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LAND VALUE CAPTURE FOR URBAN AND REGIONAL PUBLIC TRANSPORT INFRASTRUCTURE FINANCING

The 3-I strategy as an imperative for financially sustainable development and operations

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Background and Scope

In 2023, TIF published a study titled "Strategies to Improve the Financial Performance of Metro Rail Systems in India," prepared by Dr. Sandip Chakrabarti, Indian Institute of Management Ahmedabad (IIMA). The TIF sponsored study argued that catalyzing and recovering part of the land value increment generated by metro rail development from direct project beneficiaries (such as developers and other property owners) using a variety of land value capture (LVC) instruments comprising asset management tools, urban planning/development control strategies, and public finance mechanisms can effectively and efficiently help generate justified funding streams for constructing and operating metro rail services in India. The study explored globally recognized LVC instruments that are particularly applicable to India, and discussed fundamental administrative, institutional, and technical capability requirements to implement the concept in complex Indian contexts. The study emphasized the urgent need for cities that have developed or are in the process of developing metro systems to tap into the opportunity of LVC. The study additionally argued that LVC is essential for continued public and political support for high-quality public transport infrastructure development in the country, and for attracting private investors for upgrading or developing infrastructure in partnership with the government. In sum, LVC is essential for pursuing the sustainable urban and regional transportation system development agenda of our country and meeting our transportation sector decarbonization goals. Moreover, the study underscored the need for better city-state-central government coordination, and specifically the establishment of Unified Metropolitan Transport Authorities (or UMTAs) to, among other things, successfully implement LVC mechanisms across Indian cities. This TIF-IIMA collaborative report generated significant interest on the LVC topic among practitioners, researchers, public agency officials, and policymakers.

TIF has recognized that LVC is an essential element of financing not only metro rail systems but various forms of urban and regional public/mass transport infrastructure, and that further research and advocacy on this topic is imperative. Therefore, TIF conducted an innovative capacity building program in partnership with the World Bank, titled "Municipal Finance Champions Lab," in Mumbai on August 13, 2024. The round table facilitated peer-to-peer exchange between actors within the public and private sectors who have successfully deployed LVC for financing public transport projects. The discussions were facilitated and moderated by academics including Dr. Sandip Chakrabarti, IIMA. The objective was to promote institutional approaches for preparing project pipelines that rely on LVC, and to discover, through the process of peer-to-peer learning, the capacity building necessary for LVC opportunities to be fully harnessed. The various discussion themes at the Champions Lab were: innovative LVC cases from India; conditions necessary for LVC implementation; key considerations for LVC design, and; successful LVC experiments by public transport agencies in India. In addition to the various insights generated in alignment with the lab objectives, a key takeaway was that although recognition of the LVC concept exists in India, the lack of appropriate institutional, legal, and policy frameworks make the transition from theory to practice difficult. While some success stories exist in India, LVC is still not mainstream, and LVC revenues do not significantly contribute to the funding stream for any large Indian public transport system. India's central government ministries should therefore seriously consider major institutional, legal, and policy transformations so that LVC mechanisms can be facilitated and activated for local, regional, and intercity public transport systems in the interest of making the systems financially sustainable, thereby reducing public burdens.

LVC has attracted increasing attention over the past decade in India. LVC is actively promoted by multilateral development banks across developing countries of the Global South. LVC has also been a core ingredient of PPP concessions in public transport projects across all continents, from Chile to Australia, Sri Lanka to Mongolia, Nigeria to Canada. The promise of LVC in increasing the financial sustainability of Indian transport projects is therefore established. Although an LVC policy guide is available India (i.e., the Value Capture Finance Policy Framework, MoHUA, 2017) not much LVC progress has happened in the urban transport domain, except a few experimental demonstrations. Still, it is worth mentioning that states like Gujarat (betterment levy) and Maharashtra (Premium FSI), and cities like Ahmedabad (Ring Road), Nagpur (Metro), Delhi (Metro), etc., have successfully implemented LVC in contextually relevant forms. The Indian Railways has used the opportunity of redeveloping station buildings to capture the air rights over the railway lines as well. However, there are many more effective and efficient LVC instruments that can be tested in the Indian context in a routine manner. Our conversations with multiple public and private actors as well as consultants/planners reveal multiple complex factors, from lack of supportive land use related laws at the state level to jurisdictional conflicts in revenue sharing arrangements, that make LVC implementation challenging in the Indian context. This, again, justifies the need to consider specific effective ways to remove barriers to LVC implementation in India.

While LVC has been in practice for several decades, the experiences have not been captured sufficiently in a manner that can support speedier application. Compared to the scale of the need for and challenges of LVC in Indian cities, the context specific literature is sparse. To develop a comprehensive plan to implement LVC across India for urban and regional public/mass transport infrastructure development projects, the following questions, for example, must urgently be answered: What LVC tools are appropriate in the Indian context (what works and doesn't work, for diverse types of projects and various spatial/socioeconomic contexts)? Why hasn't LVC taken off (what are the hurdles)? Operationally, how to estimate land/property value increments, and how to attribute land/property value increases to a specific transport infrastructure investment? Will existing/potential owners/developers be willing to pay additional taxes and fees (why/why not)? When/how should payment(s) be made, and who will collect them? How to deal with uncertain revenues over time? Can LVC promote both private sector lending as well as investment in transit projects? How to apportion revenue between specific infrastructure needs, local/regional improvement needs, and city-wide needs (and across jurisdictions/agencies)? How can LVC become an integral component of the financial/business model of a transport project developed by the public sector or in a PPP mode? What institutional and legal changes are required to make LVC mainstream, considering state level differences in legal and policy environments? What capacity development is necessary? Addressing these questions will help offer practical advice for LVC mainstreaming.

A few national workshops have also been organized on the subject, notably by the NCRTC in June 2019 and the NITI Aayog and GIZ in December 2023. The ADB has consistently pushed LVC for infrastructure finance through blogs and a detailed study on floor area ratios (FAR) as incentives for smart development. The subject of LVC became incorporated as an ingredient of public finance after the Government of India announced its intention to monetize public assets and the NITI Aayog prepared the National Monetization Pipeline in 2021. The ADB has published a comprehensive overview of LVC application in transportation systems, "Realizing India's Potential for Transit Oriented Development and Land Value Capture: A Qualitative and Quantitative Approach" in July 2022.

Given the research gaps, and, most importantly, the lack of relevant research to bridge the LVC theory vs. practice gap in the context of urban and regional public/mass transport infrastructure development in India, this proposed TIF-IIMA collaborative study report has been envisaged.

This research report focuses on the urgent need for comprehensive LVC implementation and offers guidance for urban/regional public/mass transport projects aimed at informing central government ministries (e.g., MoHUA), state government departments (e.g., metropolitan development authorities), local jurisdictions (i.e., urban local governments), transport agencies (e.g., metro rail, bus rapid transit, and regional rail authorities, etc.), project finance agencies (e.g., the World Bank), consultants and planners. We study LVC in the context of urban (metro) as well as regional rail systems. This is because, while urban (metro) rail has been a policy priority for about a decade and systems are being developed or expanded/upgraded across the country, a new class of medium-range (about 100 km) of semi-high speed (max. speed of about 160-180 km/hr) regional rapid transit systems (RRTS) is also being conceptualized and implemented in strategic metropolitan regions, with the Namo Bharat RRTS system developed by the National Capital Region Transportation Authority, connecting Delhi with Meerut, as the first such system. Insights generated by this report are relevant for LVC in the context of high-speed railways as well.

This report is also expected to contribute to scholarship in the field of land use planning and infrastructure finance. This report examines LVC theory, its historical development, and international experiences. It outlines the foundations of value creation, capture, and redistribution, highlights key LVC models and their relevance for India, and reviews both global cases and Indian practices. Challenges and solutions in the Indian context are discussed through perspectives of experts, practitioners, and the existing literature. Case studies document infrastructure projects to assess their financing challenges and the role of LVC as a revenue source. They analyze the implementation process, hurdles encountered, and dilemmas faced by stakeholders. The analysis integrates insights from the literature and case studies to propose institutional and policy reforms required to mainstream LVC in India. Recommendations emphasize creating conditions for land value appreciation, mechanisms for capturing part of the uplift, and frameworks for redistributing revenues for sustainable funding/financing and to attract private investment in urban and regional rail systems in India.

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Executive Summary

This report titled "Land Value Capture for Urban and Regional Public Transport Infrastructure Financing: The 3-I strategy as an imperative for financially sustainable development and operations" is motivated by the growing recognition that land value creation and capture (LVCC) is critical for ensuring the financial sustainability of India's urban and regional public transport systems, especially metro and emerging regional rail projects. Building on earlier TIF-IIMA research and subsequent capacity-building initiatives, this report responds to the need for further strengthening and aligning institutional, legal, and policy frameworks to better translate LVCC concepts into practice in India. The core objective is to provide practical, context-specific guidance on how LVCC can be strategically designed, implemented, and mainstreamed as a robust financing and funding mechanism for public transport infrastructure, while simultaneously enabling sustainable urban development through the creation of vibrant, economically productive, inclusive, and livable transit-oriented mixed-use neighborhoods. This report places strong emphasis on identifying appropriate LVCC instruments for different Indian contexts, diagnosing barriers to implementation, and outlining the institutional, legal, and capacity reforms required across levels of government. It further underscores the role of LVCC in supporting sustainable transport, decarbonization goals, private sector participation, and long-term public and political support for high-quality urban and regional transport infrastructure.

Land value creation and capture is most relevant in the context of high-quality rail-based urban and regional public transport infrastructure development in India because fixed rail stations and corridors can potentially generate concentrated, predictable, and attributable land value uplifts, making beneficiary-based financing feasible. In India, where metro rail has been a sustained national priority and a new generation of regional rapid transit systems is being advanced, LVCC models discussed in this report can offer scalable approaches to close funding gaps and strengthen project bankability. International and Indian experience further shows that when aligned with transit-oriented development, emphasis on LVCC can simultaneously finance high-capex rail investments, diversify non-fare revenues, attract private capital, and steer compact, inclusive, and low-carbon urban growth.

This report contains five chapters. Chapter 1 outlines the theoretical foundations of land value capture (LVC), traces India's transport and land policy evolution, and situates LVC as critical to financing urban and regional rail, drawing on global cases such. The key takeaway is that transport investments generate significant community-created land value, which, if captured early through integrated land use and transport planning, can become a sustainable public asset and major non-fare revenue source. The chapter underscores that India is at a policy inflection point, with growing recognition of LVC as essential for affordable fares and reduced public expenditure dependence. The core learning for policymakers is that LVC must be deliberately orchestrated through legal clarity, institutional reform, transparent valuation, and TOD-led planning to ensure legitimacy, financial sustainability, and inclusive urban outcomes.

Chapter 2 reviews India's emerging LVC policies and institutions, examines applications across transport sectors, and synthesizes Indian case studies alongside global best practices. The key takeaway is that early integration of LVC – especially in metro, regional rail, and airport-linked projects – has already demonstrated revenue and urban transformation potential in India, though constrained by legal and institutional issues. It highlights that global experience shows strong governance, predictable regulation, and reinvestment of captured value are central to long-term credibility. The principal learning is the need for a clear national LVC framework, state-

level mandated adoption of LVC instruments, PPP-based mechanisms, and positioning LVC as a tool for inclusive growth through reinvestment in housing, connectivity, and public amenities.

Chapter 3 synthesizes global and Indian scholarship and case studies to demonstrate how integrated transit–real estate–regulatory models can sustainably finance infrastructure. The key takeaway is that durable LVC outcomes depend on aligning infrastructure provision, land use controls, and market instruments, supported by public-private collaboration and transparent valuation. International cases show that reinvestment in social infrastructure and phased implementation is vital for public trust and legitimacy. The key learning for India is to establish strong statutory backing, enhance inter-agency coordination, integrate transit and real estate planning, and enable rail agencies to act as land asset managers to maximize non-fare revenues.

Chapter 4 draws on insights from public agencies, developers, and global experts, comparing Indian metro cases with Hong Kong's Rail + Property model. The key takeaway is that while land value uplift is consistent, governance fragmentation, approval delays, and unclear regulations significantly constrain LVC realization in India. Stakeholders emphasize that transparent valuation, early TOD integration, zoning flexibility, and last-mile connectivity are essential to unlock private investment and non-fare revenues. The main learning is that India must strengthen institutional capacity, streamline approvals, grant metro agencies greater development autonomy, and ensure reinvestment of captured value to achieve inclusive and financially resilient TOD and LVC outcomes.

Finally, Chapter 5 presents a roadmap to mainstream Land Value Creation and Capture (LVCC) as a core non-fare revenue stream for metro and regional rail, aligning innovative infrastructure funding and financing with the country's ambitious Viksit Bharat@2047 and Net Zero 2070 goals. The key recommendation is the "3-I Strategy" involving "Invest" (adopt successful Asian TOD-LVC models), "Integrate" (implement UMTA 2.0 with a Unified Metropolitan Transport Fund), and "Intensify" (activate station-area redevelopment through PPPs) as the three core proposed actions. The strategy demonstrates that creative station-area development can simultaneously boost ridership, revenues, private investment, and urban livability. The central learning is that various levels of the government must act to catalyze systemic change through model policies, funding conditionalities, land and zoning reforms, and investor confidence-building, enabling urban and regional public transit systems to become engines of sustainable urban growth.

This study shows that LVCC is indeed imperative for sustainable urban and regional transport infrastructure financing in India. First, LVCC enables sustained non-fare revenues, where affordable fares are a policy mandate and fare box income alone cannot ensure long-term financial sustainability. Second, LVCC de-risks rail projects and catalyzes private equity participation by embedding predictable, diversified revenue streams into project finances, improving creditworthiness and aligning with the central government's PPP and National Monetisation Pipeline objectives. Third, LVCC complements the National Land Monetization Corporation's mandate by unlocking value from transit-linked land and real estate through TOD and joint development, reducing reliance on borrowings while strengthening long-term revenue and asset productivity. Collectively, these reasons position LVCC as essential for financing inclusive, investment-grade, and sustainable urban and regional rail expansion projects across India.

The Urban Challenge Fund, announced by the Government of India, aims to catalyze a new generation of context-specific infrastructure projects by incentivizing cities and states to design solutions that respond to local spatial, economic, and environmental conditions, rather than relying on standardized schemes. To ensure long-term financial sustainability, these projects, particularly high-quality public transport projects (given the context of this study), must embed innovative Land Value Creation and Capture (LVCC) mechanisms that monetize land value uplifts generated by infrastructure investments, thereby creating justified, large, and recurring revenue streams that reduce dependence on budgetary support and crowd in private sector equity participation. Central government funding support should be explicitly linked to the identification and credible assessment of LVCC potential for projects capable of driving land value appreciation and local or regional economic development, while state and local governments must be mandated to establish the necessary institutional, legal, and operational frameworks to enable effective LVCC implementation. Accordingly, project appraisal under the Fund should go beyond cost-benefit analysis to rigorously evaluate innovative revenue models and private sector attraction potential as core criteria for funding eligibility.

The LVCC-related recommendations and the proposed 3-I strategy (Invest, Integrate, Intensify), while developed for metro and regional rail, are equally applicable to High-Speed Rail (HSR) projects in India. HSR stations have strong potential to anchor high-intensity, mixed-use TODs, generating substantial land value uplift that can be systematically captured to support HSR funding and long-term financial sustainability. Applying LVCC to HSR can thus transform stations into regional growth hubs while reducing fiscal burden and enhancing project viability.

Land Value Creation and Capture (LVCC) is central to making India's urban, regional, and high-speed rail systems financially sustainable while keeping fares affordable. By converting transit-led land value gains into long-term revenues, LVCC can reduce fiscal burdens, attract private investment, and strengthen project viability.

1. LAND VALUE CAPTURE FOR INDIA: HISTORICAL EVOLUTION AND CONTEMPORARY PRACTICES

Contents:

- Theoretical foundations of land value creation, uplift, and capture; fundamental roots to contemporary practices; India's policy journey; importance of land value creation and capture for India's ambitious urban and regional rail development program.
- Select LVC tools and their role in harnessing transport investment-led value uplift; select global cases (Hong Kong, London, Tokyo, and Seoul) that highlight the requirement of legal clarity, institutional reform, and integration of land use and transportation planning for effective land value creation and capture in the context of urban and regional rail development projects.

Key takeaways:

- Land value capture (LVC) represents the recovery of community-created value, transforming urban growth into a shared public asset.
- Transport investments can generate significant unearned land and property value increments and capturing them early becomes transformative.
- Transport investments offer opportunities to catalyze station area developments and local transit-oriented developments that can generate significant long-term revenues for infrastructure funding and financing, and to ultimately reorient cities around transit.
- India is at an inflection point, with policies moving decisively toward institutionalizing LVC.
- International successes demonstrate that aligning LVC with integrated land use and transport planning can unlock unprecedented financial, social, and environmental dividends for India.

Learnings for Indian planning and policymaking:

- Effective land value creation and capture require the integration of land use and transportation planning, supported by legal clarity and institutional reform, which international successes have shown can unlock unprecedented financial, social, and environmental dividends for India.
- LVC is imperative for India's urban and regional rail systems to ensure sustained non-fare revenues, as the policy priority of providing affordable fares limits fare box income streams, thereby requiring LVC-based revenue to strengthen financial sustainability and reduce dependence on subsidies.
- Real value creation from public infrastructure investment is not automatic and must be orchestrated by urban planners and designers through deliberate planning, policy, and legal changes/actions that facilitate and catalyze built environment change, especially through TOD and station area planning.

- For legitimacy and public acceptability, LVC implementation necessitates clear and evidence-based assessments of value creation to design taxes and charges that proportionately reflect benefits accrued to landowners.
- To support the formal articulation of LVC in national policy, continued efforts are essential to harmonize policies, build capacity at the metropolitan level, coordinate land use and transportation development, innovate land-based financing tools, and strengthen Unified Metropolitan Transport Authorities.

1.1 Why "capture" land value?

"It is not the fortunes which are earned, but those which are unearned, that it is for the public good to place under limitation." John Stuart Mill (1848)

While the utilitarian calculus seeks to maximize pleasure, some philosophers argue that pleasures derived from unearned and undeserved fortunes amount to unworthy pleasures.

The global interest in Land Value Capture (LVC) stems from the fiscal stress faced by cities worldwide. Public resources for critical goods, services, and systems are limited, even as urban demands continue to grow. Efforts to raise taxes and fees for infrastructure investments, aimed at meeting these demands, often encounter public opposition and are generally politically unpopular.

This fiscal pressure has therefore stimulated interest in new revenue sources to build, operate, and maintain public systems, including the creation of monetizable assets connected with a public infrastructure and the capture of land and property value increments generated, either by design or as an automatic byproduct, by public infrastructure. It has also necessitated private sector engagement in the design, financing, construction, and operation of critical public systems, whether independently or in partnership with government.

Both theory and empirical evidence suggest that LVC is efficient and can help develop and maintain urban infrastructure projects, including urban and regional rail, even under fiscal stress. It can also stimulate economic growth by mobilizing private sector investment in potentially profitable projects. Theory further suggests that value capture is efficient when beneficiaries of infrastructure contribute to its costs, thereby preventing the undervaluation of public goods. Economists argue that value capture can promote equity if part of the revenues is shared with all city users and directed toward reducing disadvantage, consistent with Rawlsian philosophy. Moreover, value capture can promote growth by reducing tax burdens in depressed regions.

1.2 Land value capture as an imperative for India

The concept of LVC, in the context of the present study, includes the following: 1) the capture of land and property value increments generated – either by deliberate planning, policy, and design interventions or as an automatic byproduct – by urban and regional rail development projects, usually within designated areas around stations and corridors along lines, commonly referred to as a transit-oriented development zones, and 2) the creation of monetizable assets such as mixed-use developments within, above or below, and around urban and regional rail stations and corridors and capturing revenue streams generated by such assets.

When the current and anticipated future proceeds from value capture revenues – sourced from both existing and planned mechanisms – are ring-fenced and earmarked for the development, operation, and upgrading of rail infrastructure that primarily generates such place-value increments and, in turn, revenues, the government can more easily mobilize funds and secure project finance debt for rail infrastructure development. Moreover, the government can more effectively attract private equity investment when value capture revenues are substantial, predictable, and enhance the profit potential for private investors. The key, therefore, is to implement institutional and policy reforms that can facilitate LVC in Indian cities, particularly in the context of critical capital-intensive infrastructure projects such as urban and regional rail systems.

There are three key reasons why LVC is imperative in the Indian urban and regional rail development context.

