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A REVIEW: EXPLORING THE PRACTICES AND CHALLENGES OF IMPLEMENTING LAND VALUE CAPTURE IN THE GLOBAL SOUTH

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A REVIEW: EXPLORING THE PRACTICES AND CHALLENGES OF IMPLEMENTING
LAND VALUE CAPTURE IN THE GLOBAL SOUTH

A Research Paper

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of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

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by

Juyeon Maeng

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ABSTRACT

Municipal governments in the global south are faced with a shortfall of municipal resources as cities experience rapid urbanization. Cities are experiencing rising urban populations, as well as an expansion of the urban footprint, both of which increase the demand for infrastructure and services. Urban planners and policymakers are increasingly looking at land value capture (LVC) as a tool to generate revenue for infrastructure provision. It can recover the costs of development and/or redistribute the development increments to the wider community. At the same time, it can finance the unintended adverse impact of change in land use and infrastructure delivery and promote social equity. While this approach has been successful in some cases in the global north and south, there are also obstacles to its implementation faced by others. This study will explore multifaceted tensions that underlie LVC implementation, with a focus on (i) imperfect valuation and (ii) conflict between private property rights and wider public goals, (iii) economic goal versus equity goal.

BIOGRAPHICAL SKETCH

Juyeon Maeng is dedicated to sustainable urban development in the global South, particularly focusing on climate change mitigation and adaptation for vulnerable urban populations. This dedication continues through her academic journey as a graduate of the Master of Regional Planning program at Cornell University, building upon her educational foundation with a Bachelor's degree in International Area Studies and Urban and Environmental Engineering from Handong Global University. In her career journey, she has been engaged with UN agencies and NGOs, actively participating in efforts to localize climate action within cities in the global South.

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1. INTRODUCTION

The provision of new infrastructure in low- and middle-income countries (LMICs) would cost between 2 percent and 8 percent of each country's gross domestic product (GDP) per year by 2030 (Rozenberg & Fay, 2019). Cities with tight budgets and limited revenue streams are inadequate in terms of the instruments, procedures, and resources available to keep up with the growing demands for infrastructure and basic services from the rapid and complex urban growth. Such cities are often dependent on transfers from other levels of government or with low revenue collection rates. The weak bond markets and property tax systems, and heavy external and internal debt of some municipalities in the global South further limit their ability to access internal and international capital markets, making infrastructure financing even more difficult (Mathur, 2019; White & Wahba, 2019). In such cases, investment capacity is limited, and construction investments take priority while maintenance expenses are neglected, leading to short- and long-term problems that require reactive measures. To break this cycle, maintain a healthy fiscal position, and adequately address urban challenges, such as rapid urbanization, deteriorating infrastructure, and climate crisis to establish well-managed and sustainable urbanization, the local governments are driven to explore innovative sources of predictable and healthy own-source revenues (Tirumala & Tiwari, 2021; Welch et al., 2022; van der Krabben & Del Canto, 2023).

The global economic recession decreases the tax revenue from income and sales and reduces the financial assistance from the central government while the demand for entitlement programs surges. When municipalities attempt to increase taxes and fees to finance local public services, they often encounter public opposition. The current economic crisis had triggered the governments to seek new revenue sources, including LVC, which is collecting and reinvesting the land value increased from public investment. To qualify an LVC, there must be (1) government's regulatory decision to change land use and/or

investment in infrastructure instigates an increase in land values, (2) mechanism established to capture and redistribute a portion or entirety of the increase, and (3) the captured land value flowed into finance infrastructure investments and services to the broader community. The captured land value should fund any other improvements to offset the negative consequences of the changes and implement public policies to promote social equity (Suzuki et al., 2015; Ingram & Hong, 2012). Many countries in the global South are actively seeking LVC as a new local revenue source. Some global north countries such as the UK, Netherlands, and US, and some global South countries such as Brazil and Columbia already have a long history of leveraging LVC (OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022; Berrisford et al., 2018).

This review of literature aims to explore and offer insights into the implementation of LVC in the global south. The structure of the review article is as follows: Section 1 presents a concise overview of the study's objectives; Section 2 outlines the review methodology; Section 3 delves into a deeper understanding of LVC and its applications in the global south; and Section 4 engages in a discussion concerning the tensions associated with applying LVC in certain global South cities, particularly focusing on issues like imperfect valuation, conflicts between private property rights and public objectives, and the balance between economic and equity goals within LVC implementation.

2. METHODS AND FINDINGS

This section presents the method and findings of a comprehensive literature review on topic of LVC in the global South. We delve into the methodology and outcomes of a comprehensive literature review focused on LVC within the context of the global South. Two key outcomes of the comprehensive literature review are the diverse geographical distribution of LVC application across regions like Asia, Latin America, and Africa, and a notable prevalence of LVC case studies in the transportation sector.

2.2. Methods

We compiled a comprehensive list of relevant literature selected guided by a systematic literature review of articles guided by Preferred Reporting Items for Systematic Reviews and Meta-analysis statements (PRISMA) (Moher et al., 2009). The search results from PAIS, Scopus, and JSTOR were initially filtered using the following search keywords: “Land Value Capture”, “Land-Based Financing”, “Urban”, and “Cities”, and the year of publication was restricted to 2010 to 2023. I used the umbrella terms because terms used for each instrument vary by country and to ensure to include the literature that explicitly talk about capturing the development increments.

