OECD: Country Fact Sheets. OECD published, Paris.
Pojani, D., Stead, D. (2015). Sustainable urban transport in the developing world: beyond megacities. Sustainability, 7(6), 7784–7805.
Qin, Y. (2016). China's transport infrastructure investment: past, present, and future. Asian Economic Policy Review, 11(2), 199–217.
Reisi, M., Aye, L., Rajabifard, A., Ngo, T. (2016). Land-use planning: Implications for transport sustainability. Land Use Policy, 50, 252-261.
Salon, D., Shewmake, S. (2011). Opportunities for value capture to fund public transport: A comprehensive review of the literature with a focus on East Asia. Institute for Transportation and Development Policy, New York.
Sharma, R., Newman, P. (2018). Can land value capture make PPP's competitive in fares? A Mumbai case study. Transport Policy, 64, 123–131.
Smith, J., Gihring, T. (2006). Financing transit systems through value capture: an annotated bibliography financing transit systems through value capture. American Journal of Economics and Sociology, 65(3), 751–786.
Smolka, M. O. (2012). A new look at value capture in Latin America. Land Lines, 24(3), 10–15.
Song, Y., Lee, K., Anderson, W.P., Lakshmanan, T.R. (2012). Industrial agglomeration and transport accessibility in metropolitan Seoul. Journal of Geographical Systems, 14(3), 299–318.
State Council (2007). Property Law. Law Publication, Beijing.
State Council. (2001). Notice on strengthening the management of state-owned land assets. State Council publication, Beijing.
Su, X.G. (2014). Study on investing and financing model of urban rail transit – with Tianjin as an example. Tianjin University Press, Tianjin. (in Chinese)
Sue, E.D., Wong, W.K. (2010). The political economy of housing prices: hedonic pricing with regression discontinuity. Journal of Housing Economics, 19(2), 133–144.
Sun, J., Chen, T., Cheng, Z., Wang, C.C., Ning, X. (2017). A financing mode of urban rail transit based on land value capture: a case study in Wuhan City. Transport Policy, 57, 59–67.
Suzuki, H., Murakami, J., Hong, Y.H., Tamayose, B. (2015). Financing transit-oriented development with land values: adapting land value capture in developing countries. World Bank Publications, Washington, DC.
The World Bank. (2015). A global opportunity for sustainable transport. (http://www.worldbank.org/en/news/feature/2015/07/31/a-global-opportunity-for-sustainable-transport; Accessed 19 March 2019).
Tian, L. (2006). Impacts of transport projects on residential property values in China: Evidence from two projects in Guangzhou. Journal of Property Research, 23(4), 347–365.
Tian, L., Ma, W. (2009). Government intervention in city development of China: a tool of land supply. Land Use Policy, 26(3), 599–609.
US Government Accountability Office (2010). Public transportation: federal role in value capture strategies for transit is limited, but additional guidance could help clarify policies. (https://www.gao.gov/new.items/d10781.pdf; Accessed 15 March 2019).
Verma, A., Ramanayya, T.V. (2014). Public transport planning and management in developing countries. CRC Press, Boca Raton.
Walker, A. (1992). Land, property & construction in the People's Republic of China (Vol. 1). Hong Kong University Press, Hong Kong.
Walters, L.C., Rosengard, J.K. (2012). Are property-related taxes effective value capture instruments. In G.K. Ingram, Y.H. Hong (Eds.), Value capture and land policies. Lincoln Institute of Land Policy, Cambridge, MA.
Wang, R. (2010). Shaping urban transport policies in China: Will copying foreign policies work?. Transport Policy, 17(3), 147-152.
World Economic Forum. (2017). The world's 10 biggest economies in 2017. (https://www.weforum.org/agenda/2017/03/worlds-biggest-economies-in-2017/; Accessed 15 March 2019).
Xia, F.Z., Yang, D. F., Yan, J. M. (2015). A Comparative Study on Foreign "Land Bank" and "Land Banking" System. Journal of Sichuan University of Science & Engineering (Social Science Edition), 30(5), 54-60. (in Chinese)
Xinhua News. (2018). China's 34 cities open rail transit. (http://www.xinhuanet.com/2018-04/04/c_1122639198.htm; Accessed 15 March 2019). (in Chinese)
Xu, T., Zhang, M., Aditjandra, P.T. (2016). The impact of urban rail transit on commercial property value: New evidence from Wuhan, China. Transportation Research Part A: Policy and Practice, 91, 223–235.
Yang, C. Wu, C. (1996). Ten-year reform of land use system in China. Zhong Guo Da Di Publication, Beijing. (in Chinese)
Zhang, Y., Wang, Q., Wang, W. M. (2007). Harmonizing problems between urban planning and land use planning. Guangdong Land Science, 6(2), 4–10. (in Chinese)
Zhao, Z.J., Cao, C. (2011). Funding China's urban infrastructure: revenue structure and financing approaches. Public Finance and Management, 11(3), 284. (in Chinese)
Zhao, Z.J., Das, K.V., Larson, K. (2012). Joint development as a value capture strategy for public transit finance. Journal of Transport and Land Use, 5(1), 5–17.