1) First, LVC can ensure sustained non-fare revenues amid fare affordability constraints. We know that urban and regional rail systems in India are mandated to provide affordable fares to ensure inclusive access. This, however, imposes limits on fare box revenue streams. Studies indicate that fare box revenues in most global systems, barring a few systems across Asian cities, cover only a portion of operating expenditure, with little scope for servicing capital investments. While existing and planned Indian metro and regional rail systems have the potential of generating large ridership volumes, affordable fares will continue to remain a policy priority, and, therefore, overall financial sustainability of the systems will depend on creative non-fare revenue sources. LVC provides a socially and politically acceptable and systematic method to harness the increase in land and property values generated by improved transit accessibility. Instruments such as additional land and property taxes and fees around station areas (along with the creation of intensive high-value development potential around station areas using planning, policy, and design-based interventions) and station-area commercialization projects can establish durable non-fare revenue streams. Embedding LVC in project business plans can enable rail corporations to strengthen financial sustainability, reduce dependence on subsidies, attract private investments, and achieve the broader policy goal of affordable, high-quality public transport.

2) Second, LVC is key to de-risking and catalyzing private equity participation in metro and regional rail projects, along with the central and state governments as shareholders. As we know, private equity and institutional investors seek diversified and predictable revenue streams to mitigate demand and policy risk. Rail projects reliant exclusively on fare revenues are exposed to such risk, reducing their attractiveness. Embedding LVC-based income streams into financial models of rail projects provides long-term revenue certainty/stability and improves project creditworthiness. Value capture financing should be a prerequisite for project appraisals and linked to the central government's project funding decisions given its role in ensuring financial sustainability. This de-risking effect of LVC can potentially attract private capital and ensure that urban and regional rail expansion is underpinned by financially resilient, investment-grade revenue frameworks. LVC is therefore aligned with the objectives of the National Monetisation Pipeline (NMP), which is designed to unlock private capital by granting revenue rights over public infrastructure while retaining government ownership. For metro and regional rail, fare box income alone rarely supports the long-term viability of Design–Build–Finance–Operate–Transfer (DBFOT) projects. Concession frameworks become financially robust when private entities are provided with development rights and monetization opportunities in and around stations and along corridors as part of the project package. Such rights, implemented through transit-oriented development, joint real-estate ventures, or commercial leasing of metro-adjacent land,

allow concessionaires to diversify revenues and stabilize cash flows. LVC, therefore, can enable urban rail projects to evolve into mobility-cum-urban-development platforms that are attractive to private investors.

3) And third, LVC effectively complements the National Land Monetization Corporation's (NLMC) objective of unlocking value from non-core assets such as land and real estate. By channeling the appreciation in land and property values arising from public infrastructure projects, LVC helps mobilize sustainable revenues, reducing reliance on borrowings, and secure low-cost long-term debt financing through enhanced creditworthiness. Increased development in and around urban and regional rail stations, undertaken through Joint Development (JD) models with private developers, offers a powerful mechanism for asset monetization. Such partnerships enable the creation of commercial, residential, and mixed-use spaces that enhance both footfall and long-term income streams. Further, Transit-Oriented Development (TOD) generates additional LVC opportunities by catalyzing compact, high-density developments around transit hubs. Increased revenues from taxation, user charges, and betterment levies feed back into the project. Together, these approaches strengthen the ecosystem of value capture, closely aligning with NLMC's goal of maximizing returns from land and real estate assets while promoting sustainable urban growth.

1.3 Mechanisms to unlock, create, and capture land value

Rapid urbanization is placing unprecedented demands on infrastructure development in India. Most developing countries, including India, struggle to balance between their high infrastructure investment needs with fiscal constraints that limit public capital spending. Indian cities face significant challenges regarding the cost recovery of major infrastructure investments and services, comparable with comparable geographic contexts (Hart, 2020).

As urban centers expand, up to 70% of residents lack access to one or more essential services. This context has brought renewed attention to the concept of Land value capture, i.e., LVC (Ahluwalia & Mohanty, 2014). This approach offers an array of government funding and public finance instruments and initiatives that enable communities to recover and reinvest land value increases resulting from public investments and other government actions (Germán & Bernstein, 2020). In contexts where fiscal constraints limit public investment capacity, the government can employ contemporary financial instruments to recuperate a portion of the additional expenditures incurred in infrastructure enhancement or expansion.

LVC mechanisms can serve as a catalyst for urban development by fostering economic growth, reducing spatial disparities, and addressing the adverse effects of unplanned urban sprawl. However, in the absence of effective institutional frameworks for capturing a share of the land value appreciation resulting from public investment, most of these financial benefits accrue to private landowners. This, in turn, restricts the government's capacity to finance further infrastructure projects. LVC offers a strategic solution to this challenge by directly linking infrastructure development with mechanisms for mobilizing public revenue (MoHUA, 2017).

1.3.1 Fundamental concepts and definitions

To better understand the framework and implementation of LVC, it is essential to first clarify the key terms and concepts associated with it. This section introduces foundational terminology

that forms the basis of LVC strategies in urban development. To clarify, "land" value creation and capture discussed in the following sections refer to both land and property, as relevant in each context.

A. Value creation

Land value creation in the present context is the process through which the value of land/real estate increases because of public infrastructure investments, regulatory changes, and broader economic or demographic trends, rather than direct investment by individual land or property owners. This rise in value stems from improvements such as new infrastructure development/ upgrades along with strategic investments in enhanced amenities and modifications in zoning and development rights. These changes make the land/real estate more desirable or productive, thereby increasing its market value, and spurring development activity (World Bank, 2022; MoHUA, 2017).

New infrastructure investments including metro and regional rail investments can potentially increase the latent demand for acquisition of land/real-estate within a certain impact area (e.g., areas around stations that benefit from accessibility increases as a result of a rail system development) by potential developers/buyers/tenants, but real value can be created (i.e., the willingness to pay for land/real-estate can be increased, and intensive, high-value development activities can actually happen) only in the presence of deliberate planning, policy, and legal changes/actions that can facilitate and catalyze built environment change. In other words, infrastructure investment related value creation is not automatic (particularly when built environment transformations are difficult owing to individual or government/legal hurdles) and therefore must be orchestrated by urban planners and designers. The following Exhibit 1 gives some examples of value creation mechanisms.

Exhibit 1: Value creation mechanisms

PLANNING INTERVENTIONS

- **Transit-oriented development (TOD):** Encourage compact, mixed-use, high-density development around stations to maximize accessibility and land use efficiency.
- **Zoning reforms:** Permit higher Floor Space Index (FSI) or Floor Area Ratio (FAR) near stations, with flexibility for mixed commercial, residential, and institutional uses.
- **Public realm improvements:** Invest in pedestrian infrastructure, last-mile connectivity, green spaces, and amenities to enhance desirability and increase land values.
- **Integrated land use and transport planning:** Align metro expansion with city master plans, economic nodes, and housing policies to create synergies.

POLICY INTERVENTIONS

- **Joint development and PPPs:** Introduce joint development frameworks in and around stations to reduce development costs; Enable co-development of real estate and commercial spaces on metro land or adjacent parcels.
- **Affordable housing mandates:** Ensure inclusive development while still creating value uplift by reserving a share of higher FAR for social housing.
- **Incentives and disincentives:** Offer tax breaks or density bonuses for desired development, while discouraging speculative land banking.

LEGAL INTERVENTIONS

- **Clear property rights and land titling:** Ensure transparent and efficient land ownership records to reduce disputes and speed up redevelopment.
- **Amendments to planning and municipal laws:** Provide statutory backing for TOD zones, higher FSI near rail corridors, and compulsory land pooling/assembly.
- **Eminent domain and land pooling frameworks:** Legally enable consolidation of fragmented parcels for integrated development around stations.
- **Revenue earmarking laws:** Mandate that a portion of captured land value uplift is reinvested in metro financing and area-level improvements, thereby attracting developers and long-term tenants further.

Land value creation implies an increase in the overall value (reflected in the market value) of land/real estate in the infrastructure impact zone. Building on this understanding, land value capture (LVC) is an approach designed to equitably recover a portion of this publicly generated increase in land value. Given that public interventions are the primary drivers of such appreciation, it is both fair and economically efficient for the public sector to reclaim part of this value. The reclaimed funds can then be used to finance further infrastructure and essential public services. In this way, LVC ensures that beneficiaries of public investments contribute back to the system that enabled their gain (Goytia & Cristini, 2019).

Regulatory interventions play a significant role in promoting development activity and boosting land/real-estate value. Changes in zoning laws, increases in the Floor Area Ratios, and the allocation of additional development rights, expand the buildable potential of land. This regulatory flexibility increases the revenue generating capacity of land/real estate, which in turn drives up its latent value, leading to increased potential of development activities and the appreciation in real market value. Furthermore, broader economic growth and the rising demand for urban land/buildings due to population growth and commercial expansion intensifies competition, leading to increased land/real-estate prices. The provision of public amenities including parks, schools, healthcare services, and safety infrastructure also makes land/real estate more attractive, further contributing to value appreciation (Suzuki et al., 2015).

Real-world examples clearly demonstrate the impact of land value creation. In Indian cities such as Delhi and Bangalore, properties located near metro stations or new road corridors have seen significant increases in prices due to improved connectivity and accessibility. The development of the Delhi Metro, for example, led to sharp increases in adjacent land/real-estate prices, illustrating how transit infrastructure influences development markets (Li & Love, 2022). Similarly, in Mumbai, the rezoning of certain areas to allow higher-density commercial development has resulted in substantial increases in land/real-estate values. The Bandra-Kurla Complex is one such area where regulatory changes have significantly boosted prices (MoHUA, 2017).

Understanding and accurately measuring infrastructure-linked land value creation is critical not only for establishing a robust financial foundation for LVC but also for promoting principles of equity and transparency in its implementation. Clear and evidence-based assessments of value creation enable policymakers to design taxes and charges that proportionately reflect the benefits accrued to landowners or developers owing to infrastructure investments. To make this possible, governments must set up reliable systems that use tools such as satellite imaging and market data. These tools help track how much value has been added due to public actions so that charges can be applied in a fair and balanced way. This approach mitigates the risk of arbitrary taxation and enhances the legitimacy and public acceptability of LVC mechanisms, thereby strengthening institutional and societal support for such initiatives.

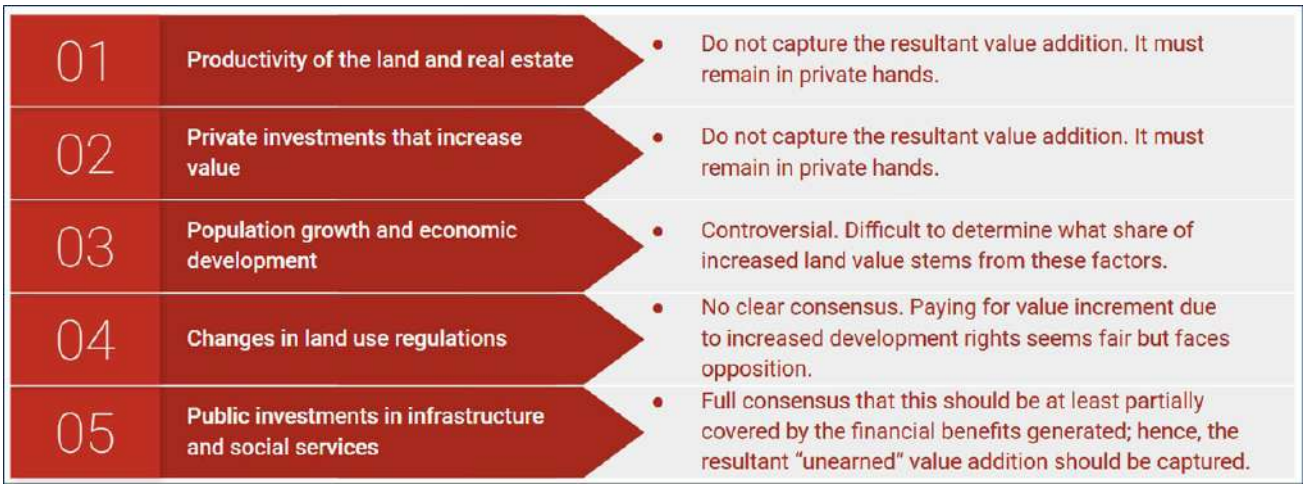
B. Value capture

The quote, “LVC is not about taxing landowners; it’s about recovering what the community creates, not what the individual earns,” effectively captures Henry George’s perspective on LVC. He argued that the value of land arises primarily from collective societal activities and public investments, rather than the efforts of individual landowners. Therefore, at least a part of the “unearned increment” in land value, accruing due to societal/public efforts and investments, should be returned to the community through taxation, rather than remaining fully with the landowner (George, 1879).

LVC is a public funding/financing strategy that enables governments to selectively recoup the increase in land/real-estate value resulting from public infrastructure investments. LVC, therefore, can be considered as a redistributive mechanism where the unearned benefit of development accrued to landowners are shared with the local community and city/region at large (World Bank, 2022).

The following Exhibit 2 illustrates which part of value increment in land/real estate should be captures via LVC type mechanisms/tools from the efficiency and equity perspectives.

Exhibit 2: Determinants of value increment and rationale for capture



Interestingly, land value capture is not mainstream, but land acquisition compensation is the norm. This asymmetry between takings and givings (i.e., wipeouts versus windfalls) reflects a longstanding concern with protecting private property rights against state power. Most constitutions prohibit the government from taking land or taking any actions that diminish its value without providing just compensation. Yet they remain silent on the converse situation, where government actions generate unearned benefits for private owners without requiring reimbursement of the costs of infrastructure provision. While the prohibition on uncompensated takings discourages the state from acquiring more land than is needed for public purposes, there is no corresponding policy to ensure the recovery of the public's "unearned benefit."

Land value capture (recovery) mechanism design is difficult. When property is taken for public use, the costs are borne by a few while the benefits are shared by many, and the cost-bearers are compensated at the market value of the property taken. In contrast, when infrastructure is provided, the beneficiaries are numerous and widely dispersed, making it expensive to design a system that fully recovers the value of the benefits they enjoy. A more feasible and equitable approach may be to charge a relatively small number of clear beneficiaries who experience substantial "unearned" gains in property value. Yet mechanisms tied to individual land/real-estate values can create distortions: just as owners of potentially affected land may overinvest to maximize compensation, owners of potentially benefited land/real estate may underinvest in improvements to minimize their payment. This raises the question of whether an ad valorem land or property tax is inefficient.

Although it is well accepted that the "betterment value" or the value added to land/real estate specifically due to the infrastructure investment under consideration should be captured, how the captured value is to be used remains a matter of debate, which complicates LVC policy

further. Historically, both Britain and France adopted policies to tax the betterment arising from development opportunities, requiring developers to contribute toward the cost of infrastructure that supports or enhances their projects (e.g., Britain's Community Infrastructure Levy and France's Local Infrastructure Tax). The rationale is straightforward: developers should contribute to the infrastructure their projects depend on or benefit from, to recoup the "unearned" gains they derive from public investment, and to offset the broader impacts their developments impose on the surrounding environment.

The philosophical debate about how the captured "betterment value" should be used remains. A Rawlsian theory of urban justice suggests that the benefits of urban land ownership, including profits, should not accrue solely to landowners but should flow to all city users. Moreover, these benefits ought to be deployed to redress disadvantage, since that is the arrangement individuals would choose from the "original position," behind a "veil of ignorance." From a Pigouvian perspective, developers should be required to offset the negative externalities of their projects, particularly the additional demands placed on local infrastructure and public services. This ensures that private gain does not come at the expense of collective well-being. The "user pays" principle supports the collection of betterment value as a hypothecated tax. Such revenue is earmarked for reinvestment in the same locality, ensuring that users and beneficiaries of new infrastructure directly contribute to its costs. Betterment taxation, in fact, can be seen in two complementary ways: as a source of public finance to fund urban infrastructure, and as a mechanism of wealth redistribution that captures the "unearned increment" in land and property values for broader societal benefit.

1.3.2 Theoretical foundations of Land Value Capture

Land value theories provide the conceptual foundation for understanding how land gains and increases in value, especially in urban contexts shaped by infrastructure investments and regulatory frameworks. The theory of LVC is rooted in classical economic thought, particularly the works of David Ricardo and Henry George. They emphasized that land value is influenced not only by its inherent characteristics and location but also by societal progress and public investments. At the core of LVC is the principle that a portion of the increase in land value – referred to as the unearned increment – resulting from public actions should be recaptured and reinvested for public benefit. This is often justified through the "beneficiary pays" principle, where those who benefit from infrastructure improvements contribute to their costs (Suzuki et al., 2015).

LVC operates on the principle that public actions should yield public benefits. It involves three key stages (Suzuki et al., 2015):

1) Value creation through public investments or regulatory changes that raise land values;
2) Value recovery by capturing a portion of this increase; and
3) Value distribution through reinvestment in public goods.

This approach supports local economic development by leveraging land value appreciation to finance infrastructure, raise tax revenues, and address social priorities such as affordable housing and inclusive urban services. In doing so, LVC offers alternative financing mechanisms to local governments, especially amidst tightening fiscal conditions, enabling cost-sharing with private stakeholders and fostering mutually beneficial outcomes (Blanco et al., 2016).

A central concept within LVC theory is transit-induced land capitalization. Investments in urban transport systems, particularly metro and rail networks, significantly enhance the accessibility

of nearby areas, increasing their desirability and land value. As people and businesses cluster around transit hubs, land demand and prices rise. Transit-oriented development (TOD) can amplify these gains by integrating land use and transport planning, transforming these areas into high-value urban zones (Asian Development Bank, 2022).

Another important theoretical foundation of LVC is the idea of agglomeration benefits. These refer to productivity gains that emerge when people, firms, and services are concentrated in dense urban environments. Effective transport systems support such clustering by improving connectivity and reducing travel time, thereby raising productivity and land values near transport nodes (OECD, 2022). Although less directly measurable, agglomeration effects significantly contribute to the rising land value in accessible urban areas.

LVC tools focus on capturing the unearned increment in land value rather than imposing conventional taxes, thus reducing the financial burden on public budgets while improving equity and urban development efficiency (OECD, 2022). When implemented alongside transparent governance and sound planning, LVC ensures that the benefits of public investments are broadly distributed rather than accruing solely to private developers. This helps promote social equity, sustainable growth, and a more balanced distribution of wealth in urban areas (World Bank, 2019).

Importantly, LVC theory is not merely academic but presents a practical and increasingly necessary solution for financing urban infrastructure in rapidly urbanizing countries like India. Traditional revenue sources such as user fees, property taxes, and intergovernmental transfers are often inadequate to meet the growing demand for infrastructure. For example, Indian metro systems operate under significant subsidies, with fare structures kept low for affordability. However, these fares often fail to recover operational costs, let alone capital investments. In this context, LVC offers a strategic financing option by allowing governments and planning authorities to capture a share of the land value appreciation resulting from public investments. By doing so, LVC can bridge infrastructure funding gaps, reduce reliance on debt or external aid, and promote compact, accessible, and transit-oriented urban growth (NCRTC, 2023).

1.4 LVC instruments: Forms, functions, and applications

To effectively implement LVC, a range of instruments have been developed that enable governments to harness the increase in land values resulting from public investments and regulatory interventions. These instruments vary in form and function – from direct tools like betterment levies and development charges to more market-driven mechanisms such as land readjustment, joint development, and transferable development rights. The choice and success of these tools often depend on legal frameworks, institutional capacity, and local market conditions.

This section explores the key LVC instruments that are most relevant for the Indian context and specifically in connection with urban and regional rail development projects, highlighting their design, operational mechanisms, and potential for real-world applications.

1.4.1 Land value tax

In land value tax, landowners are required to pay taxes based on the assessed value of the land they own, rather than on the value of any structures or improvements on the land (NIUA, 2025(a)). It is widely regarded as an efficient value capture tool, as it not only captures value

increments but also helps stabilize property prices, discourage speculative investments and promote equitable urban development. States like Maharashtra and Tamil Nadu have further strengthened its impact by extending its application to urban land through specific legislation (MoHUA, 2017). For example, under the Tamil Nadu Urban Land Tax Act of 1966, all urban land in cities such as Chennai, Madurai and Coimbatore are assessed to an urban land tax at a flat rate of 0.4% on the market value of each urban land (NIUA, 2020).

1.4.2 Vacant land tax

It is a tax imposed on landowners who leave their land undeveloped or idle, especially in urban areas. It is used to discourage land hoarding and promote efficient land use (MoHUA, 2017). For example, the Greater Hyderabad Municipal Corporation imposes a tax of 0.5% of the land's registration value on vacant plots that are not used for agriculture or do not have any buildings constructed on them (NIUA, 2025 (b)).