Criteria	Search Expression
What	“Land Value Capture” OR “Land-Based Financing”
Where	“Urban” OR “Cities”
When	Jan 2010 to April 2023

Table 1 Search Keywords

A total of 295 references are collected from Jstor, 159 from Scopus, and 89 from PAIS. The collected references (n = 543) were then identified and screened based on the eligibility criteria listed below:

- 1) The study focuses on LVC in urban areas. The study on their use in non-urban areas is excluded.
- 2) The study is a book or journal article published in scholarly journals. Articles published in magazines, trade journals, or thesis/dissertation, are excluded.

- 3) The study should include quantitative and qualitative case studies that clearly state its finding on the LVC in urban areas in the global south. Proposals or feasibility studies and risk analysis were excluded.
- 4) The article is written in English and the full text is accessible.

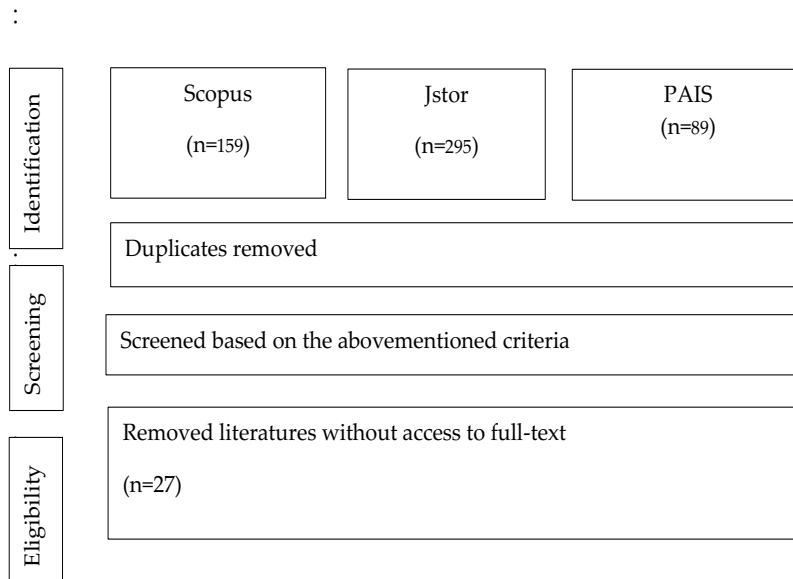


Figure 1 workflow summarizing the literature review process and final results

In the first exclusion process, all duplicates were removed. Then, the articles were examined to verify whether the studies include case studies of LVC in the global south that match the abovementioned criteria. The final list of references contained 27 articles in total. The number of case studies does not represent the total projects using LVC in the global south but rather the frequency of being mentioned and studied in the research community. According to OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center (2022), all countries, except for Uganda among 60 studied countries with diverse income groups, are using LVC sporadically. The low number of cities and countries identified in this study implies there are gaps in documenting the LVC in many cities in the global south. Other literature excluded during the screening process such as the feasibility studies of LVC in

global south cities or not specifically mentioning its finding on the LVC in urban areas in the global south are not quantified in the analysis but will be mentioned to complement the result.

2.3 Findings

The literature review has revealed diverse instances of LVC application across various regions including Latin America, Asia, and Africa. In Asia, cities such as Nanchang, Quijing, Shenzhen, Wenchuan County, Dongguan Guangzhou, Guiyang in China, Delhi, Ahmedabad, Bangalore, Bengaluru, Hyderabad, Kochi, Rajkot in India, and Ho Chi Minh and Tra Vinh in Vietnam, Kathmandu in Nepal have implemented LVC. In Latin America, Colombian cities like Bogotá, Medellin, and Pereira, along with Brazilian cities São Paulo and Curitiba, have a notable history of LVC implementation.

Among the various topics, transportation emerged as the most common sector for LVC case studies. The exact reason for this prevalence is not explicitly discussed in the literature. However, according to Medda (2012), measuring the gains in transportation accessibility can provide a basis for financial recovery and even aid in designing financial mechanisms that accurately achieve the intended increase in accessibility. This trend aligns with the World Bank's findings, which highlight transportation as one of the costliest sectors in LMICs in terms of investment. Transport investments can range from 0.9 percent to 3.3 percent of LMICs' GDP per year. Interestingly, this popularity of LVC for transportation projects contrasts with the relatively low application rate of LVC for funding electrification, despite electrification being identified as one of the high-cost infrastructure projects in LMICs (Rozenberg & Fay, 2019). Fewer case studies were found on topics outside of transportation, including water, sanitation, and hygiene, as well as slum upgrading. Limited literature explored the use of LVC in informal settlements, and the effectiveness of providing affordable housing through LVC lacked comprehensive documentation. Notably, South Africa employed Land readjustment (LR) for slum upgrading (McGaffin et al., 2019), and

São Paulo utilized the Sale of Development Rights approach (Mahendra et al., 2020), though these methods are not without controversy, as later discussed in section 3. Another notable aspect is the application of LVC in green infrastructure. Estimates indicate that improvements in areas like canal systems and storm and wastewater upgrades, aimed at reducing flood impacts, can lead to appreciations in land value ranging from 11% to 18%. This suggests the potential for using LVC to fund resilience projects (Avner et al., 2022). For instance, Curitiba used the Sale of development rights to finance its green stormwater infrastructure, which not only mitigates flood risks but also contributes to carbon sequestration (Welch et al., 2022).