1.4.3 Property tax

Municipalities collect taxes on land and buildings annually. These taxes can be adjusted to reflect rising land/real-estate values due to public investments. Revisions in property tax rates or improved collection systems allow local governments to capture a portion of the land value appreciation (OECD, 2022). In cities like Bengaluru and Pune, efforts have been made to link property tax assessments with market rates, thereby enhancing the scope of LVC (Vyas et al., 2020).

1.4.4 Additional stamp duty/surcharge

Additional stamp duty/surcharge is an LVC instrument involving a supplementary charge on property transactions – such as buying, selling, or leasing – through an added or increased stamp duty rate. It is triggered at the time of transaction and does not directly affect existing property owners. The Brihanmumbai Municipal Corporation stamp-duty surcharge in Mumbai is a significant example of an LVC-style levy, specifically designed to fund transportation infrastructure projects. It is a dedicated 1% additional stamp duty on property transactions. This levy is used to fund projects like the metro rail, monorail, freeways, and sea-link projects in Mumbai (MoHUA, 2017).

1.4.5 Betterment levy

Betterment levies are charges imposed on property owners who benefit from an increase in land value due to public infrastructure or planning decisions. This levy ensures that a share of the "betterment" or value gain is returned to the public authority that created it. Cities like Mumbai, Bengaluru, Ahmedabad, Pune, and Hyderabad have applied betterment levies. In 2022, CIDCO charged landowners with 0.05% of their land value for the NAINA project (Pednekar et. al, 2024). Similarly, PCMC used betterment levies to fund riverfront development by charging landowners benefiting from the project, ensuring cost-sharing for public improvements (MoHUA, 2017).

1.4.6 Development charges or impact fees

Development charges or impact fees are one-time payments collected from developers or property owners to cover the cost of new or expanded infrastructure needed due to new

development. Development charges are widely used across states like Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu, and Madhya Pradesh, collected upfront during development approvals. For instance, under Gujarat Regularization of Unauthorized Development (GRUDA) Act, 2022, Ahmedabad Municipal Corporation levies an impact fee of ₹2/sq.m. for residential and ₹4/sq.m. for commercial buildings to regularize unauthorized constructions (MoHUA, 2017).

1.4.7 Transfer of Development Rights (TDR)

TDR is a land-based tool that allows landowners to transfer unused development potential from one parcel (usually reserved for public purpose or conservation) to another parcel in a designated receiving zone. This tool helps preserve land while enabling higher density development elsewhere, ensuring balanced urban growth. TDR is actively used in cities like Mumbai, Hyderabad, and Ahmedabad to manage urban growth (MoHUA, 2017). In Ahmedabad, TDR is granted to landowners or developers in exchange for land or development restrictions in areas marked for public purposes. These rights can then be used or sold for additional construction in designated receiving zones. TDR in Ahmedabad is currently being used for slum rehabilitation, heritage conservation, and public housing redevelopment projects (Sharma & Patel, 2025).

1.4.8 Floor Area Ratio (FAR) or Floor Space Index (FSI)

FAR or FSI is the ratio of a building's total floor area to the size of the plot it is built on, regulating how much construction is allowed. It is a value creation as well as capture method where developers pay a premium fee to receive an additional FAR/FSI beyond the standard limit allowed by planning regulations, enabling them to build more floor space on the same plot of land. States like Maharashtra, Karnataka, Gujarat and Tamil Nadu allow developers to buy extra FAR/FSI by paying a premium fee (MoHUA, 2017).

1.4.9 Air rights sale

Air rights sale involves selling the unused development potential (typically in terms of height or floor area) above a property to another developer or entity. It allows cities to capture land value by monetizing vertical space, often used to fund infrastructure. In metro rail projects, there is potential to generate revenue by allowing private developers to build above stations and tracks. Since metro authorities typically own the land, they also control the air space above it, within legal limits, considering building byelaws and development control regulations. In countries like the US, this air space is often used for commercial and residential developments such as offices, shops, apartments, parking, or recreational spaces. Leasing or selling these air rights has proven to be a significant income source for metro agencies and is already practiced in countries like Canada, France, India, the Philippines, and the US (Asian Development Bank, 2022).

1.4.10 Land acquisition and development

It is a value capture method where the government acquires land, provides infrastructure improvements, and then uses the increased land value to recover costs and make profits either by selling the developed land or entering joint development projects with private developers. It helps fund urban growth and infrastructure projects. In the context of Indian metro or regional rail projects, planned land acquisition and systematic development around stations and along corridors by the metro agency in association of relevant government stakeholders can help create high value real estate due to improved accessibility and connectivity. By integrating

transit-oriented development (TOD), commercial complexes, and mixed-use projects, metro agencies can directly create value through higher density, premium amenities, and more organized land use. This justifies the implementation of land value capture (LVC) mechanisms such as lease premiums, betterment charges, or joint development, that can generate revenue to partly fund/finance the rail infrastructure.

1.4.11 Land pooling

It is a land assembly method where landowners voluntarily contribute their land into a common pool, which is then developed with infrastructure. After development a portion of the reconstituted and serviced land is returned to the original owners in proportion to their contribution. States like Gujarat, Haryana and Andhra Pradesh have used land pooling system where landowners pool their land for development and after infrastructure is built, they receive a smaller serviced plot. For example, Andhra Pradesh used land pooling to develop its capital city Amaravati (MoHUA, 2017). Land pooling can serve as an effective value creation and capture tool for metro and regional rail projects in India by enabling high-density developments around stations and along corridors without the high costs and social resistance often linked to compulsory land acquisition. Under this approach, landowners may contribute their land parcels into a common pool for enabling transit-adjacent mixed-use development projects, while a smaller but more valuable portion may be returned to owners for their residential or commercial use. This way, the metro agency or state/urban authority or other stakeholders of the rail project can effectively monetize transit-adjacent land through lease, sale, or joint development, ensuring that part of the land value appreciation generated by improved connectivity directly supports rail funding/financing.

The Magarpatta Township in Pune illustrates an inclusive model, where farmers pooled land, became shareholders, and directly captured the increase in land value generated by urban development. Instead of displacement, landowners benefited as long-term stakeholders in a mixed-use township, demonstrating community-led value capture under favorable local and market conditions (Chatterjee, 2008).

1.4.12 Land disposal and leasing

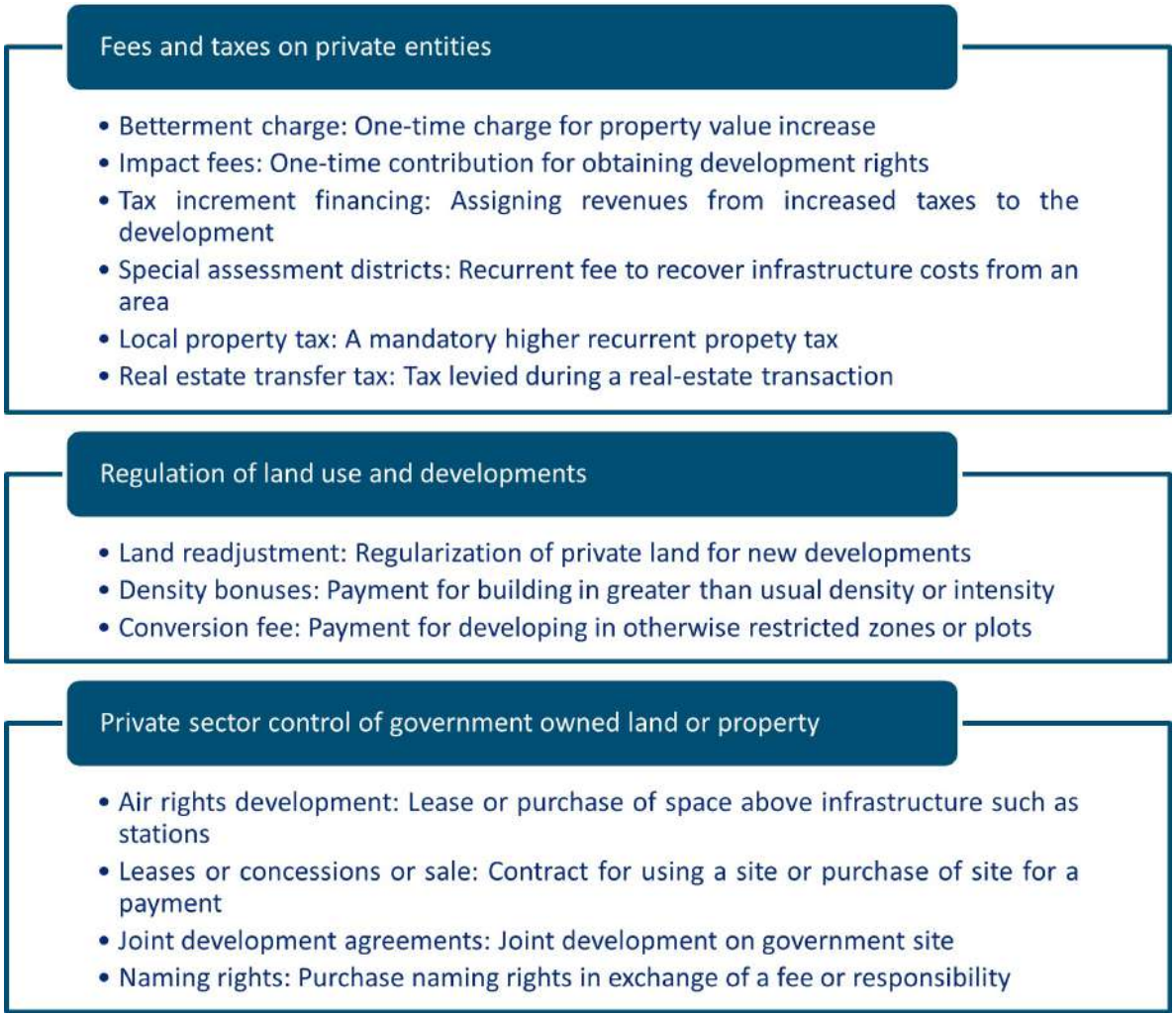
Government agencies lease or sell developed land to capture value gains. The Delhi Metro Rail Corporation leases out spaces at its stations. After the land transfers are obtained from multiple government agencies, DMRC usually invites shortlisted bidders to make concession agreements with successful tenders for the development rights. Most residential development projects on depots and standalone plots with long-term leases generate substantial upfront payments, and commercial properties within station buildings with short-term leases and on large plots outside stations with medium-term leases produce recurrent revenue streams (MoHUA, 2017).

1.4.13 Tax Increment Financing (TIF)

TIF aims to capture, and leverage estimated future revenues from incremental increases in collection of property (or other) taxes within a geographically specified area of redevelopment, a “TIF district.” It is popular in many developed countries. It is useful to finance new investments in existing habitations. Some of the smart city proposals have planned for TIF in their area-based developments (Suzuki et al, 2015).

While the abovementioned LVC instruments are most suited for the Indian context, the following Exhibit 3 summarizes a wide range of mechanisms for quick reference.

Exhibit 3: A summary of LVC instruments



Source:GIZ, NITI Aayog, ASCI[1]

1.5 Land Value Capture in India: Policy evolution and persistent challenges

This section traces the evolution of land acquisition practices in India, from colonial-era policies to contemporary reforms. It highlights how the shift from compulsory to more participatory acquisition opened space for alternative land assembly and revenue generation, l^eading to land value-based financing mechanisms for infrastructure development. The discussion then moves to the formal adoption of Value Capture Financing (VCF) and Transit-Oriented Development (TOD) in national policies from 2017 onward, linking land use and transport planning.

India's modern land acquisition practices trace back to British colonial rule. In the 18th century, the East India Company began acquiring land for commercial and administrative purposes. A major milestone was the Permanent Settlement of 1793, which formalized property rights and gave colonial authorities strong control over land (Bhattacharya, 2020). This laid the foundation

1. GIZ, NITI Aayog, ASCI. (2021). Land Value Capture - Towards Planning and Financing Equitable Cities in India. Workshop Proceedings. Retrieved from https://www.niti.gov.in/sites/default/files/2022-04/LVC&S_Workshop_Proceedings_25042022.pdf.

for the Land Acquisition Act (LAA) of 1894, which legally empowered the government to acquire land for projects deemed in the "public interest." However, in practice, it often prioritized state and private interests over traditional land rights and community needs (Cho et al., 2022).

Post-independence, despite efforts at land redistribution, the 1894 Act remained in use, enabling large-scale projects such as dams and highways that frequently displaced communities with inadequate compensation. Even with economic liberalization and the rise of Public-Private Partnerships (PPPs), the same acquisition model continued, increasingly blurring the lines between public benefit and private profit (Hoda, 2018).

By the early 2010s, growing public resistance to inequitable land acquisition led to major legislative reform. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (LARR), enacted in 2013, replaced the outdated LAA. It introduced social impact assessments, mandated consent from landowners, and aimed to ensure fair compensation and proper rehabilitation (Hoda, 2018). However, the new law also made land acquisition more complex and time-consuming, prompting governments to explore alternative, voluntary land assembly methods such as land pooling and joint development. These shifts laid the groundwork for adopting LVC strategies.

A major turning point came with the National Metro Rail Policy, 2017, which formally integrated land-based financing mechanisms into urban infrastructure planning. The policy promotes metro systems that are sustainable, financially viable, and closely tied to broader urban planning. A key feature is the emphasis on Value Capture Financing (VCF) and Transit-Oriented Development (TOD), requiring states to develop a Comprehensive Mobility Plan and establish a Unified Metropolitan Transport Authority. It encourages funding models such as PPPs, equity sharing, and viability gap funding—all of which demand mechanisms to recover public investments. The policy also mandates supporting infrastructure for last-mile connectivity and non-motorized transport, strengthening the link between land use and transit (NCRTC, 2024).

Complementing this, the National TOD Policy (2017) offers a detailed framework for compact, mixed-use development around transit nodes. It encourages densification near metro corridors while mandating the inclusion of affordable housing to prevent gentrification and displacement. By enabling land value appreciation near transit hubs, TOD creates clear potential for value capture. The policy explicitly ties the financial sustainability of metro projects to revenues generated from increased land values in TOD zones and promotes the use of tools such as betterment levies and joint development. Together, the Metro Rail and TOD policies institutionalize LVC as a strategic approach to financing urban transport while addressing long-standing issues related to forced acquisition and exclusion from development benefits (NCRTC, 2024).

To support these efforts, the MoUD released the Value Capture Finance Policy Framework in 2017. This framework urges States, ULBs, and Central agencies to incorporate VCF early in project planning, feasibility studies, and policy formulation. Its objective is to ensure that public investments lead to shared and sustainable outcomes. The framework focuses on capturing private land value appreciation and excludes monetization of public land assets (NIUA, 2020). The MoUD also committed to assisting states and ULBs in effectively implementing these tools.

While the formal articulation of LVC in policy is recent, its principles have been applied in India for decades. The Hyderabad Municipal Corporation Act of 1955 and the MMRDA Act of 1974 authorized the use of betterment charges. In the 2000s, Hyderabad's Outer Ring Road project introduced impact fees and development deferment charges. States like Gujarat and Haryana institutionalized land pooling through town planning schemes, which not only helped assemble

land and generate revenues from their development but also funded infrastructure using betterment levies (MoHUA, 2017).

The policy shifts mentioned in this section have helped move toward mainstreaming land value capture, particularly for metro and regional rail projects, by enabling them to generate land-based revenues from value increments and to develop stations and station areas through joint development with private partners. Such mechanisms have the promise to enhance the financial sustainability of rail systems by diversifying funding and financing sources. Yet, significant challenges remain, and realizing the full potential of LVC will require continued institutional innovation and effective on-ground implementation.

1.6 Land value uplift from transport investments

In many parts of the world, public transport systems do more than simply move people from one place to another. They also reshape how land is valued and used in expanding cities. Land rent theory helps explain this dynamic by showing that the worth of land is closely tied to its accessibility. When transport improves travel speed and access to jobs and services, land near these routes becomes more attractive and valuable. This process reshapes perceptions of land and redistributes value across different parts of the city (Mulley, 2024).

Urban (metro) and regional rail systems significantly improve city-wide accessibility and mobility, often resulting in substantial increases in land value. However, this uplift does not occur automatically. To fully realize these benefits, cities must engage in integrated planning, i.e., aligning land use with transport investments. Tools like station area planning and transit-oriented development (TOD) enable the creation of dense, mixed-use, walkable communities around transit nodes. When such development is strategically planned and supported by financial tools, cities can capture land value gains to help fund the infrastructure that created them.

Instruments like betterment levies, land pooling, and joint development convert land value appreciation into public revenue, supporting more sustainable infrastructure financing and promoting compact, accessible, and inclusive urban growth (Peterson, 2009). These increases in value, often called “windfall gains,” benefit property owners due to public investments rather than personal efforts. LVC mechanisms aim to redirect a share of these unearned gains back to the public sector to finance infrastructure and services.

For successful implementation, LVC requires clear legal frameworks, transparent governance, and inclusive stakeholder participation. It must also be aligned with broader planning goals, including housing affordability, environmental sustainability, and economic development (OECD, 2022).

The extent and distribution of land value increases vary significantly depending on several factors: the type of transport mode (with heavy rail generating the greatest uplift), the quality of infrastructure (dedicated vs. mixed-traffic corridors), and proximity to major urban centers like central business districts (OECD, 2022).

Cities can strengthen value capture outcomes by using a diverse mix of instruments, including the sale of development rights, property tax adjustments, and strategic asset management. These tools help mitigate financial risks and provide multiple revenue streams to support major infrastructure projects (OECD, 2022).

Globally, value capture is being used in cities such as Hong Kong, London, Tokyo, and Seoul. Hong Kong's MTR Corporation applies the "Rail + Property" model, partnering with developers to build near stations and using profits to fund transit. London's Crossrail combined development charges, business taxes, and the sale of air rights. Tokyo and Seoul have used land readjustment and upzoning near transit corridors to finance projects while involving local communities (OECD, 2022).

In conclusion, metro and regional rail systems have the potential to generate significant land value gains, but realizing these benefits requires deliberate planning and the use of well-designed LVC instruments. By channeling windfall gains into public revenues, cities can not only finance infrastructure more sustainably but also promote compact, accessible, and equitable urban growth. Global experiences show what is possible, yet the effectiveness of LVC ultimately hinges on strong institutions, transparent processes, and integration with broader urban development goals.

1.7 Summary

Transportation infrastructure plays a pivotal role in shaping urban form and driving land value appreciation. As accessibility improves, particularly through investments in high-quality, high-capacity systems like metro and regional rail, surrounding land becomes more desirable, leading to significant increases in potential land and property values that can be tapped for funding and financing the rail systems through the taxation of private benefits and the catalysis of intense development activity along with the extraction of fair revenues/taxes from them. India's experience with LVC reflects its broader history with land, from colonial control to development-led acquisition to the current market-based approach. As cities grow and the need for infrastructure increases, LVC can be a powerful tool to raise funds fairly and sustainably. By capturing the unearned increment in land and property values generated by public actions, LVC not only creates a sustainable revenue source but also promotes compact, transit-oriented, and inclusive urban growth. In this context, India's recent policy initiatives, such as the Ministry of Urban Development's Value Capture Finance Policy, represent important steps toward institutionalizing LVC. These continued efforts to harmonize policies, build capacity at Urban Local Bodies, and innovate land-based financing tools are essential to unlock the full potential of LVC as a mechanism for addressing infrastructure deficits and spatial inequalities in Indian cities.

2. REVIEW OF LAND VALUE CAPTURE IN PRACTICE: FRAMEWORKS, APPLICATIONS, AND GLOBAL INSIGHTS

Contents:

- India's evolving policy and institutional frameworks; sector-specific applications across roads, airports, metro and regional rail systems, and Indian Railways.
- Key Indian case studies and global best practices; lessons for integrating LVC into sustainable urban infrastructure development.

Key takeaways:

- Sector-focused application of LVC, especially in urban/regional rail and airport-linked projects maximizes both revenue generation and urban transformation.
- India has already started experimenting with innovative LVC approaches in the transportation infrastructure development sector, across modes; preliminary LVC initiatives have been successful, demonstrating the promise of LVC in project finance.
- Legal and regulatory clarity on LVC instruments is critical.
- Global best practices show that early integration, strong governance, and effective reinvestment of captured value foster long-term trust and stability.
- Adapting international models to India's governance and market realities can unlock equitable growth and sustainable infrastructure financing.