The LVC mechanisms mentioned throughout the literature is diverse. The instruments were divided according to the categorization established by Biitir, et. al. (2022) with reference to Suzuki et al. (2015)'s definition of (1) tax or fee-based instruments and (2) development-based instruments. The tax or fee-based instruments are fees, charges, or taxes levied on land or property. Their purpose is to recover the cost of the provision of urban services and is not directly tied to an increase in land value. These include Development charge, Infrastructure levy, Impact fee, Property tax, etc. Tax or fee-based instruments are more widely used in global north countries that have been practicing LVC for a long period with institutionalized mechanisms and legislation, such as the United Kingdom, Germany, Nordic countries, and the Netherlands (Nguyen et al., 2018). The development-based instruments serve the purpose to achieve a social or use-related outcome and directly capturing land value (Biitir, et. al., 2022). These include the Sale of development rights, Land Sale, Land Lease Premium, LR, In-kind contributions, and more. This report will focus on three Development-based instruments that were identified as most mentioned.

Instruments	Description	Source	Implemented Cites
Charges for development rights	Payments are exchanged for the authorization to construct with increased density and to adjust zoning for higher permitted densities or land use alterations.	Biitir, et. al., 2022; OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022;	São Paulo, Rajkot, Delhi, Bengaluru
Land sale/Land lease premiums	Payment are exchanged for a freehold title to the public land or privilege to occupy and benefit from public land	Biitir, et. al., 2022;	Nanchang, Harare, Delhi, Alexandria, Accra, Ho Chi Minh
Land readjustment (LR) /Land pooling	Private land is pooled and developed jointly as landowners voluntarily give up a part of their land in exchange for infrastructure improvement	OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022; Suzuki et al., 2015	Ahmadabad, Bhuj, Huambo

Table 2 LVC Instruments

3. HISTORY AND PRACTICES OF LVC

In this section, we will provide an overview of the historical discourse surrounding LVC, from the discussion of land rent in the nineteenth century to its recent resurgence.

Additionally, we will delve into the practices of three essential LVC tools – Sale of development rights, Land sale/Land lease, and LR – all of which have been adopted by various regions in the global South.

3.1 History of Land Value Capture

The history of academic debates on LVC dates back to nineteenth century when economic significance of land was explored in classical economics of the nineteenth century by David Ricardo's land rent analysis and Henry George, Adolf Damaschke, and Hans Bernoulli's proposal on land reforms. Rent was defined by Ricardo as compensation paid to landlords for the inherent and unchanging qualities of land. Similarly, von Thünen emphasized the immobility of land and recognized transportation costs, considering land rent as payment to landlords for a superior location. Over time, the focus of land rents gradually shifted from agriculture to urban environments, aligning with the diminishing role of agriculture in national economies. Classical economists began showing interest in urban land rents and discussed the taxation of land rent. Mill, for example, regarded rents as unearned since they were incidental and did not involve any effort or sacrifice (Vejchodská et al., 2023). During that period, Henry George proposed the concept of a "single tax" in his book, *Progress and Poverty*, and emerged as a significant advocate for taxing urban land rents. The book suggested that the continuous payment of land rent alone, not including the buildings and improvements, would be sufficient to fund all of society's public needs. The tax on land, which is immovable, would avoid the economic disruptions caused by taxes on labor and financial capital (Alterman, 2011; McGaffin et al., 2019). George suggests that local public facilities influence the rent that landowners can earn to increase and that this increase in land value created by the community should be taxed for the purpose to finance investments. At the time George proposed this idea, he did not directly associate value capture with land-use regulations, as these concepts were not yet established in their modern forms (Alterman,

2011). Despite the appeal of Henry George's single-tax theory, the global consensus remains largely opposed to it, with only a few local exceptions. Property taxes, particularly those imposed on land, are the most common form of land taxation internationally, although they generally capture only a small portion of property values, deviating from George's original concept. Nevertheless, the underlying rationale of the Georgian argument still resonates with many, especially in the context of sharing the added value generated by land-use regulations with the public.

The shift from classical to neoclassical economics led to a decrease in the analysis of the causes and effects of high land rents in mainstream economics. Land began to be treated as a standard factor of production, losing its distinctiveness. Discussions on land rent shifted primarily to the field of urban economics, which mainly focused on describing the origin of land rent rather than providing normative assessments or suggesting public financing strategies. However, urban planners, lawyers specializing in spatial planning, and researchers in public policy continued to analyze the consequences of high urban land prices. They explored legal instruments to mitigate the societal impact of high land values and advocated for their utilization for public purposes. The concept of LVC gained traction within these disciplines throughout the twentieth century and is currently growing in significance. In the twentieth century, LVC instruments were rejected in most countries and even the few cases of practical applications were modest approaches (Vejchodská et al., 2023). The revitalized interest in LVC is evident from the recent increase in the number of literature and application in the academic community and international professional communities. These are encouraging the global south cities to seek new revenue sources from land-based financing tools. OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center (2022)'s Global Compendium on Land Value Capture compiles LVC practices from 60 countries from different income groups. World Bank's publication on "Financing Transit-Oriented

Development with Land Values” proposes the application of LVC to overcome financial hurdles in financing TOD to promote LVC in the global South (Suzuki et al., 2015).

3.2. Sale of development rights

Development rights were traditionally tied to the land but began to be seen as a separate bundle, allowing for un-bundling for their independent sale or transfer. Transfer of development rights is sending off the development rights of an area to be used in another area. As the development in sending areas is restricted, the intensity of development is increased in receiving areas than their underlying zoning regulation. The Sale of development rights, which similarly increases the development intensity of an area, allows purchasing the of the development rights without specific sending or receiving areas. (Mathur, 2015; Welch et al., 2022)

3.2.1. São Paulo: Certificates of Additional Construction Potential (CEPACs)

To generate revenue for public infrastructure projects, the municipality of São Paulo enacted a federal city statute in 2001 that approved the issuance of a form of bond known as CEPACs. These certificates grant developers additional building rights, including increased floor area ratio (FAR) and footprint, as well as the flexibility to modify the permitted land use within the plot. In exchange for these new building rights, developers finance the construction of public infrastructure. CEPACs are sold in auctions in the stock market and can be used to pay for building rights within the Joint Urban Operations (OUC) projects for which the CEPACs are issued (Mahendra et al., 2020; Sandroni, 2010). OUC is a public-private partnership tool designed to transform cities through comprehensive restructuring and to capture the increase in real estate value created by investments (Montandon & de Souza, 2007). Once an OUC is approved, the anticipated value increments generated by the project are estimated, and the sharing ratio between the public and private sectors is decided.

CEPECs enable the capturing of the expected increase in land value before the private developer's constructions commence (Mahendra et al., 2020; Montandon & de Souza, 2007; Sandroni, 2010).

The revenue collected from the sale of CEPACs allows municipalities to finance the upfront cost of infrastructure construction without incurring a deficit, accumulating public debt, or diverting budgetary resources that could otherwise be allocated to essential sectors like education or health. The municipality also has the option to use CEPACs as a non-budgetary source to compensate firms contracted for infrastructure construction using CEPACs through private auctions. The generated revenue from the sale of CEPACs is exclusively allocated toward achieving the specific objectives of the OUC project (Mahendra et al., 2020; Montandon & de Souza, 2007; Sandroni, 2010). The Água Espraiada Urban Operation project (OUCAE) in Água Espraiada utilized CEPACs to reinvest in public infrastructure, addressing informal housing and drainage issues while facilitating urban development. Major interventions included road and stream drainage infrastructure improvements, along with the resettlement of 8,000 informal houses in flood risk areas. Smaller public infrastructure installments, such as parks, public schools, and healthcare centers, were also implemented as part of the project's objectives (Mahendra et al., 2020; Montandon & de Souza, 2007; Sandroni, 2010).

3.2.3. Rajkot: Rajkot Municipal Corporation (RMC) project

To address the deficiency of public transit system in Rajkot, the city employed the Sale of development rights to enhance urban transportation, alleviate congestion, and provide an efficient and accessible public transit option for its residents. Prior to the project, the city's population stood at 1.2 million, yet only 13 buses operated by the state transportation corporation were available. To rectify this, the RMC proposed the establishment of three Bus Rapid Transit (BRT) corridors: the Blue Corridor (29 km), the Green Corridor (16.5 km), and

the Red Corridor (18 km), collectively spanning 63.5 km. The project was divided into phases, initially focusing on a 10.7-km segment of the Blue Corridor under RMC's ownership. The introduction of high-quality public transportation was expected to catalyze real estate development, particularly within a 250-meter radius on both sides of the corridor, where the impact of BRTS would be most significant. To leverage this potential, the RMC intended to generate revenue by selling additional floor space. Although the Blue Corridor already had a maximum Floor Space Index (FSI) of 1.5, with an average utilization of 0.68 FSI, the impact of BRT warranted an FSI of 1.5–1.7, leading to potential additional demand for 0.7–0.9 FSI. The RMC considered three options for selling extra FSI (0.50, 0.75, and 1.0), ultimately opting to sell 0.75 FSI at the second price level. This decision was projected to yield revenue slightly exceeding Rs. 1.2 billion (approx. USD 14 million), surpassing the estimated project cost of around Rs. 1.1 billion (approx. USD 13 million). Notably, even the least ambitious option—selling 0.50 FSI at the first price level—was expected to generate substantial revenue, approximately Rs. 413.3 million or about 38 percent of the project cost (Mathur, 2015).

During Phase 1-Part 1 of the project, eleven buses began operating at four-minute intervals along the 10.7-km route. The project cost eventually rose to Rs. 1.75 billion (approx. USD 21 million) due to overpass construction. The government of Gujarat State approved a 0.45 FSI increase for areas with robust public transportation, granting RMC the authority to sell 0.75 FSI within 250 meters of the BRTS corridor. FSI sales commenced in 2013, based on the Jantri rates, the official valuation of land and property used for taxation in India, and had generated Rs. 310 million (approx. USD 3.7 million) by mid-March 2015. Roughly 25 percent of eligible land parcels had purchased additional FSI, leaving 75 percent of parcels available for potential sales, and with increasing Jantri rates, FSI sales could surpass Rs. 2 billion (approx. USD 24 million), surpassing both the total project cost and RMC's estimates (Mathur, 2015).

3.3. Land readjustment

LR or Land Pooling is an alternative land acquisition tool used to create public land by resizing parcels and establishing infrastructure through the expansion and alignment of streets, lots, and blocks (Hein, 2010). To apply a new land use plan or provide network infrastructure in an area, the public authority pools privately owned land and creates a new land use plan involving publicly funded infrastructure. The parcels of land in an area are readjusted in a way that each landowner contributes an amount of land in proportion to the benefits received from the infrastructure. The benefits are determined by the size and location of each land parcel. The land given up by the landowners is then used to provide community facilities and amenities and can also be sold or leased out to recover the costs of delivering the infrastructure. Even though the size of each land parcel has shrunk after giving up part of their land to the public authority, or some of the lands are now occupied by new infrastructure such as roads, the total value remains the same as before because land values increase due to better planning and infrastructure provision (Collier et al., 2018).