Learnings for Indian planning and policymaking:

- India should establish an integrated LVC policy framework with legal clarity, empowered institutions, transparent administration, and special-purpose agencies for cross-departmental coordination and timely project delivery.
- States must adopt national LVC guidelines and explicitly define the legal validity of instruments such as premium FSI, impact fees, development rights charges, and other value capture instruments in TOD zones.
- TOD policies in India need to move beyond FAR-driven densification to holistic urban design that fosters accessibility, mixed land use, and placemaking, consistent with the National TOD Policy.
- Policymakers should deploy PPP-based LVC mechanisms, including joint development, long-term leases, and auctioning of development rights, to attract private capital and boost non-fare revenues for transport systems.
- LVC must be positioned as a tool for inclusive urban growth, with revenues reinvested beyond just the infrastructure project under consideration to affordable housing, last-mile connectivity, and public amenities, aligning with sustainable city development goals.

2.1 Land value capture policy and practice in India

For cities to grow sustainably and equitably, the efficient use of land for urban infrastructure development is essential to support both urbanization and economic growth. Land is a state subject; the national government cannot directly make provisions regarding it. Traditionally, urban planning in India has relied heavily on the compulsory public acquisition of land under the LAA of 1894 (Morris & Pandey, 2010). This Act was later replaced by the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013, which regulates land acquisition and lays down procedures and rules for granting compensation, rehabilitation, and resettlement to affected persons (Mishra, 2014). A major drawback of the 1894 Act was the absence of provisions for conducting a social impact assessment, a gap that was addressed in the 2013 Act.

However, relying only on compulsory land acquisition is no longer enough to meet the complex needs of modern cities. As Indian cities continue to expand and invest in public transport systems, there is a growing need for planning approaches that make better use of land and infrastructure. Transit-oriented development or TOD is one such approach (Asian Development Bank, 2022). It focuses on creating compact, walkable, and mixed-use neighborhoods around public transport hubs. Rather than serving transport needs alone this approach plays a role in guiding how urban land is arranged and used. By encouraging higher density and better-connected forms of development near transit locations it helps shape more balanced and functional urban growth. These spatial shifts tend to attract people, services and investment creating conditions for improved land use and activity. As these areas become more active and well linked, they often experience a gradual increase in land worth. This rise known as land value creation, often facilitated further though specific place-based planning, policy and design interventions, reflects how public investment adds to the usefulness and appeal of the surrounding area. However, in the absence of a structured mechanism to channel these gains, the value appreciation often accrues primarily to private landowners, making it difficult for public authorities to mobilize resources for broader urban development goals (Mulley, 2024).

To support TOD and other large infrastructure projects, cities also need effective ways to finance development. LVC supports this objective by allowing public agencies to recover part of the value generated through public investment. In India, various policies and pilot efforts have introduced elements of both LVC and TOD. However, implementation continues to face barriers related to regulatory clarity, institutional readiness and coordination among urban authorities (Hart, 2020).

This chapter reviews the policy landscape and practice of LVC in India and identifies opportunities to strengthen its role in urban development.

TOD and LVC are recognized as important approaches for sustainable urban growth and for financing public transport. Cities worldwide are integrating transit and land use planning through innovative funding methods. LVC instruments, applied in both public and private forms, are helping to fund transport projects and add value within TODs (Sharma & Newman, 2018). In India, Bengaluru is considering LVC mechanisms to meet the costs of metro expansion (Dhindaw et al., 2021). Indian TOD policies generally focus on increasing densification and permitting higher FAR, but often lack provisions for employment densities, multimodal integration, and smart technologies (Kapoor & Brar, 2022). Effective implementation of TOD and LVC requires a comprehensive approach that integrates financial, political, and social capital (Sharma & Newman, 2018).

2.2 Mapping the existing policy and institutional framework

In India, land is a state subject, and as a result, different states have adopted various LVC mechanisms to finance urban infrastructure while minimizing compulsory land acquisition for revenue-generating activity development (Hart, 2020). The concept of LVC dates to the 19th century with the introduction of betterment levies. Early efforts such as the Bombay Town Planning Act of 1915 and the Madras Town Planning Scheme of 1920 laid the foundation for mechanisms like the Town Planning Schemes (TPS). After independence, the focus shifted to public land ownership, and cities like Chandigarh and Navi Mumbai were developed using this model, wherein governments acquired land at low cost and later benefited from its increased value. Institutions like the Delhi Development Authority (DDA) followed similar approaches.

Some of the most promising examples of LVC in practice are TPS models in Gujarat, and more recently in Navi Mumbai and Pune. These initiatives seek to harness the rise in land values that follows public infrastructure development. Their impact is often confined to cost recovery rather than capturing the full spectrum of benefits generated. A continuing difficulty arises from the intricate and frequently disputed methods of land valuation.

The National Urban Transport Policy (2014) promotes high-capacity public transport and encourages user-based cost recovery. It supports the use of funding tools such as fuel taxes and betterment levies, and proposes innovative ideas like employer taxes, though the latter have yet to be implemented. The revenue generated is to be earmarked for improving public transport infrastructure (CEEW, 2024; Verma et al., 2021).

Building on this, the Metro Rail Policy (2017) made TOD a core strategy, encouraging the use of LVC tools like premium FSI, property tax surcharges, and auctioning development rights to monetize land value gains. The National TOD Policy (2017) reinforced this by supporting higher densities along transit corridors and enabling mechanisms including betterment levies, land value tax, impact fees, and transferable development rights (MoHUA, 2017). These measures were complemented by the Value Capture Finance Policy Framework (2017), which offers guidance for the application of LVC tools and empowers states and Urban Local Bodies to recover part of the unearned increment generated by public investment (MoHUA, 2017).

LVC is also being integrated into Public-Private Partnership (PPP) models. For instance, the Delhi Airport Metro Express used real estate development to finance infrastructure, and similar models were adopted in Bangalore and Kochi through real estate cross-subsidization (Sinha, 2015; Sinha, 2018). These examples demonstrate the potential of leveraging land value increments in collaboration with private developers.

However, effective implementation of LVC requires distinguishing between general land-based taxes and true value capture tools. Property tax, the most common fiscal instrument in Indian cities, is often based on outdated valuations and rarely linked to infrastructure improvements. In contrast, Mumbai's water and sewerage benefit tax is more aligned with LVC principles, as it is directly linked to service provision. Premium FSI and development right charges are the most widely used LVC tools today, but legal clarity is essential since FSI is a regulatory allowance, not a commodity, and courts have ruled that its monetization is a form of taxation. Stamp duty, another common instrument, captures value at the point of transaction and is better suited for areas experiencing new development, such as Mumbai's metro corridor, though it has yet to be systematically applied there (Mishra, 2017; NITI Aayog, 2021).

Adopting global models like impact fees, community infrastructure levies, or TIF in India faces institutional and contextual challenges. LVC is not merely a financial tool, it intersects with legal, planning, and governance frameworks. For it to support sustainable and inclusive urban growth, India needs an integrated framework that combines legal certainty, robust institutions, transparent administration, and strategic planning (MoHUA, 2017).

2.3 Exploring land value capture potential across different sectors

2.3.1 Road sector

The Government of India launched the land value capture mechanism in 2019 and revised it in March 2021 as a policy instrument to partly finance national highway projects through value capture finance. It is jointly undertaken by the National Highways Authority of India and State Governments. This framework seeks to mobilize a portion of the land value gains arising from highway development. The policy enables States to monetize value appreciation within one kilometer of the highway corridor by capturing revenues from instruments such as stamp duty, CLU fees, and development charges (MoRTH, 2022). As of June 2022, several states such as Karnataka, Tamil Nadu, and Punjab have adopted the framework in varying capacities.

The land value capture mechanism reflects a broader shift toward sustainable infrastructure financing, leveraging land value gains induced by highway expansion. By fostering collaboration between central and state agencies and offering regulatory and fiscal support, the mechanism promotes both resource mobilization and project efficiency. Though flexible in its application across states, the framework's effectiveness depends on robust intergovernmental coordination and adaptive, locally relevant revenue-sharing models. State-level initiatives underscore its potential to address infrastructure funding gaps while advancing inclusive urban and regional development.

2.3.2 Airport infrastructure

Airports are key drivers of regional economic growth, often triggering significant land value appreciation in surrounding areas due to improved connectivity and accessibility. Traditionally, airports have relied on Airport Improvement Fees (AIFs) or Passenger Facility Charges (PFCs) to fund capital-intensive projects such as terminals, runways, and access infrastructure. In the U.S., PFCs are capped at $4.50 per passenger per takeoff and have supported billions in upgrades. In Canada, where airports are run by not-for-profit authorities, AIFs ranging from C$15 to C$25 are a major funding source (Ingram & Hong, 2012).

However, these user-based fees place the burden primarily on passengers, even though infrastructure benefits a broader range of stakeholders including businesses, developers, and communities. This raises equity concerns and highlights the need for complementary mechanisms like LVC.

2.4 From policy to practice: LVC applications across modes

2.4.1 LVC approaches for airport projects

LVC enables airports and public authorities to recoup part of the value created by airport infrastructure investments. Tools like TIF capture the increase in property tax revenues resulting from rising land values post-development. These funds can be reinvested in infrastructure, ensuring that beneficiaries of airport-driven growth such as nearby landowners and developers, contribute to its financing (Li & Love, 2019). LVC becomes even more substantial when real-estate development is stimulated using planning, policy, and design instruments in airport adjacent areas and when public or private airport developers and operators can enter joint development with property development companies.

The following are details of LVC in the context of select airport projects, based on limited publicly available information. We, therefore, offer insights on general principles rather than comprehensive details about how LVC has been implemented.

Adani airports: Introduction

Adani Airport Holdings Limited (AAHL), the airports platform of Adani Enterprises, operates eight airports in India. Six of these are leased from the Airports Authority of India under a public-private partnership: Ahmedabad, Lucknow, Mangalore, Jaipur, Guwahati, and Thiruvananthapuram (Ministry of Civil Aviation, 2022). The company also manages Mumbai Chhatrapati Shivaji Maharaj International Airport through Mumbai International Airport Limited and is developing Navi Mumbai International Airport through Navi Mumbai International Airport Limited (Adani Enterprises, 2024). The group has launched an Aerocity programme with an investment plan of Rs. 20,000 Crore, of which majority is concentrated in Mumbai and Navi Mumbai. The objective is to increase non-aeronautical revenues substantially by 2030. Airports are being repositioned as mixed-use districts that integrate air travel with hospitality, offices, retail, convention facilities, and logistics (Economic Times, 2025).

From the LVC perspective, the initiative monetizes city-side land within airport estates by leveraging the uplift from airport connectivity and urban transportation and civic infrastructure improvements. This strategy provides recurring revenues from leases, rentals, and retail concessions while benefiting from public investments in transport. Control over Mumbai and Navi Mumbai airports enables the group to phase city-side development in line with regional transport upgrades and urban growth (Adani Airport Holdings Limited, 2025).

The Adani airport portfolio operates under two distinct governance and development arrangements with the Airports Authority of India (AAI). Six airports, namely Ahmedabad, Lucknow, Mangalore, Jaipur, Guwahati, and Thiruvananthapuram are managed through Operation, Management, and Development Agreements with a tenure of 50 years. These follow a pure concession model, under which Adani has the right to plan and develop commercial facilities in the city-side area as per the approved master plan, while land ownership remains with AAI. In contrast, Mumbai's Chhatrapati Shivaji Maharaj International Airport is governed by a Public Private Partnership (PPP) concession through Mumbai International Airport Limited, an equity-based special purpose vehicle (SPV) with majority private participation. This concession

runs for 30 years, extendable to 60 years under certain conditions, and grants control over city-side land parcels for commercial development during the concession period, with AAI retaining ownership of the underlying land.

Adani airports: Concession framework and commercial model

Six Airports Authority of India airports

Under the concession agreements, the operator is required to pay a per passenger fee to the Airports Authority of India. The fee is payable monthly and is calculated separately for domestic and international passengers. The base per passenger fees for domestic passengers are as follows. Ahmedabad Rs. 177, Lucknow Rs. 171, Mangalore Rs. 115, Jaipur Rs. 174, Thiruvananthapuram Rs. 168 rupees, and Guwahati Rs. 160. The fees for international passengers are generally set at double the domestic rate (Airports Authority of India, 2018).

These agreements also provide the operator with the right to develop non-aeronautical facilities on city-side land. While the ownership of the land remains with the Airports Authority of India, the operator can lease the land for commercial activities within the terms of the concession. This arrangement enables the airport to capture part of the land value uplift created by improved accessibility and passenger footfall.

Mumbai Chhatrapati Shivaji Maharaj International Airport

This is a brownfield airport with significant constraints on available land. The city-side strategy focuses on vertical development such as commercial towers, hospitality assets, and retail upgrades. LVC in this context is realized through intensive use of limited parcels to maximize the yield per square meter rather than through greenfield expansion (MMRDA, 2025).

Navi Mumbai International Airport

The concession with the City and Industrial Development Corporation includes substantial city side land for commercial development. The site is part of a wider regional development plan which includes an Aerocity and Corporate Park as well as the Navi Mumbai Airport Influence Notified Area. This creates opportunities for a layered LVC system. The public sector can implement mechanisms such as betterment levies and premium FSI charges in surrounding areas while the airport operator monetizes parcels within the concession area through long term leases and commercial operations (Thakkar, 2025).

Adani airports: Aerocity development scope and phasing

The Aerocity programme covers multiple locations across the AAHL network. Phase one involves the development of approximately 114 acres across eight airports. Around 50 acres are in Mumbai and Navi Mumbai with the remainder spread across the other airports.

The asset mix includes hotels, retail centers, convention facilities, office space, food and beverage outlets and entertainment venues. Over the medium term the group plans to deliver approximately 18 hotels with around 4,500 rooms. Retail space is expected to cover around 2.6 million square feet. Food and beverage areas will cover around 1.1 million square feet and multiplexes will include about 66 screens. Some sites may also include healthcare facilities (Adani Airports Holdings Limited, 2024).

Navi Mumbai is the largest greenfield opportunity in the portfolio. The city side estate will host a full scale Aerocity with hospitality logistics offices and a convention center. This development is integrated with regional transport planning to the year 2054 which enhances the LVC potential.

LVC is achieved through several mechanisms. These include long term ground leases to developers and operators of hotels and offices, revenue share agreements with retail and entertainment operators, and synergies with public sector LVC instruments applied in surrounding districts such as premium FSI charges and guided land auctions.

Delhi Aerocity

Delhi Aerocity, developed adjacent to the Indira Gandhi International Airport, is a prominent example of LVC implementation. Spearheaded by the DDA, it transformed underutilized land into a high-value commercial district with hotels, offices, and retail. Through land allocation and mixed-use planning, both public authorities and private developers benefited from rising land values via lease premiums, property taxes, and commercial rents. Aerocity demonstrates how airport-linked development can drive urban regeneration and financial sustainability aligned with LVC principles (NIUA, 2020).

2.4.2 LVC approaches for urban and regional rail

Urban (metro) and regional rail systems raise surrounding land values by enhancing accessibility, enabling authorities to recover part of that value using LVC tools such as special taxes, sale of development rights, and the creation and leasing of commercial spaces.

Delhi Metro and RRTS

Delhi Metro has attempted to actively leverage LVC through commercial development near stations, including malls, offices, and retail outlets. This non-fare revenue supports operational costs and infrastructure upgrades. A more structured example is the Delhi-Ghaziabad-Meerut Regional Rapid Transit System (RRTS), which incorporates four major LVC tools: sale of additional FAR, added stamp duty, extra development fees, and a transaction cess in TOD zones (MoHUA, 2017). Backed by Uttar Pradesh's regulatory framework, these tools are expected to generate substantial revenues earmarked for the RRTS. This model demonstrates LVC's growing role in India's transit finance landscape (OECD, 2022; Mishra, 2017; NCRTC, 2023; DMRC, 2023).

Mumbai Metro and real estate integration

Mumbai Metro applies LVC through transit-linked real estate development. For instance, the Mumbai Metropolitan Region Development Authority (MMRDA) integrates metro planning with land monetization by auctioning development rights and leasing commercial spaces near stations. Metro Line 3 (Colaba–Bandra–SEEPZ), being implemented by Mumbai Metro Rail Corporation (MMRC), includes provisions for TOD and value capture through premium FAR sales and station-area development. The metro aims to reduce reliance on passenger fares and create long-term revenue through commercial exploitation of metro assets and adjacent land parcels.

Hyderabad's PPP-driven metro with real estate focus

Hyderabad Metro, developed under a PPP using the DBFOT model (Design, Build, Finance, Operate, and Transfer), demonstrates private-sector-led LVC. Larsen & Toubro (L&T) secured a 35-year

concession with minimal Viability Gap Funding. Hyderabad Metro Rail Limited facilitated land acquisition and approvals, providing 269 acres for property development. L&T was granted rights to develop commercial spaces at depot and station sites, expecting 45% of revenue from real estate, 50% from fares, and 5% from advertising and parking. TOD is being planned within a 300-meter radius around stations, focusing on walkability and multi-modal integration. However, integration costs were excluded from the original agreement and are expected to be covered by supplementary funds (MoHUA, 2010).

2.4.3 LVC approaches for Indian Railways

Indian Railway Stations Development Corporation (IRSDC)

Constitution and vision

The Indian Railway Stations Development Corporation (IRSDC) was established on 12 April 2012 as a special purpose vehicle under the Ministry of Railways. It was initially a joint venture between the Rail Land Development Authority (RLDA) and IRCON. Later, RITES also became a partner. The primary objective of the corporation was to redevelop India's railway stations into modern centers that could operate sustainably. The guiding vision, called "Railopolis," aimed to conceptualize stations as vibrant urban centers that functioned round the clock. These stations were expected to provide safety, efficiency, and comfort to passengers. The financial model relied on revenue generation through the commercial use of railway land and airspace. This strategy was designed to reduce dependence on government funds and to align Indian stations with international standards.

Mandate and institutional authority

IRSDC's mandate extended across the full cycle of station redevelopment. Its responsibilities included planning, design, execution, commissioning, operations, and long-term maintenance. In 2018 the Union Cabinet recognized IRSDC as the principal project development agency. As a result, projects under IRSDC did not require municipal-level clearance. This exemption allowed for quicker approvals and faster project execution. Around 400 A1 and A category stations were identified for redevelopment. IRSDC was assigned several of the most prominent projects. Its approach was not restricted to superficial beautification. Instead, the projects incorporated airport-style concourses, segregated passenger movements, multimodal integration with metro and bus services, universal accessibility features, and sustainable infrastructure such as solar panels and water recycling facilities.

Scope of redevelopment

Redevelopment under IRSDC was defined in a comprehensive sense rather than as limited aesthetic improvements. The projects introduced reorganized entry and exit points and ensured clear separation between arriving and departing passengers. They included advanced surveillance, fire safety, and access control systems. Redevelopment also provided facilities for differently abled passengers and senior citizens. The overarching aim was to create stations that operated as integrated hubs. These hubs were expected to improve the passenger journey while also functioning as commercial and social anchors within the city.

Standardization and manuals

IRSDC prepared a series of manuals and codes to ensure standardization across its projects. These manuals addressed station planning, transit-oriented development, form-based regulations, architectural design, environmental management, and heritage conservation. They introduced new regulatory instruments such as Layout Regulating Plans, Property Development Cards, and Green Building Guidelines. These instruments promoted consistent practices, flexibility in design, and sustainable outcomes. At Bijwasan, for example, the application of these manuals led to an increase in projected revenue. The same application also resulted in a threefold increase in public space. The manuals were not prepared in isolation. They were developed through consultations with ministries, state governments, private developers, and independent experts. This participatory process enhanced their credibility and facilitated adoption (Rail Analysis India (a), 2021).

PPP and financing models

IRSDC actively promoted PPP as a way of financing redevelopment. Private developers were allowed to invest in station projects in exchange for long-term leases ranging from 45 to 99 years on adjoining railway land (Rail Analysis (b), 2021). One of the earliest examples was the redevelopment of Rani Kamlapati (Habibganj) station in Bhopal (Ministry of Railways, 2021). This project was awarded in 2017 to a developer. The developer rebuilt the station to airport-like standards and received rights to commercial space and retail area for cost recovery and revenue generation (Bansal Group, 2021). Another significant example was the Gandhinagar Capital station which was redeveloped under a joint venture with the Government of Gujarat. This project included a luxury hotel, premium accommodation, and a convention center above the station. Both projects demonstrated how partnerships could transform stations into integrated civic and commercial centers.

Key projects and achievements

By 2020-21, IRSDC was engaged in over 120 redevelopment projects. Of these, 63 were under its scope and 60 were under RLDA. The Gandhinagar Capital station was inaugurated in July 2021 and became the corporation's flagship achievement. The project combined a modern terminal with India's largest column free platform roof along with a convention center and a hotel above the tracks (Bhardwaj, 2021). The Rani Kamlapati station was inaugurated in November 2021 and became the first station redeveloped in PPP mode. It provided modern concourses together with lounges and retail outlets (Nayak, 2025). Another notable project was the Nagpur station redevelopment. This project demonstrated adaptive reuse of heritage structures along with the introduction of new wings and modern passenger facilities. It also included metro integration and a logistics hub with commercial development above the station. Taken together these examples showed IRSDC's ability to balance heritage preservation with modernization and to align transport efficiency with real estate development. With statutory authority under Section 11 of the Railways Act, 1989, IRSDC could execute station projects without municipal approvals, though it coordinated with urban authorities on essential services. Key initiatives included redevelopment projects at Anand Vihar and Bijwasan stations, as well as plans for five additional stations, including two in Delhi, and the Chandigarh station upgrade. The corporation also engaged a global consulting firm to support the ₹8.5-lakh-crore nationwide railway modernisation programme (MRT Online Desk, 2025). Other important initiatives included redevelopment at Lucknow covering Charbagh and Gomti Nagar as well as Puducherry and Surat's Multi Modal Hub. Detailed planning was also carried out for New Delhi and Mumbai's Chhatrapati Shivaji Maharaj Terminus (Dhawan, 2020).

Challenges and shortcomings

Despite its ambitious mandate, IRSDC faced many challenges. Initial rounds of bidding for public-private partnership projects attracted limited interest. Developers pointed to restrictive sub-leasing rules, shorter lease terms, and unpredictable revenue streams. Although reforms in 2018 extended leases and introduced new revenue models, private participation remained limited to metropolitan regions. The corporation also had limited staffing, which made it difficult to manage numerous projects at the same time. Overlaps with RLDA created duplication of responsibilities. There were also frictions with zonal railway divisions that retained operational control. External factors such as the COVID-19 pandemic further delayed construction and bidding processes (Ministry of Railways, 2021; Government of India, 2018).

Dissolution and successor initiatives

By 2021, IRSDC was responsible for 63 stations while RLDA oversaw 60. The RLDA, established in 2006, complemented IRSDC by commercially developing surplus railway land and airspace to bridge India's infrastructure funding gap. Figures available at the time of drafting this report suggest that RLDA manages approximately 43,000 hectares, converting it into residential, commercial, and transit-oriented assets, with all revenues returned to Indian Railways. Its portfolio includes more than 20 leased commercial sites generating about ₹1,700 crore, redevelopment of 84 colonies covering 25,000 staff quarters, transformation of over 50 railway stations under PPP models, and over 50 multifunctional complexes contributing ₹500 crore (MRT Online Desk, 2025). Together, RLDA and IRSDC played central roles in land value capture, asset monetisation, and early station redevelopment efforts. In October 2021, the Ministry of Railways decided to dissolve IRSDC as part of its rationalization policy. The Railway Board concluded that their roles were overlapping. Projects were transferred to RLDA and zonal railways (Lok Sabha Secretariat, 2021; Indian Railways, 2022). Staff were absorbed back into their parent organizations. The broader station modernization agenda did not end with this closure. Instead, it continued under RLDA's leadership. Flagship projects at New Delhi and Mumbai are now under RLDA, while the Amrit Bharat Station Scheme, launched in 2022, focuses on upgrading more than 1,000 smaller stations through phased improvements (Siddique, 2020; Dastidar, 2021).

Amrit Bharat Station Scheme

The Amrit Bharat Station Scheme (ABSS) was launched in 2023 as the flagship programme of the Government of India to redevelop 1,275 railway stations. The scheme aims to transform them into modern hubs with world-class facilities and services. It also seeks to integrate heritage-sensitive design and eco-friendly infrastructure. By May 2025, more than 100 stations had been redeveloped. The government had initially planned the scheme under the PPP model. However, private interest remained limited. In December 2022, the strategy was revised, and projects were shifted to the Engineering, Procurement, and Construction model. This change was supported by a sharp increase in budgetary allocation. The amount rose from ₹2,159 crore in the financial year 2023 to ₹15,511 crore in the financial year 2025. Analysts expect that this approach will create business opportunities worth nearly ₹30,000 crore for EPC companies. The scheme continues to retain the option of using railway land and airspace for commercial development to attract supplementary investment (ICRA, 2024). ABSS therefore represents a decisive step toward large-scale government-funded station modernization.

Institutional legacy and continuity

The contribution of IRSDC lies in its attempt to redefine railway stations as catalysts of urban development. Its Railopolis vision, reliance on TOD, preparation of standardized manuals, and promotion of PPP created a framework for modernization. Demonstration projects such as Gandhinagar, Rani Kamlapati, and Nagpur showed how transport hubs could combine passenger convenience, heritage preservation, station area real-estate development, and financial sustainability. Although the corporation was dissolved in 2021, its methods and case projects continue to guide station redevelopment in India. The launch of the Amrit Bharat Station Scheme in 2023 has carried this agenda forward on a much larger scale with assured government funding and updated models of implementation. The legacy of IRSDC therefore rests not only in embedding principles of sustainability, multimodal integration, and revenue generation into the country's transportation infrastructure policy but also in shaping the institutional foundations upon which ABSS now builds.

Gandhinagar Capital Railway Station Redevelopment

The redevelopment of Gandhinagar Capital Railway Station began in 2016 under the Railways' "Railopolis" vision. The idea was to establish world-class hubs that combined transport and commercial functions while operating throughout the day and night. The strategy placed importance on the efficient use of station land as well as adjoining areas. It encouraged high-value and mixed-use development that joined transport facilities with hospitality, cultural, and business functions (Tiwari, 2021).

The project required ₹71 crore for station redevelopment works and nearly ₹500 crore for the adjoining Leela Hotel together with the Mahatma Mandir Convention and Exhibition Centre (IRSDC, 2022). Execution was managed by Gandhinagar Railway and Urban Development Corporation Ltd. (GARUD). This special purpose vehicle was created jointly by the Government of Gujarat and the IRSDC, with an equity share of 74 percent and 26 percent respectively (CEPT University, 2025).

A central highlight of the project is the 300+ room Leela Hotel, located above the station and connected directly to the Mahatma Mandir Convention Centre. The hotel was developed under a 75-year lease framework. Public agencies retained ownership while they secured fixed lease payments and a portion of revenues. At the same time, the private operator oversaw the hospitality services. GARUD, representing the Government of Gujarat and Indian Railways, collected lease payments and a share of hotel earnings. The Leela retained the larger share of hospitality revenues after meeting its contractual responsibilities. This arrangement gave the public sector predictable income, provided the operator with a stable financial return, and ensured resources for maintaining infrastructure. The wider precinct includes green building practices, facilities accessible to persons with disabilities, landscaped spaces, and art installations. It is further linked with city mobility systems such as BRTS, bus routes, and road networks. These measures improved passenger convenience, raised visitor numbers, and supported tourism based on events and conventions. In conclusion, the Gandhinagar station redevelopment project illustrates how coordinated land use strategies can enrich the passenger experience, generate sustainable non-fare revenues, and promote wider regional growth (The Leela Palaces, Hotels and Resorts, 2021).

2.4.4 LVC approaches for road projects

The Government of India introduced the LVC mechanism in 2019, which was subsequently revised in 2021, to facilitate joint implementation of Value Capture Finance (VCF) with States and the National Highways Authority of India (NHAI) for partial funding of highway projects. The mechanism allows States to facilitate project implementation, contribute land or land-related revenue, provide waivers or refunds on royalties and taxes, and participate in the sharing of increased land values through instruments such as stamp duty, Change of Land Use (CLU) fees, development charges, and additional FSI/FAR premiums. The extent of implementation varies across States, with some committing to share land acquisition costs or provide fiscal concessions, while others are still under discussion. The deposit percentage is flexible and determined by mutual agreement. No amendments mandate sharing captured value with previous landowners, though States may choose to do so voluntarily (MoRTH, 2022).

The following section examines selected roadway projects in India as illustrative cases of LVC implementation. These examples demonstrate how infrastructure-led development can be leveraged to mobilize financial resources, support project financing, and guide planned urban growth.

Betterment Levy for Hyderabad Outer Ring Road (ORR)

The Hyderabad ORR is a 158-km, eight-lane expressway developed to decongest the city by diverting traffic through a growth corridor. To capture land value gains from this infrastructure, Hyderabad Metropolitan Development Authority (HMDA) implemented area-based LVC instruments – Special Development Charges (SDCs) and Development Deferment Charges (DDCs).

The project cost ₹6,696 crore, with Phase 1 (₹699 crore) funded by bank loans led by Bank of Baroda, and Phase 2 (₹2,439 crore) developed through a PPP. Implementation was undertaken by Hyderabad Growth Corridor Limited (HGCL), an SPV of HMDA and Infrastructure Corporation of Andhra Pradesh (INCAP).

SDCs (up to 1.5× building permission fees) were levied based on proximity to the ORR, while DDCs were charged on vacant land. These one-time charges funded infrastructure linked to new development. Between 2011–2015, SDCs and DDCs formed part of HMDA's development charges; in 2016, SDCs contributed 3–4% of development charges and 1.5% of HMDA's net revenues, though funds were merged into the general budget (World Bank, 2025).

Highway Corridor Zones (HCZs) and TOD in NCR RP-2041

Highway Corridor Zones (HCZs) have been adopted as a broader planning instrument in the NCR to manage and harness growth along major transport corridors. Under the Regional Plan 2041 (RP-2041), HCZs are designated along expressways, national and state highways, and freight corridors across the NCR to prevent unplanned ribbon development and promote structured, corridor-based urbanization. The HCZ influence area has been expanded from 500 m to up to 1 km on either side of transport corridors, reflecting the growing development pressures around high-capacity infrastructure.

With the expansion of metro, RRTS, and expressway networks, HCZs and associated transit nodes are envisioned for higher-density, mixed-use development supported by enhanced FARs and value capture provisions, while maintaining traffic segregation, green buffers, and right-of-way protections. State governments are responsible for identifying HCZ and TOD areas based on local potential and detailing them through Sub-Regional and Master/Development Plans, positioning HCZs as an institutional mechanism to align infrastructure investment with land development and land value capture (MoHUA, 2021).

The Yamuna Expressway: PPP and land related risk

The Yamuna Expressway, initiated in 1997 to link Greater Noida and Agra, was awarded to Jaiprakash Associates Limited under a BOT concession with five township parcels and 500 hectares of leasehold land intended to cross-subsidize construction. Implemented through Jaypee Infratech Limited (JIL), the project faced land acquisition delays across 300+ villages, farmer protests, litigation, and environmental clearance hurdles. Project costs escalated from about ₹2,500 crore to nearly ₹10,000 crore by 2010, while weak real estate uptake delayed revenues, exposing JIL to traffic risk, legal uncertainty, and financial stress, making insolvency foreseeable well before completion (Raghuram & Mehta, 2011).

2.5 Enablers of TOD and LVC in practice

TOD and LVC are becoming essential tools for funding and financing of urban transport and promoting compact, sustainable growth in India. Their effective implementation requires coordinated policy support. National frameworks like the LVC Guidelines (2019, revised 2021) should be adopted by states to enable tools such as stamp duties, CLU fees, and development charges near infrastructure projects. Urban planning policies need to support mixed-use, high-density development within 300–500 meters of transit stations by revising master plans and FAR norms.

Financial instruments like betterment levies, TOD cess, and sale of development rights, already used in the Delhi-Meerut RRTS and Hyderabad Metro, should be formalized. Special-purpose agencies are also needed to manage land acquisition, approvals, and coordination across departments. While these tools can unlock land value and reduce reliance on public subsidies (Asian Development Bank, 2022), implementation is often slowed by policy and institutional gaps (Dhindaw et al., 2021). TOD policies in India have largely advanced through central government initiatives, showing how key actors shape policy agendas (Mittal & Shah, 2022). Involving the private sector early can enhance LVC opportunities and long-term value (Sharma & Newman, 2018). However, successful adoption depends on local adaptation, trust-building, and institutional capacity (Thomas & Bertolini, 2020).

The Delhi–Ghaziabad–Meerut Regional Rapid Transit System (RRTS) represents the first high-speed rail corridor developed as part of the integrated transport plan for the National Capital Region. The corridor extends more than 80 km. The NCRTC implements the project and promotes TOD principles including compact, walkable station areas, and integration of land use with transport planning. The project also utilizes LVC instruments such as development charges, land leasing, betterment levies, and property value capture, to ensure financial sustainability and support balanced urban growth (NCRTC, 2023).

2.6 LVC lessons from India and around the world: a snapshot

This section explores how LVC has been applied in diverse urban contexts, highlighting domestic and global practices and their adaptability to different governance and financing frameworks.

2.6.1 Insights from LVC implementations: Indian examples

Focusing on the Indian context, we review key projects and policies that demonstrate how LVC mechanisms are being tested in the context of urban infrastructure development initiatives.

Anand Vihar, Ghaziabad, and Sahibabad Multimodal Hubs in the NCR

Part of the Delhi–Meerut RRTS corridor, this pilot integrates RRTS, metro, and bus terminals with mixed-use development on public land. By leveraging zoning changes, enhanced FSI and phased development, the project generates potential for long-term revenue through land appreciation and commercialization. The primary beneficiaries include the National Capital Region Transport Corporation (NCRTC), which can enhance financing of infrastructure, local governments, which can increase public revenue, and residents/businesses who will benefit from improved connectivity and facilities. The project serves as a model for replicating LVC strategies in other transit corridors (NIUA, 2020; NCRTC, 2024; NCRTC, 2023). The TOD and LVC initiatives in the RRTS context effectively illustrate how multiple agencies along with the state and central government departments can work collaboratively, leading to institutional, policy, and legal reforms in the interest of sustainable funding and financing of high-quality transportation infrastructure projects.

Sabarmati Riverfront in Ahmedabad

The Sabarmati Riverfront project initially relied on LVC by monetizing reclaimed land (Rajpriya & Shukla, 2018). The controlled release of land and strategic urban branding helped raise land values along the riverfront, reducing the need to sell as much land as initially planned. Volumetric regulations were imposed to ensure that private developments did not disrupt the skyline or riverfront harmony, maintaining the quality and equity of the public realm (MoHUA, 2017).

Impact Fees in Hyderabad

The Greater Hyderabad Municipal Corporation (GHMC) introduced one-time impact fees for new commercial/high-rise developments along the Outer Ring Road (ORR) and designated Growth Corridors. Rates vary based on building size and use, with exemptions for essential uses. The revenue is deposited into a dedicated municipal account and used exclusively for capital works such as road widening, junction upgrades, flyovers, and stormwater drainage. The fee is also applicable to land-use changes from residential to commercial. To encourage compliance and support the real estate sector during market slowdowns, GHMC has simplified the fee structure and reduced rates. This model allows Hyderabad to recover infrastructure costs from direct beneficiaries of development, reduce reliance on public debt, and promote equitable urban growth, making impact fees a practical and transparent tool for implementing LVC (MoHUA, 2017).

Bandra Kurla Complex in Mumbai

The BKC in Mumbai exemplifies how LVC strategies can finance large-scale urban infrastructure while reshaping cityscapes. Developed by the MMRDA to decongest South Mumbai and create a new Central Business District (CBD), BKC spans more than 200 hectares and has evolved into a

prominent financial and commercial hub. MMRDA initially reclaimed marshy land and realigned the Mithi River, acquiring land from the state government. Certain blocks were earmarked for high-density development with enhanced FSI, increasing from 1 to 3 for residential plots and from 2 to 4 for commercial ones. In 2003, MMRDA adopted a leasehold auction model, offering land parcels on 80-year leases. This shift allowed MMRDA to monetize land effectively, raising more than ₹5,000 crores by auctioning just more than 10 hectares in 2006-07. Land values surged from ₹30,000 per square meters in 1993 to over ₹5,00,000 per square meter by 2007. Revenue from these auctions, despite MMRDA's inability to impose taxes, funded major infrastructure projects including the Mumbai Metro and the Mumbai Trans-Harbour Link. BKC's success in attracting corporate offices, generating jobs, and enabling high-value real estate development highlights how well-structured LVC tools and FSI incentives can create a sustainable and replicable model of urban finance (MoHUA, 2017).

FSI and Transfer of Development Rights in Hyderabad

Hyderabad presents a compelling example of using FSI incentives and Transfer of Development Rights (TDR) to manage urban growth and facilitate infrastructure development without relying on forced land acquisition. To address rising traffic congestion, the Municipal Corporation of Hyderabad (MCH), with support from the Government of Andhra Pradesh, implemented a policy encouraging landowners to voluntarily surrender land required for road widening. In return, they received compensatory FSI benefits, such as permission to construct additional floors or relaxed building setbacks. In cases where vertical expansion was not feasible, landowners were granted TDR certificates that allowed them to use or sell the equivalent built-up area, calculated at 200 percent of the surrendered land, at another location within the city. This approach provided flexibility, reduced resistance, and eliminated the need for large monetary payouts. Additional provisions, including relaxed norms for smaller plots and conditional allowances for commercial development along widened roads, further supported participation. The initiative resulted in major road improvements and spurred commercial redevelopment, enhancing property values and boosting economic activity. Nevertheless, it came with environmental costs, particularly the loss of green cover due to tree removal. Overall, Hyderabad's use of FSI and TDR demonstrates how urban planning tools can align infrastructure goals with property rights, offering a model for inclusive and sustainable city development (NITI Aayog, 2020).

2.6.2 Insights from LVC implementations: Global examples

Kings' Cross redevelopment in London

The King's Cross redevelopment project in London is a significant case of how LVC mechanisms can promote equitable and sustainable urban transformation. This large-scale urban renewal project converted a derelict 67-acre brownfield site in Central London into a vibrant, mixed-use, transit-oriented development comprising residential, commercial, recreational, and green public spaces. The project was a multi-stakeholder initiative which involved private, public and community partners. The redevelopment was facilitated through Section 106 of the Town and Country Planning Act 1990, which allowed the Camden Borough Council, in coordination with the Greater London Authority and other stakeholders, to secure financial and in-kind contributions from developers in exchange for planning approval. This agreement ensured that the increase in land value resulting from public investment in infrastructure would benefit the broader community. As part of the obligations, the project delivered 1,900 residential units, with more than 40 per cent designated as affordable housing and allocated approximately 40 per cent of the total site to green and accessible public spaces. It also included the construction of community amenities such as sports facilities, educational centers, and a visitor center. A significant social

benefit was establishing a Construction Training Centre and Skills and Recruitment Centre, supported by a Euro 2.1 million fund to create between 24,000 and 27,000 local jobs. In addition, the redevelopment improved local connectivity through enhanced transit infrastructure, including new bus routes, upgraded streets, and a canal bridge (Suzuki et al., 2015).

Kowloon, Hong Kong: Rail plus Property (R+P) Model

The Kowloon Station project in Hong Kong is a leading example of (R+P) development integrated with TOD principles. Developed on reclaimed land in West Kowloon, the project aimed to maximize transit connectivity, create a vibrant mixed-use urban hub, and support the broader city-led waterfront revitalization effort. It was a joint initiative between the Hong Kong government and private developers, with the Mass Transit Railway Corporation (MTR) playing a leading role as both the transit provider and land developer. Thirteen private developers were involved in the phased construction of residential, commercial, and public spaces over a period from 1998 to 2010. The project created a high-rise, mixed-use urban node centered around Kowloon Station, featuring a landmark commercial center, luxury residential towers, and extensive retail spaces, all within a 13.5-hectare zone (Suzuki et al., 2015). An FAR of 8.1 was maintained to balance high density with livability and public access. The development was executed in seven phases, and its podium-based design enabled seamless integration of various transport modes and pedestrian pathways, enhancing internal connectivity. Despite some limitations in ground-level permeability due to the elevated structure, the project stands as a significant example of how TOD-led R+P models can effectively drive large-scale urban transformation in dense metropolitan settings (Leong, 2016).

Transfer of Development Rights in New York City

The TDR in New York City is a planning mechanism that allows property owners to sell unused development potential, known as air rights, to other properties to enable higher density development in targeted locations. The New York City Department of City Planning is the principal authority responsible for regulating zoning and overseeing TDR transactions. The Metropolitan Transportation Authority (MTA) has also played a key role, especially around Grand Central Terminal, where revenues from TDR sales have been used to finance major infrastructure projects. Private developers are significant actors in this system, purchasing TDRs to expand their projects in high-demand areas such as Midtown Manhattan. Between 2003 and 2011, a total of 421 TDR transactions were recorded in the city, of which 385 transactions, or 91.4 percent, occurred through the zoning lot merger mechanism. Among these, 328 were arm's-length transactions between unaffiliated parties, indicating an active and competitive market. Grand Central Terminal alone held more than one million square feet of unused development rights, which were leveraged to help fund the East Side Access project. This project involved a total investment of USD 2.3 billion in Long Island Railroad capital upgrades. The East Midtown Rezoning proposal introduced a District Improvement Fund model that allowed developers to purchase bonus floor area by contributing USD 250 per square foot for commercial use and USD 360 per square foot for residential use. Legally, the TDR mechanism has been supported since 1968 under the Landmarks Preservation Law, which allows landmark property owners to transfer development rights as compensation for preservation restrictions. This legal basis was further reinforced by the 1978 United States Supreme Court decision in the case of Penn Central Transportation Company versus New York City. Over time, TDR has been implemented through zoning lot mergers, landmark preservation programs, and special purpose districts, making it a powerful tool for promoting dense, transit-oriented development while funding public infrastructure and preserving historic buildings (Suzuki et al., 2015).