One of the major challenges in providing infrastructure in urban areas is the supply of adequate land. In urban areas, the land is likely to be subdivided into smaller parcels. Compulsory land expropriation can cause a high financial burden on the government to buy and develop land plots, and LR is a potentially and financially less costly option. It helps achieve the optimal use of land to meet the demand for urban land and offers positive benefits to owners and residents after development. LR transforms irregularly shaped urban or agricultural plots into orderly, more feasible lots conducive to planned urban development. By streamlining the provision of public amenities such as roads, civic facilities, and auxiliary infrastructure, LR facilitates efficiency and organization. At the same time, it mobilizes private landowners to collaborate and voluntarily aggregate and give up their land resources for a collective goal and provide public spaces and infrastructure to them. It can be a win-

win solution that is non-coercive, equitable, and does not result in significant displacement of original landowners (Hong and Brain, 2012; Byahut & Mittal, 2017; Collier et al., 2018).

3.3.1. Bhuj: Town Planning Schemes (TPS)

In India, a variant of LR, TPS, is popularly practiced at the local level. Cities in Gujarat state have effectively employed this approach to enable planned growth and provide serviced urban land in rapidly urbanizing regions. Firstly, a plan outlines the layout planning, the reconstitution of original lots, and the preparation of financial aspects such as land valuation, compensation to be provided to landowners for land deduction, and charges for improved infrastructure (referred to as betterment charges). Then, the town planning officer is designated and vested with quasi-judicial authority to conduct individual hearings with landowners and finalize the physical layout in the preliminary TPS. Lastly, the final TPS includes the conclusive financial details including compensation and betterment charges for landowners. Throughout the planning process, 150 public meetings and outreach sessions were conducted to reach at least 350 residents, and an outreach office was built to engage stakeholders and obtain feedback. After the Gujarat earthquake, TPS was used to decongest, preserve the urban form, and build a safer city of Bhuj, which is historically significant and densely constructed. LR presented a financially and physically viable option for the government, as it utilized appropriated lands and damaged structures to reconstruct streets, open areas, and additional infrastructure, thus avoiding the need to allocate substantial upfront capital for land acquisition or the demolition of surviving buildings (Ballaney, 2013; Byahut & Mittal, 2017).

The narrow and convoluted streets in Bhuj were identified as one of the main factors in a significant fatality. The post-disaster efforts focused on enhancing access and connectivity for future disaster prevention. To ensure the original street layout and undamaged buildings were preserved, a practical street network was carefully devised to

minimize disruption to existing structures. The newly designed major streets were expanded from 3 km to 18 km and included an additional 40 km of internal streets, ensuring emergency access and connectivity. The land for the new street network and public facilities was acquired through LR strategies, which proportionately deducted from landowners, repurposed land from damaged structures, and land from residents relocating outside the area. The Gujarat Town Planning and Urban Development Act of 1976 allows up to 50% land appropriation from existing landholdings, but due to fractional ownership and small lot sizes, the city employed a policy that varied appropriation by lot sizes, spatial patterns, and building damage extent. For lots measuring less than 30 sq m, no appropriation was undertaken, while for lots exceeding 500 sq m, an appropriation rate of up to 35% was enabled. Exemptions were in place for small fully covered lots and intact buildings post-earthquake, unless their significance was critical, or they fell within proposed road alignments. To facilitate the implementation, the municipality provided landowners with 80% compensation for land appropriation upfront, along with up to one year's rent for buildings that were fully impacted (Ballaney, 2013; Byahut & Mittal, 2017).

3.3.2. Huambo: Bairro Fátima Land Readjustment

In the aftermath of a prolonged civil war, a peripheral area of Huambo's rapidly expanding informal settlements, Bairro (neighborhood) Fátima, applied LR as a solution to enhance land tenure security and access to basic services for the displaced population in a post-conflict context. The legal land was mainly supplied from Huambo municipality's urban planning activities, which assembled, planned, and redistributed land in the peripheral regions. There was no compensation for the land assembly, and redistribution hinged on a waiting list maintained at the municipal office, where residents could submit their requests for a parcel. The supply of land could not keep up with the great demand for land, resulting

in a substantial backlog. The land was allocated for self-help housing for those on the housing waitlist, but it was inadequate as it lacked access to basic infrastructure (Cain et al., 2018).

To kick off LR in Bairro Fátima, a multi-stakeholder management group was formed, joined by the provincial government, traditional leaders, local administration, and NGOs. The household census, community diagnostic, and land registry were created with community participation. The physical readjustment plan was developed by planners and presented to the communities, with the site layout plan implemented. The plan reserved 30 percent of land for infrastructure and roads and 35 percent for redistribution to landowners. Each land plot was 15 meters by 25 meters (375 square meters) and worth USD 500. Landowners received a rounded-off number of land parcels proportional to their previous land size. Despite slightly imprecise calculations due to the lack of practical alternatives, stakeholders accepted them. Landowners received occupation licenses and registered at the land cadastre developed by the municipality. Property boundaries were marked with wooden pegs, optical instruments, and measuring tape, with plots numbered. The remaining 35 percent (225 plots) were sold to private individuals registered on the government's housing waiting list, indicating 152 families, mostly from the lower-middle class, purchased land for housing. Since the informal market land price in per-urban Huambo ranges from USD 700 to USD 7,000, and value increased as the land ceased being informal, new landowners benefited. The release of 225 new plots did not disturb land value in the market due to high demand for house plots in Huambo. Revenues from land parcel sales, about USD 80,000, covered the cost of implementing layout planning, clearing roadways, and installing boreholes for drinking water (Cain et al., 2018).