Washington DC: Joint Development Program

The Washington Metropolitan Area Transit Authority (WMATA) has implemented one of the most influential Joint Development programs in the United States, leveraging public land near transit stations to catalyze private investment and generate revenue for transit operations. Initiated in the 1970s and formalized over subsequent decades, WMATA's program evolved as an entrepreneurial response to declining federal support for transit capital funding. It involves leasing or selling WMATA-owned land, often surface parking lots or air rights, which is adjacent to metro rail stations for high-density, mixed-use developments in partnership with private developers. The program spans across the District of Columbia, Maryland, and Virginia, requiring careful coordination with local governments, zoning authorities, and federal oversight agencies. More than 65 joint development projects have been executed, contributing to over USD 235 billion in economic development. Studies suggest that properties within a half mile of metro stations account for approximately USD 3.1 billion in annual property tax revenue, and those closer (within 0.25 miles) generate around USD 1.8 billion. The program has led to notable increases in property values. An example is the New York Avenue–Florida Avenue–Gallaudet University Metro station, where land value in surrounding blocks rose from USD 535 million in 2001 to USD 2.3 billion by 2007, aided by a special assessment district. Although joint development revenues have contributed only modestly to WMATA's operating income (0.74% to 1.33% annually between 2004 and 2012), they have played a vital role in promoting TOD and enhancing land use efficiency. The program's success lies in its entrepreneurial approach, regional coordination, and strategic use of tools like long-term leases, development agreements, and value capture instruments, making it a benchmark for transit agencies aiming to integrate land use and transportation planning (Suzuki et al., 2015).

The case studies mentioned above show the transformative potential of integrating LVC with TOD. Despite diverse governance structures, legal frameworks, and market contexts, these projects share common success factors such as strong public-private collaboration, proactive planning and zoning policies, reinvestment of land value gains into public goods, and a strategic alignment of transport infrastructure with urban development. For India, where urban expansion and transit investments are accelerating, these models offer valuable insights. India can adopt such mechanisms by strengthening institutional capacity at the city level, enabling legal reforms to support tools like betterment levies, TDR, and public land monetization, and ensuring equitable outcomes through community engagement and social safeguards. India, therefore, can make TOD+LVC a financially viable and socially inclusive strategy for sustainable urban growth.

2.7 Summary

This chapter examines how Indian and global cities are using LVC to fund urban infrastructure and guide city growth. It traces how Indian policies have evolved from early methods such as betterment levies to newer approaches that link land use with infrastructure through tools like higher floor space allowances, joint development, and the sale of development rights. While many Indian cities have initiated pilot LVC projects in roads, airports, and metros/RRTS, progress has been uneven. Examples from Delhi, Mumbai, and Hyderabad show how linking land value with transport investment can help reduce the government's financial burden of developing critical infrastructure. This chapter also reviews successful global projects in London, Hong Kong, New York, and Washington, D.C., which demonstrate that early planning, clear legal backing, and strong partnerships can help share the gains from rising land prices with the wider public. These cases highlight the need to involve local governments, private developers, and communities from the outset. For India to benefit from these ideas, it must improve city-level coordinated planning, update institutional and policy frameworks, and ensure that public gains are not limited to landowners. If implemented well, LVC can become more than just a funding tool and support cities in growing sustainably and inclusively.

3. CASE STUDIES: LAND VALUE CAPTURE AND URBAN DEVELOPMENT

Contents:

- Synthesis of national and international scholarship on LVC along with evidence on implementation and impact; global case studies from Japan, London, Hong Kong, Bogota, and Sao Paulo, alongside Indian experiences in Delhi, Hyderabad, and TOD-based PPPs.
- Models integrating transit, real estate, and regulatory instruments to generate sustainable financing for urban infrastructure and regeneration.

Key takeaways:

- Effective LVC requires aligning infrastructure provision, land use regulations, and market-based instruments to generate lasting value.
- Public–private collaboration, as seen in Japan and Hong Kong, can accelerate infrastructure delivery and ensure sustainable revenues through fair benefit-sharing.
- Transparent valuation, phased implementation, and reinvestment in social infrastructure are critical for maintaining legitimacy and public trust.
- Indian cities can adopt global best practices by integrating LVC into master plans, building stronger governance capacity, and directing revenues toward inclusive urban development.

Learnings for Indian planning and policymaking:

- India must establish a strong statutory and legal foundation to implement LVC mechanisms effectively.
- Enhanced institutional coordination among various public agencies is critical for successful LVC strategies and spatial outcomes.
- Transit planning must be fully integrated with real estate development planning, allowing agencies to co-develop land near stations.
- Authorities should utilize tools like Additional Development Rights to promote valuable, higher-density development around transit stations.
- State-owned rail authorities can function as real estate developers and asset managers to maximize non-fare revenue streams.

3.1 Introduction

The demand for infrastructure and essential urban services has increased significantly in recent years due to accelerating urbanization. This surge has created a ripple effect, compelling urban governments to explore innovative and sustainable financing mechanisms to support development initiatives. In this context, land value capture (LVC) has emerged as a prominent tool for harnessing increases in land value generated by public investments and regulatory interventions. Nobre (2023), along with institutions such as the International Transport Forum (2024), has recommended land value capture (LVC) as an effective mechanism for financing urban interventions, particularly in contexts where conventional financing tools fall short. These initiatives focus on regaining the increased land values generated by public investments,

routing them back into projects that benefit the community (Gurdgiev, 2012). The transformative potential of land value capture (LVC) is evidenced by its successful implementation in cities such as Bogota and Sao Paulo, where it has been used to enhance public transportation systems and urban amenities (Stokenberga, 2014). Beyond these cases, cities including London and Hong Kong have adopted more advanced LVC strategies, channeling the revenues generated into community development and social programs. These investments have contributed to improved quality of life for residents and have helped address urban inequality (Covarrubias, 2004).

This chapter synthesizes notable insights from a set of national and international case studies examining how LVC strategies have been implemented in diverse urban contexts. In the international context, Bogota, Sao Paulo, Hong Kong, Japan and London have utilized various LVC tools to finance urban infrastructure. The above cases throw light on the mechanisms, institutional frameworks, and outcomes related with LVC in diverse governance and market settings.

3.2 Global case studies on LVC and urban development

3.2.1 Japan's urban rail development model

In Japan, LVC has been a key strategy for financing urban transit infrastructure and promoting compact sustainable city development. Unlike many countries where transit systems primarily rely on public subsidies or fare revenues, Japan takes a more integrated approach which is by capturing the increased land values generated by transport investments to fund infrastructure and guide urban development. Private railway companies such as Tokyu Corporation pioneered this model in the early 20th century. These companies faced limited profits from fares alone. To address this, they began purchasing large tracts of land before constructing rail lines. After building the infrastructure, they developed residential and commercial projects along the corridors. This approach helped generate ridership and allowed them to benefit from the subsequent increase in land values (Calimente, 2012). As a result, they created what are now known as Rail Integrated Communities. These are high density, mixed use and pedestrian friendly urban areas where people can meet most of their daily needs by walking, cycling or public transport (Cao & Zhejiang, 2022).

Japan's transit-oriented development is vastly different from that of North America. In many North American cities, even areas near train stations require car access for daily life (Calimente, 2012). But in Japan, people can live comfortably without needing a car. One primary reason for this is Japan's long-standing effort to discourage car ownership (Saxena, 2017). The government implemented methods such as high taxes on buying and registering vehicles, extra charges based on weight, and some of the highest toll fees in the world, along with gasoline taxes that are 2-3 times that of North America. These prohibitive costs make owning a car less attractive, encouraging people to use public transportation instead (Cervero, 1998).

A notable example is the Tsukuba Express line, which began operating in 2005. The project used land readjustment, a system which reorganized scattered land plots to make space for necessary infrastructure. Original landowners received smaller but more valuable parcels in return, benefitting from improved accessibility and rising land values. The sale of reserved land parcels helped to recover 63% of the project's costs, which demonstrates the financial viability of the approach. Additionally, cities in Ibaraki along the corridor experienced a 41.9% increase in total asset value and an impressive 9.2% annual population growth rate, which highlights the strong economic and urban development impact of the project (Global Infrastructure Hub, 2021).

In contrast Tokyu's Futako-Tamagawa redevelopment project shows how private-led LVC can drive urban development. As the majority landowner with over 95% of the property, Tokyu collaborated with more than 200 landowners to consolidate parcels, sell unused FAR rights and construct high-rise, mixed-use towers. The project yielded ¥120 billion in property sales and transformed the area into a dynamic urban center (Calimente, 2012).

Japan's LVC model highlights important strategies such as integrating transport and land use planning, minimizing car dependency, empowering local governments, and using land readjustment to cut acquisition costs (Ingram & Hong, 2011). By balancing private sector innovation with public oversight, the approach ensures transit projects are economically viable, socially inclusive, and environmentally sustainable.

These examples show that India can significantly increase non-fare revenue streams for its metro and regional rail projects by adopting the integrated LVC approach pioneered by private railway companies in Japan, securing large tracts of land prior to construction to develop high-density, mixed-use rail integrated communities that generate ridership and capture resulting increases in land values. For financing core infrastructure, India should leverage tools like land readjustment to successfully reorganize scattered plots and utilize the sale of reserved land parcels to recover project costs while stimulating strong economic and urban development. Furthermore, to maximize development returns and sales revenue, project planners should emulate private-led LVC strategies by consolidating land parcels, selling unused FAR rights, and constructing high-rise urban centers.

3.2.2 LVC in London

The Crossrail project, now operating as the Elizabeth Line, is one of the most significant urban rail developments in Europe. It was initiated to address the increasing demand for high-capacity, rapid transit across London by connecting its eastern and western edges, thereby relieving pressure on existing networks and promoting urban regeneration and economic productivity (Mulley, 2024). The main objectives were improved connectivity and stimulation of urban renewal and economic growth across London (Buck, 2017). In the early 2000s, the initial planning of the project commenced. The business community in London realized the financial benefits associated with enhanced connectivity, specifically that improved accessibility would increase the property values and stimulate commercial growth. This understanding was essential for acquiring the financial support needed to fund the project (Loo et al., 2018).

Funding for the project was secured through public investments and value capture mechanisms. Transport for London contributed £5.1 billion, while the Department for Transport provided £4.8 billion. Additional revenue was generated using value capture techniques, including the Community Infrastructure Levy (new developments in London to pay between £20 - £50 per square meter), Business Rate Supplement (an additional levy), and direct developer contributions, e.g., in station developments (TFL, 2017).

The institutional and political backing for Crossrail played a critical role in its progress. Legislative support from the Parliament, leadership from the Mayor of London, and formal Treasury approval for new levies collectively enabled the implementation of innovative financing tools. A collaborative approach was adopted in engaging key stakeholders, especially developers and property owners located near new station sites (Dadswell, 2012). This collaborative approach not only mitigated potential resistance but also helped fast-track redevelopment and regeneration around transport nodes. Despite its technical and financial complexity, Crossrail demonstrated the feasibility of co-financing large public infrastructure projects by involving the beneficiaries,

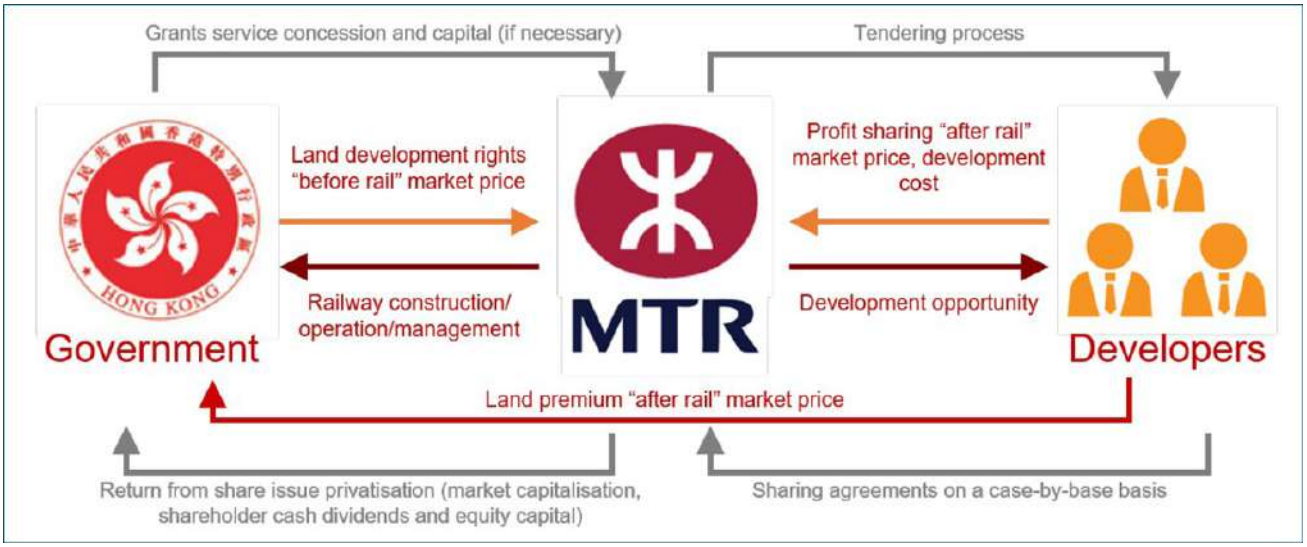
particularly businesses and landowners. This project exemplifies how strategic financial planning, and effective institutional coordination can facilitate the delivery of infrastructure that not only enhances mobility but also contributes to the transformation of urban landscapes.

Most of the land value uplift around Crossrail, however, remained with private stakeholders, turning into windfall gains, while the public sector recovered only a fraction of the generated value (Mulley, 2024).

3.2.3 Hong Kong: Rail + Property Model

Hong Kong's approach to LVC, widely known as the Rail + Property (R+P) model, stands out as one of the most effective and innovative examples globally. It further exemplifies the integration of land and transit development (Leong, 2016). The MTRC developed the strategy in response to the city's constrained land availability, rapid urban expansion and increasing property prices. Rather than funding metro infrastructure directly through public subsidies, the government adopted a land-based financing model. Under this system, MTRC was granted development rights over government owned land near new transit stations at "before rail" prices, allowing it to capture the increase in land value once the rail infrastructure was in place.

Exhibit 4: Hong Kong's Rail + Property Model



Source: Jauregui-Fung, F. (2022). Land value capture and transit oriented development as a way of funding railway systems: The case of Hong Kong Rail + Property Model [Non-paper report]. German Institute of Development and Sustainability (IDOS). https://www.idos-research.de/uploads/media/Jauregui-Fung_Hong_Kong_MTR_IDOS.pdf.

Between 1984 and 1995, property prices in Hong Kong rose by nearly 700 percent, which created a favorable environment for value capture through real estate development. The model worked in such a way that MTR, after receiving development rights over land near new stations, would offer these sites to private developers. These developers took on the cost and risk of construction and shared profits with MTR. This created a cycle where investment in transit led to property development, generating revenue that could fund further infrastructure. The early and close coordination between MTR and government planning agencies made this model particularly effective (Bian, 2021). Together, they identified land with strong development potential before the stations were built, allowing them to design the stations in a way that naturally incorporated housing, retail, and commercial spaces. This integration did not just make commuting more

convenient; it also boosted foot traffic and accessibility which has increased the value of surrounding land and increased revenue from sources beyond just ticket sales. Over time, MTR evolved to rely heavily on non-fare income particularly from property development, leasing of commercial space, and rentals (Verougstraete & Zeng 2014).

LVC in Hong Kong was achieved through multiple financial instruments. These included land premiums collected at public auctions, additional premiums for lease modifications, re-grants of expired or non-renewable leases at updated market prices, and annual land rents calculated based on rental valuations (Hui et al., 2004). In addition, the government collected property taxes and municipal rates based on rising rental values on land to ensure that public revenue also increased alongside the land appreciation driven by transit investment. The institutional design supporting this model was key to its success. Since the government owned all land under a leasehold system and held regulatory control, it was able to strategically allocate development rights. The MTR, which is majority state-owned, functioned not only as a transit agency but also as a real estate developer and asset manager, giving it a unique dual role in driving urban transformation (Dubach & Blandeau, 2019). Challenges began to rise after 2010 when land prices surged, and market conditions changed. The developers became less eager to participate. All these situations led MTR to change its strategy. They started managing the properties they already owned. The goal was to ensure a steady stream of rental income and not by focusing on new developments, as discussed by Cervero and Murakami (2008).

To rapidly increase non-fare revenue streams, India can consider implementing the Rail + Property (R+P) model by having state governments grant transit agencies development rights over land near new stations at "before rail" prices, enabling the capture of subsequent land value appreciation to fund infrastructure. India should reform its institutional structure by mandating that the majority state-owned rail authority function not only as a transit provider but also as a real estate developer and asset manager, which requires early and close coordination with planning agencies to strategically identify land and integrate commercial and housing spaces into station design.

3.2.4 Bogota: Land value development tax, betterment levy, and additional development rights

The capital of Colombia, Bogota, had to combat multiple stressors like rapid urbanization, fiscal stress, and aggravated social inequality. The response to these challenges was the introduction of a set of LVC tools, including Land Value Development Tax (LVDT), betterment levies and additional development rights. These tools were designed in such a way that they would raise funds for public infrastructure and affordable housing, and in line with the city's planning and development policies (Garza, 2019; Triveno et al., 2018).

The city initiated LVC in the late 20th century. By the early 21st century, LVC was incorporated into the urban development framework. This integration led to a more sustainable and equitable approach to managing growth (Garza, 2019). Captura de Plusvalia, one of the key instruments of the LVDT in Bogota, required the landowners to pay a share, which is typically between 30 and 50 percent of the increase in the land value resulting from public investments. However, the tax is only applied when a landowner applies for a development permit. This means the city collects the tax only during moments of land use change, not on a recurring basis (Garza, 2019). To calculate the increase in land value accurately, the city uses a double appraisal system. It also identifies areas with high development potential using spatial planning units, known as UPZs. The Planning Department is responsible for determining the tax rates and selecting areas where land

values are expected to rise due to public works (Garza, 2019). This targeted approach encourages development in key zones and ensures landowners contribute to the infrastructure that benefits them. Since implementation, Bogota has developed more than 1,000 hectares of urban land. It has also approved nearly 150,000 units of affordable housing (Triveno et al., 2018). The policy had strong results.

Alongside the LVDT, the city used another tool known as the betterment levy, or contribución de valorización. This levy was managed by the Urban Development Institute (IDU) and helped finance public works such as roads, parks, and drainage systems. Each property owner's payment was determined by using the lowest of three factors: the total cost of the project, the value added to the property, and the owner's ability to pay (Garza, 2019). To determine which properties would benefit the most from each project, the city established "areas of impact" around them. Between 1997 and 2007, this charge brought in over $1 billion in revenue and assisted in funding 217 public projects (Blanco et al., 2016). Later, the city moved from linking the levy to group projects from the individual ones. By doing so, the fiscal responsibility is distributed more fairly among property owners. Greater public participation in the selection of projects brought in more transparency that has built trust and support for the levy.

To promote higher- density urban development, the city introduced additional development rights (or ADR), which allowed developers to build larger and taller buildings than the normally permitted, if they paid a fee. The revenue from the ADR was then used to finance public infrastructure projects in the surrounding areas (Triveno et al., 2018). The city further explored a vacant land tax in TOD areas to reduce land speculation and capture the added value of improved transportation access (Garza, 2019). The legal foundation for land management and planning was established by the Territorial Development Law of 1997 and the Urban Reform Act of 1989. The city's statutory development plan required the city to create and use its own planning instruments. This resulted in allocating the power to control land use, protect the environment, and manage urban growth to the local government (Juan &Juan, 2018; Tamayo & Estrasa, 2022).

The city completed over 665 projects through its LVC strategy, improving urban development and infrastructure (Triveno et al., 2018). However, challenges included delayed approvals, poor departmental coordination, and real estate market fluctuations. New levies prompted some developers to start projects early, impacting development timing and location (Garza, 2019). Despite these issues, Bogota showed that cities can use LVC tools to fund growth and enhance urban life. The city's approach serves as a valuable example for other cities in Latin America and globally.