3.4. Land sale

By selling or leasing public lands or lands acquired from private landowners, governments can capture the land value increments generated by public infrastructure

investment or regulatory changes (Suzuki et al., 2015). In a public land leasehold system, land value can be captured through an initial public auction or tender, collecting annual land rent, modifying lease terms during adjustments, and introducing new terms upon lease renewal (Ingram & Hong, 2012). Another approach, known as Land banking (LB), involves municipalities acquiring and retaining land use rights in anticipation of future requirements for urban renewal, land consolidation, managing urban growth, and capitalizing on land value appreciation (OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022). This approach often pairs with land reclamation, where land surrendered by private landowners is either sold or used as collateral for loans to generate funds for infrastructure projects (Byahut & Mittal, 2017).

3.3.1. Wuhan: Metro line 2 Predetermined Land Reserve (PLR)

In China, all land is publicly owned and cannot be traded, but land use rights have been commercialized since the mid-1990s through land leasing. Private actors obtain, utilize, and transfer land use rights through leasing arrangements: residential land leases last for 70 years, industrial uses have 50-year leases, and the retail and entertainment sectors are allocated 40-year leases. Chinese governments have prominently used public land leasing to tap into the increase in land value, raising revenue to promote economic growth, and financing urban infrastructure and large-scale development projects (Cain, 2017). The rent, including the payment of a land premium and prepayment of all community and urban infrastructure fees, is generally paid upfront. The lessee then possesses the right to sell, mortgage, or use the rights within a secondary market. Even though sub-leasing is informal, public entities, including state-owned enterprises, may transfer or sublease land rights to private developers (Ingram & Hong, 2012; OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022). These lump sum payments account for the major proportion of land revenue for local governments in China, serving as a primary source for highway

infrastructure finance in the wealthier coastal provinces in China for the past 15–20 years. However, non-recurring income from land leasing lacks sustainability as a long-term resource for public finances. As this source of revenue has been exhausted, municipalities must explore other means (van der Krabben et al., 2019; Ingram & Hong, 2012). Moreover, relying on leasing fees to finance municipal expenses could incentivize the Chinese governments to convert rural land into urban use, potentially contributing to urban sprawl (Suzuki et al., 2015).

The PLR model presents a new approach to urban rail transit financing tailored to the unique circumstances of Chinese cities. It leverages land reserves by establishing a connection between specific land parcels and rail transit projects, strategically using predetermined land reserves to supplement rail transit investments. Wuhan city constructed a rail network spanning the Yangtze River, totaling 73.4 km in length, encompassing Metro Line 1 and parts of Line 2 and Line 4 in 2012. A total investment of at least USD 6.69 billion was required for the project, and most of the costs were covered by the government budget and land sale revenue. The city planned to use 21.98% of the total cost from land sales in their budget. The construction of the Wuhan Yangtze River Tunnel in 2004 and the planning and construction of Metro Line 2 in 2006 caused the value of land parcels in the Jiyu Bridge area to increase. The average Floor Price (land price per floor area) of some parcels had increased from USD 20.37/ft² in 2004 to USD 145.49/ft² in 2012. The increase in the value of the reserve parcels in the surrounding area of the construction was captured through the PLR mode and covered the cost of the project. For instance, in 2010, a land parcel in the Jiyu Bridge area named No. 150, which was set aside for Metro Line 2, was traded in an auction for USD 0.58 billion (USD 46.20 million per ha), setting a record for the highest land price in Wuhan city. The revenue, after deducting the taxes and fees, was returned to the Wuhan Metro Group to finance the construction of Metro Line 2 (Sun et al., 2017; van der Krabben et al., 2019).

4. MAIN TENSIONS

This section will explore the fundamental limitations and tensions present in LVC within the global South. These tensions are intertwined with issues arising from limited institutions and resources, conflicting private property rights and public goals, as well as the balance between economic and equity objectives. Failure to acknowledge these tensions would hinder LVC from fully realizing its potential benefits, as it would overlook addressing unintended adverse impacts and social inequalities throughout the process.

4.1.1. Imperfect Valuation

The current valuation of the land is vital in examining the viability of LVC. Capturing the increase in value from existing properties is important because new properties often only account for 2-5% of all properties while existing properties make up the majority. There are cases in which an LVC mechanism captures added value for new developments only, such as new property development and the sale of the FAR. In the case of transportation projects, LVC needs to factor in existing properties, as they also benefit from proximity to transportation and the agglomeration effect. To capture land value in existing properties, metrics such as land parcel size, parcel boundaries, building footprints, physical features, property value records, ownership details, streets, and utilities are necessary for measuring the current value (Byahut & Mittal, 2017; Mathur, 2019).

Global South cities often lack the comprehensive and accurate property records needed for valuing existing properties (Mathur, 2019). The OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center (2022) mentions low-quality cadasters/land registries as obstacles for middle- and low-income countries in LVC implementation. Many municipalities struggle with identifying affected owners and levying fees due to a lack of cadaster and registry data and related expertise. They rely more on non-market-based

approaches for land valuation. However, market-based approaches are generally preferred for their ability to provide more accurate valuations, differentiate plot values in greater detail, provide reliable justification for LVC, and minimize legal disagreements. The OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center (2022) highlighted the necessity of providing cadaster and registry data to local governments, along with administrative support measures, to promote the effective use of LVC in countries like Costa Rica, Ghana, India, Indonesia, Nigeria, and Peru.