The Bogota experience further shows how India can adopt LVC strategies as an integrated part of its comprehensive urban development framework to simultaneously combat fiscal stress, manage rapid urbanization, and strategically generate funds for public infrastructure and affordable housing. To ensure the legitimacy and enforceability of these tools, India should establish a strong statutory and legal foundation, granting local authorities the power to control land use and implement mandatory LVC mechanisms such as the Land Value Development Tax (LVDT) that must be collected strategically now a landowner applies for a development permit. Furthermore, authorities can utilize tools like Additional Development Rights (ADR) to promote higher-density, valuable development around stations, while ensuring public trust by implementing transparent betterment levies linked fairly to projects and clear "areas of impact."

3.2.5 Sao Paulo: Outorga Onerosa, CEPACs and public-private alliances

Sao Paulo implemented various LVC tools to capture the land value to ensure that those who

benefit from public investments also contribute to them. One of the main tools was the Additional Building Rights (Outorga Onerosa do Direito de Construir – OODC), which allowed developers to build more than the standard zoning limits if they paid a fee. The city also used CEPACs which permit developers to buy through public auctions to gain extra building rights (Mahendra et al., 2002). These tools charge developers for building more than the allowed limit (FAR). They can also sell the extra building rights through electronic auctions (Smolka & Maleronka, 2018) which ensures that the city captures money based on real market demand. The money collected from these fees and sales was used to improve urban infrastructure and public services. In some cases, the city also taxed the increase in property values that resulted from public improvements. Public-Private Partnership (PPP) was another important method by which developers and the city worked together to share the costs of big infrastructure projects. All the money collected through these different tools was managed by a city fund called Fundurb, which helped ensure that it was spent on transport, housing, public spaces, and other urban needs (Smolka & Maleronka, 2018).

The city has set up 13 Urban Operations zones, like Agua Espraiada and Faria Lima, where the money from CEPACs is used to improve infrastructure. From 2004, these auctions have raised money that helped the city in funding public housing, drainage projects, parks, roads, and transit systems (Mahendra et al., 2022). In addition to CEPACs, the city uses OODC fees which has been introduced through the 2002 Strategic Master Plan and 2004 Land Use Law. It let developers pay when they want to build more than the fundamental limits. The FAR regulations in the city also help to control urban density and tie growth directly to the city's ability to provide infrastructure (Biderman, 2021).

The motivation behind this initiative was to promote social equity and ensure a fair distribution of the financial benefits arising from public investments and land use changes. By implementing tools such as OODC or sale of building rights charges and CEPACs, the city directed to address inequality in land policy and urban development (Smolka & Maleronka, 2018). The idea behind these measures was mainly to stop private citizens from making outsized profits from public projects and ensure those gains helped parts of the city that had been left behind. The focus was to build a fairer and inclusive urban community. This initiative shows the city's commitment to using urban development to reduce inequality and support those in need through targeted, inclusive public investments (Nobre, 2023).

In the mid-1980s, the city started implementing instruments for capturing real estate appreciation with the enactment of the Law of Interlinked Operations in 1986. This allowed for increased construction rights in exchange for contributions to social housing. The key event happened in 1995 with the approval of the first Operação Urbana Consorciada (OUC). The OUC financed urban redevelopment, such as the expansion of Faria Lima Avenue, through the auction of CEPACs (Nobre, 2023). Also, in 2014, the government introduced a policy to publicly charge for additional building rights. The city was experiencing urbanization challenges with a population of over 11 million. The city needed innovative financing solutions to improve urban infrastructure (Smolka & Maleronka, 2018).

The city created development potential through a comprehensive approach that combined infrastructure investment, legal reforms, financial innovation, and a commitment to social equity. By implementing large-scale infrastructure projects in transportation, public spaces, and utilities, which eventually increased land values in surrounding areas the city enhanced urban accessibility and desirability. The Law of Interlinked Operations allowed developers to gain additional Building rights by providing contributions toward social housing. Financial instruments like CEPACs are entitled to auction additional building rights, incentivizing developers to invest in targeted zones while generating revenue for public projects. Public-private partnerships further

supported urban transformation by pooling resources and responsibilities between the city and the private sector. These measures significantly expanded the city's development potential (Nobre, 2023).

LVC was adopted in the city through legislative backing, structured policy instruments, and coordinated institutional efforts. Institutions like city planning departments, municipal councils, and other sectors work together to manage responsibilities. It helped direct funding to designated urban development efforts with accountability and transparency. This close coordination helped in building a system where LVC tools could be used more consistently and with greater accountability (Mahendra et al., 2022). The strategy implemented by the city proved to be an effective mechanism for mobilizing substantial public revenue. To finance significant infrastructure projects and direct the trajectory of the city's growth, LVC instruments proved to be efficient financing mechanisms. They have proven to be dependable and effective in promoting sustainable urban expansion over time. For example, between 2013 and 2020, the Fundurb allocated significantly large funds to projects like affordable housing, public transportation, and the revitalization of city spaces (Smolka & Maleronka, 2018). These funds made a significant difference. They helped in paying for infrastructure projects that might have otherwise struggled to get enough public backing. However, making it all work was not always easy. There are plenty of difficulties such as complicated administration, resources which often end up in wealthy neighborhoods, and the risk of deepening social divides if things are not handled carefully. Because the regulations allowed the city to finance large infrastructure projects, they had a huge influence. They strengthened the basis for long-term urban planning and aided communities with low incomes. This experience made it clear that to guarantee that the advantages of urban development are shared equally, implementation must be carefully examined, and fairness must be a constant priority.

3.3 Indian case studies on LVC and urban development

3.3.1 The case of Delhi Metro

The development of Delhi Metro shows how LVC can be used to fund public transport projects. During the 1990s, the city was facing urbanization challenges which included increasing traffic congestion, air pollution, and an overloaded bus system (Centre for Science and Environment, 2011). To mitigate these challenges, the DMRC was established as a joint venture between the central and state governments (CAG, 2021). The DMRC used various LVC methods to gather funds. This includes selling and leasing land, working with private developers on joint projects, selling naming rights for stations, and renting out space for shops and advertisements. This approach has generated close to 10 percent of required funding. In the early years, LVC played a bigger role, but after concerns arose regarding the sale of public land, the DMRC shifted to short-term leases and smaller development projects (Mathur, 2019).

Despite its efforts, the DMRC faced many challenges. It did not have control over land use and zoning decisions, had to work with many government departments, and dealt with rigid building rules that limited development near stations. Also, most of its LVC revenue came from new developments, while older properties that gained value from being near the metro were left out (Terra Economics & Analytics Lab, 2021). Nonetheless, the DMRC demonstrated innovation in identifying alternative funding mechanisms and provided valuable insights for other cities. The Delhi Metro experience shows that with better coordination between agencies, more flexible rules, and clear ways to share the benefits, LVC can be a helpful tool to support public transport in growing cities (DMRC, 2023).

3.3.2 Insights from Hyderabad

Hyderabad has been using LVC strategies to support development along the Outer Ring Road, a major highway that helps divert traffic from the congested city center. One major approach has been the use of special development charges, through which the city charges developers higher-than-usual fees for building permissions. This approach helps the city take advantage of the increasing demand for land along this important transport corridor (Hart, 2020). In addition, local village authorities have implemented deferment charges which are applied to landowners who leave their land vacant instead of developing it. The goal is to discourage speculation and encourage landowners to contribute to the area's development. Although both tools have brought in some revenue, the absence of clear and transparent data makes it challenging to evaluate their effectiveness. A third tool proposed but not yet implemented is the area development plan. This approach involves reorganizing multiple parcels of land in a coordinated way to improve infrastructure and services. Doing so can create more value for landowners while helping the government generate additional revenue. Among the three tools, area development plans have the most significant potential to support long-term and inclusive growth. However, they require strong coordination among agencies and political commitment to be successful (Hart, 2020).

One of the key challenges facing Hyderabad is the lack of integration between land development planning, transportation planning, and financing. So far, much of the new development along the Outer Ring Road has occurred in wealthier areas. At the same time, many poorer neighborhoods continue to lack basic infrastructure such as piped water and sewage systems.

3.3.3 Institutional contexts and the varied implementation of LVC in Indian cities

The application of LVC in Indian cities reflects considerable variation in institutional capacity, governance arrangements, and market responsiveness. Delhi offers a prominent case where LVC has been integrated into urban rail development, primarily through public-private partnerships (Li & Love, 2022). However, despite the scale of the Delhi Metro and its support from the central government, development-based LVC mechanisms have remained limited. This outcome is largely attributable to institutional fragmentation. Multiple tiers of government and overlapping responsibilities among public agencies have made coordination difficult, reducing the efficacy of LVC instruments (Suzuki et al., 2015).

In contrast, Hyderabad represents a more coordinated and strategic deployment of LVC. The Hyderabad Metro, widely recognized as the country's largest metro project delivered through a public-private partnership mode, demonstrates how institutional clarity and private sector participation can enhance LVC outcomes. In this case, LVC was not only employed to generate revenue but also to guide urban development. Effective inter-agency coordination and a supportive policy environment enabled the integration of transit infrastructure with real estate development, improving both financial sustainability and spatial outcomes (Suzuki et al., 2015).

Bangalore, while still in the preliminary stages of formal LVC implementation, illustrates the untapped potential of such mechanisms. Empirical studies suggest a significant willingness to pay among home buyers for properties near transit nodes, with premiums ranging from 25 to 42 percent (Jillella & Newman, 2015). This latent value underscores the opportunity for transit-oriented development strategies that incorporate LVC, provided institutional and regulatory frameworks can be strengthened.

Together, these cases highlight that the success of LVC in Indian cities is not solely a function of land market dynamics. Rather, it depends critically on the ability of local governments to coordinate across sectors, align planning and finance objectives, and manage partnerships with private actors. As urban growth accelerates, the institutional design of LVC tools will play a decisive role in determining their long-term viability and impact.

3.3.4 International insights informing India's urban financing

The global experience points to several lessons for India. Legal reforms to establish clear statutory bases, institutional capacity building for urban planning agencies, and coordinated multi-stakeholder frameworks are necessary prerequisites.

From Tokyo, India can learn the importance of integrating transit planning with real estate development, enabling metro and railway agencies to co-develop land near stations and reinvest the proceeds into system upgrades. The Japanese model also demonstrates the efficiency of land readjustment strategies, high-density mixed-use urban forms, and policies that discourage car dependence through taxation and congestion pricing. The benefits of blended financing which combines public investment with business rate supplements, developer levies and value capture mechanisms like the CIL are highlighted by London's Crossrail project as well as the necessity for early stakeholder engagement and strong legal and institutional frameworks to support the use of such instruments. Likewise, the Rail + Property model in Hong Kong has benefitted from coordinated land and transit planning from the very beginning. This was possible not only because the government was free to use public land to develop it in a way that generates long term profit but also because of the implementation of TOD. In general, enhanced institutional coordination, consensus building among stakeholders, and enhanced utilization of land assets will better enable Indian city level actors to plan and finance inclusive urban development.

3.4 Summary

This chapter explores how cities in India and around the world are using LVC to fund urban infrastructure and shape development. It presents global cases from Japan, London, Hong Kong, Bogota, and Sao Paulo, where governments and private actors used tools like land readjustment, property development levies, building rights and community charges to recover part of the value created by public investments. These efforts helped finance metro lines, housing, roads, and other services while also guiding urban growth. In India, cities like Delhi, Hyderabad, and Bangalore have adopted similar tools with mixed results. Delhi Metro showed early promise but struggled with land control and limited coordination. Hyderabad's metro project highlighted the benefits of public-private partnerships and strategic planning. Bangalore showed strong market potential but faced institutional gaps. Across all cases the success of LVC depended on how well land use, transport finance and governance were aligned. International experiences show that strong leadership, clear legal rules, integrated planning and early community and developer involvement were key to capturing value fairly and effectively. For Indian cities to use LVC as a reliable and fair tool they need better institutional capacity, more supportive regulations and stronger partnerships with private developers and local communities.

4. COLLABORATING FOR THE CITY: STAKEHOLDER PERSPECTIVES ON INFRASTRUCTURE, LAND, AND DEVELOPMENT

Contents:

- Perspectives from public agency officials, private developers, and global experts to examine how LVC, TOD, and urban infrastructure financing are shaped by governance, market practices, and institutional design.
- Review of Indian metro rail cases (Hyderabad, Delhi, Mumbai) alongside Hong Kong, highlighting challenges, innovations, and pathways for collaborative LVC implementation.

Key takeaways:

- Stakeholder insights reveal that while infrastructure consistently generates land value uplift, governance bottlenecks, delays, and acquisition hurdles significantly constrain LVC outcomes.
- Real estate developers underline the need for transparent valuations and predictable policy frameworks to sustain long-term investment confidence in TOD and LVC.
- Metro agencies stress that integrating TOD planning early, ensuring zoning flexibility, and strengthening last-mile connectivity are key to unlocking non-fare revenue potential.
- The Hong Kong Rail + Property model showcases how institutional alignment, financial innovation, and cross-subsidization can turn transit projects into powerful engines of urban growth.

Learnings for Indian planning and policymaking:

- Indian cities must strengthen institutional capacity in transport and urban planning, addressing fragmented land ownership and inter-agency coordination gaps to enable effective LVC and TOD implementation.
- Streamlining approval processes and clarifying legal and regulatory frameworks, including land-use and TOD incentives, is critical to reduce procedural delays and unlock private investment in urban transit projects.
- Granting metro agencies greater development autonomy and integrating real estate rights with transit responsibilities can create sustainable financing models, drawing lessons from Hong Kong's Rail + Property approach while adapting to India's context.
- LVC strategies should be designed to reinvest captured land value into public infrastructure and services, ensuring inclusive urban growth rather than merely financing project costs.
- Long-term success of TOD in India requires context-sensitive urban design, combining density, mixed land use, and connectivity with stakeholder engagement, to create equitable, vibrant, and financially resilient neighborhoods.

4.1 Introduction

This chapter presents an overview of stakeholder perspectives on land, infrastructure development, and urban transport planning in India. Drawing on interviews and interactions with real estate developers and senior experts from key agencies such as the MMRDA, DMRC, Hyderabad Metro, and Trans-Consult (Hong Kong), the chapter identifies the institutional, financial, regulatory, and socio-political dynamics that shape the implementation of LVC and TOD mechanisms. A comparative perspective with the globally recognized Hong Kong MTR model further enhances understanding of the viability and constraints of similar strategies in India.

This chapter is grounded in qualitative insights gathered through interviews with senior officials and key stakeholders involved in metro rail, land use planning, and infrastructure financing in India. The aim is to reflect on the firsthand experiences and institutional viewpoints shared by the stakeholders themselves.

4.2 Real estate developers' perspectives on LVC

Real estate developers' decision-making process in India is shaped by a complex set of considerations. These include connectivity, affordability, zoning regulations, and policy frameworks. Among the financial strategies related to urban development, LVC has gained international attention for its potential to recover a portion of the increase in land value resulting from public investments in infrastructure. Despite this, LVC remains a secondary mechanism in India, where traditional land acquisition based on monetary compensation continues to dominate. This chapter examines developers' viewpoints and interview insights to understand the factors influencing location preferences, the challenges of implementing LVC, and the practicality of adopting models like Rail + Property in the context of India.

4.2.1 Factors shaping location choices and strategic considerations in urban land development

For most developers, the first question that arises when planning a project about infrastructure is "Where is the road going to open?" Connectivity is a critical determinant. Developers look for areas where road networks, metro lines, and transport hubs are either operational or planned. This infrastructure improves accessibility and contributes significantly to future land value. However, connectivity alone is not enough. Developers aim to ensure that the project aligns with market needs by analyzing product-market fit. They examine zoning regulations, assess the potential for future growth, and consider whether the housing supply will be affordable and desirable.

Buyers' preferences also play a significant role. People tend to choose homes based on access to quality schools, hospitals, retail centers, and overall lifestyle amenities. Developers recognize these factors and evaluate the broader appeal of a location, ensuring it caters to a diverse demographic. Affordability of land is another crucial factor, as it directly affects the cost of housing. Thus, the attractiveness of a site is determined by its accessibility, market alignment, and potential to attract a large and varied buyer base.

4.2.2 Infrastructure investment and its influence on location

Although infrastructure investments are assumed to enhance land value, their impact is not always immediate or evenly distributed. Often, ongoing construction disrupts the area and temporarily lowers its attractiveness. For infrastructure to positively influence real estate development, it must go beyond merely connecting two points. Developers argue that unless the entire corridor is developed and supported by land-use planning, the benefits of infrastructure remain limited. Strategic interventions such as zoning adjustments, regulatory support, and active government facilitation are needed to ensure that infrastructure translates into real value for both investors and residents.

4.2.3 Challenges in implementing LVC in India

Despite the clear connection between public investment and land value, LVC has not become an institutionalized infrastructure financing tool in India. A major concern expressed by developers relates to taxation. Governments collect substantial revenues from various levies, but the allocation of these funds is often unclear. Developers, as frequent targets of taxation, feel unfairly burdened. In some cities, they must pay high premiums for land-use conversion. For instance, converting industrial land to commercial use in Mumbai requires a 25 percent premium. Developers question the rationale behind such charges and ask where this money goes. If these are forms of LVC, then transparency and clarity are needed.

Furthermore, developers often pay for infrastructure in advance but face delays in its execution. A common example involves road construction. If a developer pays for a 60-meter-wide road, but only 20 meters are built over the next several years, it raises the concern about how the funds were used. These gaps in service delivery undermine trust in LVC mechanisms.

4.2.4 Public-private partnerships and revenue streams

Considering conventional LVC mechanisms being associated with certain limitations, public-private partnerships (PPPs) offer a potential solution to address funding challenges and align public and private interests. However, the implementation of PPPs in India is often hindered by a persistent trust deficit between private developers and public authorities. There were concerns about government accountability due to perceived misuse of funds. Moreover, private developers frequently argue that they are already subject to substantial financial burdens, including stamp duties, goods and services tax, and charges related to FSI and transferable development rights, which makes any proposal to add new charges a subject of dispute or resistance.

Despite these challenges, certain urban infrastructure projects in India show that well-designed PPP models can work effectively. The Bangalore Metro, for instance, makes money by renting out the space beneath its stations. Similarly, the NICE road in Bangalore is a privately built toll road that is successfully operated and maintained by private developers. All these examples highlight that when infrastructure development is supported through strong institutional frameworks and transparent governance, PPPs can be a useful way to supplement public funding for urban infrastructure.

4.2.5 The feasibility of the Rail + Property model

The successful Rail + Property model in countries like Japan, especially in the Shinagawa district, shows promise as a form of LVC. It offers a promising approach to LVC by integrating transit infrastructure with real estate development. However, its implementation in India faces significant limitations. A key barrier is the lack of publicly owned land in major urban centers such as Mumbai and Pune, which restricts the ability to align transport and real estate development. Additionally, administrative fragmentation and disputes between state and central authorities often delay or obstruct infrastructure projects. In contrast to Japan's highly efficient and widely used public transport system, Indian cities suffer from inadequate last-mile connectivity and limited commuter amenities. This situation leads to a continued preference for private vehicles. For the Rail + Property model to be viable in India, there is a pressing need to enhance the attractiveness and reliability of public transportation. Improving service quality and increasing ridership are essential prerequisites for enabling successful TOD as a strategic tool for urban growth and revenue generation.

4.2.6 Moving towards transparent and fair value capture

Considering the ongoing challenges in infrastructure financing, it is essential to establish LVC mechanisms that are both transparent and equitable. An effective LVC framework must balance the interests of private developers, public authorities, and local communities. One critical measure is the implementation of localized surcharges, wherein taxes collected from a specific development area are reinvested within that same locality. This approach enhances transparency and ensures that the benefits of public investment are directly experienced by the contributing community. Moreover, equitable taxation is fundamental; developers often question the rationale for paying additional levies when basic infrastructure services, such as drainage, remain unaddressed. Therefore, LVC systems must be designed to guarantee reciprocal value for all stakeholders involved. Additionally, infrastructure planning must be context sensitive. While metro systems may be suitable for large metropolitan areas, other cities may benefit more from investments in BRTS, road widening, or improved pedestrian infrastructure. LVC policies must be adaptable to reflect the unique needs and priorities of each urban area to ensure both fiscal sustainability and public trust.

The ongoing discussion around real estate location choices and LVC in India points to a larger need for urban development to be fair, strategic, and transparent. While infrastructure projects can raise land values and boost real estate growth, its true impact depends on thoughtful planning, timely service delivery, and clear financial systems. If designed and implemented well, the LVC mechanism can offer a steady source of funding for urban infrastructure while ensuring that both developers and residents benefit from the increase in land value. However, for LVC to succeed in India, trust in government policies is essential along with fair taxation and timely completion of projects. A more localized and transparent approach, where the money collected is reinvested back into the same area, is useful. This can encourage developers to take a more active role in shaping better cities. In the end, urban development should not only aim to capture rising land values, but also focus on creating real, lasting values for people. This calls for strong governance, collaboration among stakeholders, and a long-term vision for sustainable and inclusive growth.