According to Sharma & Newman (2018), Byahut & Mittal (2017), and Ballaney (2013), cities in India face substantial challenges in valuation processes. These challenges include fragmented and non-standardized databases maintained by various local, regional, and state agencies, digitization of urban infrastructure maps, institutional integration in cities, land use and transit integration, plot-level land valuation, digitization of land use maps, and strategic planning frameworks. In cases of post-disaster reconstruction efforts, like in the city of Bhuj, there were particularly complex challenges due to the earthquake's destruction of building footprints and the absence of physical lot boundary marks. The densely built area in Bhuj, with around 12,000 lots in 130 ha, presented further mapping complexities. Despite efforts involving Total Station instrument-based computerized surveys, accuracy suffered due to simultaneous debris removal, building demolition, and mapping. Planning and mapping conducted concurrently resulted in complications. The implementation of LR also encountered ownership disputes and complications in marking new roads and finalizing property boundaries, leading to alterations of property boundaries and delays in the allocation of final parcels (Byahut & Mittal, 2017).

4.2.2. Conflict between Private Property Rights and Wider Public Goals

The LVC shares the burden of providing urban services with the private property owners under the premise that the public provision of services or infrastructure increases the

land value of the private land. According to Collier et al. (2018), the city authority possesses a distinct ethical entitlement to capture a portion of the land value appreciation stemming from urbanization. This appreciation in land values occurs as a result of public investments in the area and population growth. Extracting and using the land value enables a positive cycle, where the increase in urban land and property values funds the public investments that enhance the city's productivity.

Municipalities choose to capture the land value and invest in public infrastructure when they are convinced that such investment will lead to an increase in the land value of the surrounding area (Smith & Gihring, 2009). However, the lack of clarity regarding unearned land increments and profits, which are challenging to accurately value, gives rise to debates about whether the responsibility of meeting public needs and driving social changes should be shared or exclusively borne by the public (Rebelo, 2022). Additionally, there needs to be a consensus on how to allocate the windfall which is a result of contributions from public investments among municipalities, landowners, and the investing entity (Mathur, 2015). Once this is aligned, the municipality can enforce the extract the increased land value from the private landowners. In cases of government-controlled land systems, a tax or fee-based LVC approach might be suitable for extracting land value in post-socialist African countries (Cain, 2017).

Implementing LVC in countries with public land ownership, such as China, enforce public goal in expense of private rights. The process of land acquisition often compensates former occupants with a fraction of the land's value, and these inequitable compensation methods have sparked social tensions (van der Krabben et al., 2019). With city and county governments increasingly relying on land sales for vital revenue, the frequency of forced evictions has notably risen since the 1990s, becoming a significant source of unrest and public demonstrations (Cain, 2017). In addition to issues within the land acquisition process, the

lack of transparency in allocating land values exacerbates inequality. While the redistributive nature of LVC aims to direct revenues generated from rising land values back to the communities from which the value is extracted, the utilization of land lease revenue by Chinese municipalities remains unconstrained and fails to contribute to community betterment (Suzuki et al., 2015).

On the other hand, in countries where land is privately owned and government enforcement is lacking, the imposition of LVC cannot be enforced rigorously. The combination of hostility or reluctance toward taxation and a weak tax collection system makes it challenging to implement robust LVC measures. For instance, in Kigali, the unclear and inconsistent approach to property taxation in Rwanda has led to poor revenue collection. Similarly, in Ethiopia, property tax has performed poorly as a revenue instrument, constituting at most 4 percent of locally collected revenue in the late 2000s. In contrast, in many developed countries, property tax commonly accounts for over 50 percent of locally collected revenues and, in some cases, even reaches 100 percent (Goodfellow, 2017). LVC mechanisms, such as LR, that require a voluntary contribution from the landowners are likely to be faced with resistance. In Bhuj, dozens of meetings were held to convince landowners to surrender a portion of their land. Initial resistance was overcome by highlighting the possibility of losing land without compensation if consensus was not reached, prompting the municipality to opt for traditional compulsory acquisition (Byahut & Mittal, 2017).

4.2.3. Economic Goal versus Equity Goal of LVC

The case studies reveal different perspectives among municipalities or authors regarding the use or proposition of LVC: focusing on economic goals or equity goals. While LVC is a mechanism to finance infrastructure, it is also recognized as a tool to accomplish broader objectives, such as promoting social equity (Suzuki et al., 2015). The distribution of benefits and fairness in redistribution outcomes are common themes in LVC literature. The OECD &

Lincoln Institute of Land Policy, PKU-Lincoln Institute Center (2022), mention LVC's equity benefits in distributing costs as well as the benefits of urban development to the community. If LVC does not recover the "unearned" land value, private property owners retain the increments generated by public action (OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022). Garza and Lizieri (2016) describe capturing development increments from public service provisions as "society's right" to take part in unearned landowners' gains. Fainstein (2011) highlighted the importance of addressing equity concerns by ensuring that the implementation of LVC does not result in the displacement of low-income households or businesses with low profits.

Other literature has demonstrated high expectations that LVC would foster economic development backed by the good practices of the global north. Xiao et al (2020) mention land-based financing as a version of Chinese urbanization in that it leverages the profit from real estate to fund infrastructure building and lift impoverished rural communities. Goodfellow (2017) explores emulating the rapid development of East Asian 'tigers' by increasing the performance of LVC and urban property development, which played a key role in their strategies. Also, Cain (2017) proposes LVC as a tool to stimulate private investment in post-socialist African countries, as it fueled the admirable urban development of Chinese cities. According to Bérénice Bon (2016), city planners and policymakers in Delhi have implemented LVC by replicating international cases such as the Rail Plus Property strategy from Hong Kong.

However, simultaneously pursuing economic and equity goals through LVC can be conflicting. While it can generate revenue for public goods and stimulate economic growth, it can also inadvertently exacerbate inequalities if benefits disproportionately favor certain population segments, potentially excluding marginalized groups (Tirumala & Tiwari, 2021). Because its key prerequisite is the increase in land value, LVC can also contribute to

unaffordability and gentrification (Garza & Gonzalez, 2021; Suzuki et al., 2015). There is criticism that it benefits existing landowners who possess the resources and power to capitalize on land value appreciation and act speculatively (Byahut & Mittal, 2017). Leveraging the increased value of land might reinforce and worsen the existing equity issue of race, segregation, and marginality (Tirumala & Tiwari, 2021), and the financialization of urban planning through LVC could undermine the urban planning goals of fair treatment for original land tenants and social facility provision (Nguyen et al., 2018).

To offset gentrification triggered by LVC and promote social equity, Suzuki et al. (2015) propose the provision of affordable housing to alleviate shortages and offset potential gentrification. However, the OUCAE case demonstrates that this approach is not always sufficient. The OUCAE project generated a total value of BRL 2.9 billion through the sale of 3.4 million CEPACs in auctions between 2004 and 2012, achieving its economic goals through the LVC mechanism. However, the equity impact has been less favorable. Only 33.7 percent of the increased value has been allocated to urban services benefiting low-income families, while 59.6 percent has been allocated to road infrastructure benefiting higher-income vehicle owners. Additionally, the eviction of favela residents has led to the displacement of at least 20,000 low-income individuals, exacerbating socio-spatial segregation within the city. The rising land prices are contributing to the gentrification of low-income populations, and the social housing provided in the form of high-rise flats remains unaffordable for the lower-income demographic (Nobre, 2012). Despite the project's intended goal of addressing informal housing and drainage issues while promoting urban development (Mahendra et al., 2020), it has primarily benefited the high-income group and further marginalized the low-income population.

Conversely, the case in Bhuj prevented the displacement of original landowners by employing LVC in combination with other planning interventions such as comprehensive

relocation and rehabilitation policy. This approach involved purchasing properties from willing sellers, enforcing regulations for lower density, and implementing land use zoning. Selective relocation packages were provided to homeowners and businesses, focusing on three well-developed sites outside Bhuj, each equipped with adequate infrastructure to encourage and facilitate the process of relocation while maintaining cultural and economic connections. Throughout the TPS process, which typically spans multiple years, many landowners, particularly those with smaller plots, opted for relocation. They surrendered their properties in exchange for larger parcels designated for relocation and rehabilitation outside Bhuj. This strategy freed up more land and minimized land deductions from those who preferred to stay. The policy also allocated land parcels to tenants who lost their homes and to slum households located along new road alignments. Non-governmental organizations played a pivotal role in constructing extensive rehabilitation and resettlement housing projects across the city, providing 2,332 lots to affected individuals by 2005, alongside 2,463 homes built by various organizations (Byahut & Mittal, 2017).

5. CONCLUDING REMARKS

Urban growth leads to a surge in urban users' diverse demands for land equipped with infrastructure (OECD & Lincoln Institute of Land Policy, PKU-Lincoln Institute Center, 2022; van der Krabben & Del Canto, 2023). The diminishing municipal financial resources for infrastructure building and urban (re)development (Vejchodská et al., 2023) result in under-investment in infrastructure, which is a trend found globally, in both developed and developing countries (Squires et al., 2021). The situation was particularly dire for developing countries with limited taxation and revenue-generating systems, but LVC has great potential in the global South. While real estate values have reached unprecedented heights globally, the underdevelopment of these cities suggests an imminent increase in land value. Africa's urban land, as described by Cain (2017), remains an "untapped resource." Goodfellow (2017)

implies that limited transportation infrastructure in urban African areas will still attract real estate investments. According to Welch et al. (2022), global south cities are already responsible for significant innovations in using LVC.

This study focused on a range of LVC mechanisms leveraging land value to mobilize infrastructure finance and how they were practiced in global South cities. By examining case studies from diverse cities such as São Paulo, Rajkot, Bhuj, Huambo, and Wuhan, the research has illustrated how public infrastructure investments or changes in land use can trigger increases in land value. The increased land value is captured through various tools to finance infrastructure projects, and the tensions surrounding the implementation of LVC in the global South are multifaceted. Challenges of imperfect valuation in many global South cities lacking comprehensive and accurate property records and the balancing of private rights protection and enforcing public goals are present. Moreover, tension emerges because while LVC stimulates economic growth, it can also perpetuate inequality by favoring certain population segments and contributing to gentrification. Addressing these tensions and balancing financing, development, and equity goals are crucial for the successful application of LVC. Successful LVC should not only finance public infrastructure but also mitigate the adverse impacts of development and promote social equity in the distribution of benefits.

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