4.3 Governance, risk, and revenue in urban rail: The case of Hyderabad Metro

The concession structure of Hyderabad Metro operates in accordance with a long-term concession agreement with the government of Telangana for a period of 60 years. The initial 35-year period includes an additional 25-year extension. The contract is aligned with the Model Concession Agreement guideline, which standardizes PPP in infrastructure delivery.

The metro rail system comprises three fully elevated corridors with an approximate length of 70 km. The Telangana government has granted 18.5 million square feet for property development. The government distributes these across approximately 50 designated land parcels. These parcels play a vital role in supporting real estate development and generating non-fare revenue. In line with multimodal integration guidelines, it is suggested that parking facilities are required to be provided within a 50- to 300-meter radius from the station sites to ensure convenient access for commuters.

4.3.1 Operational and financial challenges

One of the biggest challenges for the Hyderabad Metro has been the way land was provided for the project. The concessionaire, L&T, received land only on a relatively short-term license basis, meaning it could use the land but did not own it. Because of this, all assets developed on the land must return to the government at the end of the concession, which makes housing projects unviable and pushes the developer to focus mainly on commercial complexes. The project has also faced restrictions on contract flexibility: the operator can sign agreements only for up to 11 months on its own, with anything longer requiring prior government approval, often causing delays. In addition, the agreement initially did not allow for mortgage or leasehold rights, which made it difficult to raise funds and slowed down private investment. Together, these rules have limited the Metro's ability to shape well-integrated, mixed-use urban spaces around stations.

4.3.2 Financial performance and risks

Hyderabad Metro is currently operating at a loss. The excessive cost of borrowing has added further strain on the project's finances. Since the COVID-19 pandemic, there has been a significant rise in work-from-home arrangements. This shift in commuter patterns has led to a noticeable decline in daily ridership. Revenue from metro operations alone is not sufficient to meet debt obligations within the required time frame.

4.3.3 Policy and contractual issues

The concession and license agreements for the metro rail project are based on a government policy framed in 2009-10. This policy was drafted by the NITI Aayog. However, it does not accurately reflect the current needs of infrastructure financing or private sector participation. One of the major concerns is the revocability clause. Under the present policy, the concession agreement can be canceled or revoked. This clause creates uncertainty and weakens the project's marketability. It also affects financial security and discourages long-term private investment.

4.3.4 Recommendations

Hyderabad Metro recommends that development rights be treated on par with those granted in the airport sector. Such an arrangement would provide the project with greater flexibility and enhance its financial feasibility. The government is advised not to impose restrictive land-use conditions; instead, granting a free hand or offering land-use rights for a fixed period would facilitate the monetization of land assets. A framework in which revenues generated can be reinvested into the project would further strengthen financial sustainability. At present, real estate developments cannot become operational until the metro itself is fully operational. Removing this restriction would enable early revenue generation and ease the financial burden during the initial phase. The first 10 to 15 years are critical for building project momentum, and granting Hyderabad Metro greater autonomy during this period would support viability and help achieve financial closure sooner. The current burden of Interest During Construction (IDC) is significant, and a revised risk-sharing mechanism is necessary to mitigate this pressure and ensure long-term sustainability. Since the project has already received VGF, converting the land-use model from license to lease would help bridge the financing gap and attract investors.

Of the approximately 100 acres of depot land, 70% is allocated for metro operations, while the remaining 30 to 40% is earmarked for real estate development. This portion could be allotted on either a freehold or leasehold basis. To maximize value creation, a joint development model is recommended, with revenue sharing integrated into both financing and development strategies. A 70:30 land-use mix is proposed, with 70% for commercial purposes and 30% for residential development. The residential portion may be given greater flexibility, and revenues from this segment could also be incorporated into revenue-sharing agreements.

4.4 Insights from DMRC on TOD and LVC implementation in Delhi

This section presents institutional perspectives from DMRC on the challenges and opportunities of implementing Transit-Oriented Development (TOD) and Land Value Capture (LVC) in Delhi. The insights underscore how structural constraints, procedural bottlenecks, and financial uncertainties shape the effectiveness of TOD as a tool for advancing sustainable urban development and supporting infrastructure financing.

4.4.1 Institutional complexity and jurisdictional overlaps

Delhi's status as the national capital contributes to a complex regulatory environment. The multiplicity of governing bodies and overlapping administrative jurisdictions creates barriers to implementing land-based financing mechanisms such as LVC. Within this setting, the DDA holds the responsibility for formalizing TOD nodes. Twelve TOD nodes have been approved to date. However, only the New Delhi Railway Station (NDLS) node has reached finalization. The selection of NDLS was based on its compliance with the criteria set forth in the officially notified TOD Policy for Delhi (Gazette of India, Notification No. S.O. 3063(E), July 30, 2021). The entire 800-meter influence zone surrounding NDLS falls within DDA jurisdiction, which allowed for coordinated land acquisition and land use modifications through the NDLS Influence Zone Plan (IZP).

4.4.2 Objectives and strategic vision for TOD

TOD is viewed as a tool to manage unplanned urban expansion, decongest high-density areas, and promote integrated residential and commercial environments around transit nodes. From the perspective of urban transport agencies, TOD also represents a critical financial strategy. By capturing the increase in land values generated by metro infrastructure, TOD offers a potential pathway toward financial self-sufficiency and infrastructure sustainability. The vision includes embedding LVC within TOD zones to support the long-term maintenance and expansion of metro networks. This reflects a broader institutional shift toward integrating land development with transit planning to diversify public revenue sources.

4.4.3 Procedural requirements and delays

The development of TOD zones involves an extensive series of procedural requirements. Projects often rely on land readjustment models, which minimize the need for compulsory acquisition. However, when land acquisition is unavoidable, several statutory clearances are required.

These include environmental impact assessment reports, water impact assessments, traffic police approvals, and long-term feasibility and projection reports covering a 35-year horizon. All approvals must ultimately pass through the Lieutenant Governor's Office. This additional step significantly increases the time required for implementation and creates procedural bottlenecks that delay project execution.

4.4.4 Private sector participation

Although the participation of private developers is not mandated in the TOD policy framework, DMRC engages them independently for specific tasks, particularly in preparing and implementing Influence Zone Plans. The inclusion of private actors is intended to supplement public resources, attract capital investment, and improve the pace of implementation. Private sector involvement is considered a means of enhancing both financial feasibility and project efficiency, particularly in contexts where public institutions face constraints in staffing or capacity.

4.4.5 Development incentives and zoning flexibility

One of the principal benefits of TOD designation is the regulatory incentive provided through increased Floor Area Ratio (FAR). In most parts of Delhi, the permissible FSI is restricted to a range between 1.5 and 2. However, TOD zones allow for higher FAR. This zoning flexibility enables high-density, mixed-use development around transit hubs. The potential for increased vertical construction and intensified land use significantly enhances the value and investment potential of these areas, making them attractive for both public and private development efforts.

4.4.6 Funding challenges and revenue gaps

Despite the promise of TOD as a revenue-generating model, several financial design issues remain unresolved. A TOD cess has been introduced as part of the policy framework. But it's unclear how the cess is calculated, who collects it, and how the money is spent.

The absence of detailed guidelines regarding the inclusion of additional stamp duties or the use of Transferable Development Rights (TDR) adds to the uncertainty. These gaps in policy design affect the financial feasibility of TOD projects and reduce investor confidence. Moreover, the revenue distribution mechanism between institutions such as DDA, DMRC, Indian Railways, and the NCRTC has yet to be formally established.

4.4.7 Delays in planning framework notification

TOD planning in Delhi is anchored in the Master Plan for Delhi, which serves as the city's primary spatial and regulatory framework. However, the 2041 version of the Master Plan has not yet been officially notified. As a result, TOD initiatives remain at the conceptual or policy level and have not translated into large-scale implementation. This delay restricts the policy's ability to influence current development decisions and undermines the momentum for infrastructure-linked urban transformation.

4.4.8 Institutional reform

To address the structural and procedural challenges associated with TOD implementation, the formation of a Special Planning Authority (SPA) has been proposed. Such an authority is expected to provide greater autonomy in planning decisions and streamline approval processes. SPAs can significantly reduce institutional delays and improve coordination and are expected to offer operational flexibility and support more efficient revenue generation.

4.5 Insights from the MMRDA

4.5.1 Land development and public resistance

Metro station lands in Mumbai could not be monetized or capitalized effectively so far. One of the main reasons is that the metro stations were constructed above ground, which results in no direct land access. This structural limitation makes it difficult to use the surrounding land for commercial or revenue-generating purposes. Additionally, one of the biggest challenges faced at several station locations was identifying suitable spots for placing the gates for entry and exit. A significant hurdle in the implementation of metro projects was public resistance. A considerable portion of the urban population lacks awareness of the long-term socio-economic benefits associated with metro systems, including improved land values and enhanced urban accessibility. For example, in Juhu, residents, including Bollywood celebrities, opposed the proposed metro alignment and instead expressed a preference for an underground alternative.

The construction of underground metro corridors faces considerable feasibility constraints, such as the presence of old utility lines, including drainage and water supply systems laid during the British era. The construction of an underground line requires the removal and complete reconstruction of these utility systems. Considering the extensive scope and technical challenges involved, this approach is not viewed as a feasible solution for Mumbai.

4.5.2 LVC and TOD policy

Various LVC strategies have been adopted to strengthen the financial viability of the Mumbai Metro. Among these, the use of metro station spaces for advertising has emerged as a major contributor to non-fare revenue. The central pillar of MMRDA's planning strategy is TOD. Under this framework, a 500-meter radius around metro stations was designated as a priority zone for integrated development. It was developed during the COVID-19 lockdown period, which gave officials the opportunity to examine ground-level realities more closely and adapt the planning process accordingly.

The formulation of TOD drew from international best practices. French planning consultants with experience in successful TOD implementation were engaged to support the design and alignment of the policy. Additionally, the model was inspired by the Hong Kong approach, where metro stations are directly connected to commercial developments at the first-floor level. This design enables vertical integration of transit and land use and allows efficient utilization of limited urban airspace.

4.5.3 Redevelopment and FSI utilization challenges

A key challenge in the implementation of TOD in Mumbai relates to the reluctance of existing buildings to undergo redevelopment, even in cases where the FSI has been increased. Redevelopment efforts have mostly been confined to structurally weak buildings or those taken up under government-led initiatives. Despite policy provisions to enhance FSI in designated TOD zones, most privately held structures have not responded to these incentives, resulting in underutilization of redevelopment potential around metro corridors.

To improve TOD implementation, MMRDA proposed revising conventional building use norms. It was recommended that the first floors of new buildings or those near metro stations be designated for commercial use, instead of limiting commercial activity to the ground floor. This approach aims to increase foot traffic and support local businesses while boosting metro ridership.

Parking norms were also revised in alignment with TOD objectives. Notably, provisions for luxury car parking were excluded to discourage private vehicle use and promote a shift toward public transport. These measures reflect a broader effort to integrate land use and transport planning and reduce car dependency.

4.5.4 Pedestrian infrastructure and accessibility

A major concern raised was the lack of adequate pedestrian infrastructure, especially near metro stations. Poor-quality or absent footpaths were frequently cited by residents. Improving these facilities is seen as essential for enhancing last-mile connectivity and ensuring safe, accessible pedestrian movement to and from stations.

MMRDA also proposed the integration of commercial first floors across buildings surrounding metro stations. The goal is to create a continuous elevated pedestrian network by connecting

the first floors of adjacent buildings. This model, inspired by Hong Kong, supports high footfall and weather-protected pedestrian circulation, and aligns with TOD principles of walkability and reduced street-level congestion.

4.5.5 Innovative funding strategies

To meet the high capital requirements of metro development, MMRDA proposed a novel funding model involving pension funds. These funds, which typically yield low interest returns, could be invested as equity in metro projects, offering higher returns to fund managers. Mumbai Metro, in turn, would benefit from access to capital at rates lower than conventional debt, reducing overall financing costs. This approach highlights the potential of leveraging long-term domestic capital for public infrastructure.

The calculation of additional FSI was also noted as a critical planning factor. Permissible FSI is linked to the carrying capacity of existing utility systems, such as water, drainage, and electricity. Increasing FSI in areas already under pressure would require infrastructure upgrades, thereby increasing the cost of development.

4.5.6 Land bank utilization and revenue generation

MMRDA holds a dedicated land bank that it leases for commercial and institutional use. Revenue from these leases contributes significantly to metro project funding. In areas such as Bandra-Kurla Complex (BKC) and Wadala, while MMRDA retains land ownership, commercial development has been carried out by private developers, demonstrating a public-private partnership model for land monetization.

4.5.7 Additional funding instruments

In addition to leasing, MMRDA introduced other funding mechanisms to support metro development. One such policy involves doubling the development charges levied by municipal corporations on real estate developers. While these funds were intended for metro-related projects, some have been redirected to other infrastructure efforts, such as coastal road development.

4.5.8 Development integration and private sector participation

To encourage private sector participation, MMRDA proposed incentives for developers to integrate their commercial properties with metro stations. These include allowing direct access gates from metro stations to malls and enabling developers to advertise their products within stations. Such integration was aimed at boosting both ridership and commercial viability. Despite these incentives, developers remained cautious. Concerns about government credibility, delays, and policy reversals limited their willingness to participate. This hesitation highlighted a persistent trust deficit between public authorities and the private sector.

A notable example was the Goregaon Station integration. In 2025, Oberoi Shopping Mall was connected directly to the metro station, serving as a pilot case for integrated transit-commercial development. This project demonstrated the potential benefits of coordinated infrastructure and real estate planning.

4.6 The Hong Kong Rail + Property Model: Lessons for India's TOD planning and infrastructure financing

4.6.1 The "Zero Subsidy" model

Hong Kong has a legally defined urban railway development framework. The cornerstone of this framework is the "Zero Subsidy" model, under which the metro system is developed, maintained, and operated without direct financial support from the government. Despite the absence of state subsidies, the MTR Corporation remains a profitable and self-sustaining enterprise.

The core principle of this model lies in granting the railway agency, namely the MTR Corporation, the right to develop land surrounding the transit corridors. In exchange for undertaking the responsibility of rail construction and operations, MTR is allowed to plan and develop real estate projects in proximity to stations. The land development rights are tightly integrated with rail infrastructure responsibilities, meaning only the railway agency is permitted to exploit this land for urban development. This integrated Rail + Property model enables MTR to recover infrastructure costs through long-term real estate revenues, rather than relying on public subsidies.

4.6.2 Urban form and planning alignment

Hong Kong's urban form follows the "linear city" concept, wherein economic and social activities are spatially aligned along the transit corridors. This spatial pattern enables efficient transport planning and enhances the viability of TOD. As transit is the backbone of daily life in Hong Kong, residential, commercial, and recreational nodes are intentionally clustered along the railway, ensuring consistently high ridership and footfall.

4.6.3 Ownership and governance of the MTR Corporation

The ownership of MTR Corporation is structured as a public-private hybrid. Approximately 77 percent of the corporation is owned by the Government of the Hong Kong Special Administrative Region, ensuring strong public oversight. The remaining 23 percent is privately owned and publicly traded on the Hong Kong Stock Exchange (HKEX). These shares are held by a mix of institutional funds, private individuals, and global investors, giving MTR access to diverse capital markets while maintaining public control.

4.6.4 Financial flexibility

In situations where the viability gap is too large to be bridged by property development or when VGF is insufficient, the model transitions from the Rail + Property structure to a concession model. Under this approach, the government assumes the responsibility of funding and constructing the rail infrastructure, while a private operator is engaged to handle operations and maintenance. This reduces the financial risk borne by the private sector but requires larger fiscal commitment from the government. Such flexibility allows Hong Kong to pursue infrastructure development even in less commercially lucrative zones.

4.6.5 Value capture instruments

To support infrastructure funding and bridge financing gaps, Hong Kong has employed a robust set of LVC instruments linked to TOD. Two principal tools are used:

- Connection Fees: These are levied on new developments that directly benefit from improved accessibility provided by new transit infrastructure.
- Property Rates: Adjusted to reflect increased land values resulting from proximity to transit, these are collected by the government and directed into general revenue.

According to the Hong Kong Planning Standards and Guidelines (HKPSG), any development located within a 500-meter radius of a transit node is eligible for additional FSI. This additional development right is granted in exchange for a land premium, which is paid to the government. The collected premium is earmarked for infrastructure funding, especially when conventional VGF mechanisms are not applicable.

4.6.6 Public revenue integration

The land premium and the increased property tax revenues generated by transit-induced appreciation are both directed to government accounts. While the land premium supports infrastructure development, property taxes contribute to the public funds. The capital required for new rail infrastructure is therefore largely financed through vertical real estate development around transit nodes, aligning spatial planning with financial sustainability.

4.6.7 Historical evolution of the rail and property development model

The development of Hong Kong's rail infrastructure was initially supported through the sale of development rights, particularly air rights. This mechanism allowed private developers to construct buildings above or around transit stations, thereby generating funds to finance rail projects. Over time, the model evolved with the introduction of public-private partnerships (PPPs). Under these arrangements, the government retained ownership of the rail infrastructure, while private developers contributed to construction and, in some cases, operational responsibilities.

Eventually, the MTR became the sole entity responsible for both rail operations and property development. This institutional consolidation enabled the MTR to directly use profits from real estate ventures to support the expansion of the rail network. The model reflects a shift toward financial self-sufficiency, where revenue from property development is reinvested into transit infrastructure directly.

4.7 Recommendations for India: An international comparative perspective

4.7.1 Land ownership and acquisition barriers

In the Indian context, land ownership is highly fragmented. Urban land is held by a diverse set of actors, including private individuals, public sector undertakings, and various levels of

government. This fragmented ownership structure presents significant challenges for large-scale infrastructure projects such as metro and regional rail systems. Land acquisition frequently involves extended negotiations, legal disputes, and administrative hurdles, resulting in delays and cost escalations. In contrast, the Hong Kong model benefits from a more centralized land management system, where land is largely under government control, allowing for more efficient acquisition and allocation aligned with transit infrastructure needs.

4.7.2 Institutional complexity and regulatory delays

Infrastructure project implementation in India is often hindered by a complex and multilayered approval system. Projects require clearances from numerous government agencies and regulatory bodies at the municipal, state, and national levels. This bureaucratic structure contributes to procedural delays and inefficiencies. By comparison, Hong Kong's planning framework is more streamlined. The Town Planning Board is responsible for approving Outline Development Plans (ODPs), and land allocation is accompanied by a dedicated infrastructure budget, significantly reducing approval timelines and implementation bottlenecks.

4.7.3 Limitations in current TOD practices

In India, many developments labelled as Transit-Oriented Developments (TODs) do not fully embody the principles of integrated planning. Rather than prioritizing connectivity and multimodal integration, such projects are often large-scale real estate ventures located near transit stations. These developments frequently lack seamless integration with transportation infrastructure and do not support walkability or mixed-use environments. In contrast, Hong Kong's TOD model prioritizes integrated design. Station areas are directly connected to residential, commercial, and recreational zones, creating a well-coordinated and user-friendly urban environment.

4.7.4 Retail planning and customer-centric development

Another key distinction lies in retail planning. In India, retail spaces within or around transit nodes are often leased to the highest bidder, regardless of contextual relevance or user needs. This may result in the dominance of businesses such as sweet shops or local food vendors that do not necessarily align with the broader needs of commuters or local communities. In Hong Kong, retail planning is guided by customer behavior and community needs. Developers intentionally curate retail offerings to ensure they are aligned with passenger expectations and the functional character of the station environment.

4.7.5 Core recommendations for India

- Streamline land acquisition processes: Centralized coordination mechanisms and dedicated urban land management agencies should be explored to simplify land acquisition for infrastructure projects.
- Simplify and consolidate the regulatory framework: Establishing single-window clearance systems and improving inter-agency coordination could significantly reduce procedural delays.

- Reform TOD implementation strategies: TODs should be redefined to emphasize multimodal connectivity, walkability, and functional integration between transit and land use, rather than treating them as isolated real estate ventures.
- Align non-fare revenue with long-term financial sustainability: There is a need to strengthen non-fare revenue sources in a way that complements fare revenues. This could include strategic land development, advertising, and curated retail planning to ensure operational viability over the long term.

4.8 Summary

This chapter synthesizes diverse stakeholder perspectives to uncover the institutional, financial, and procedural challenges facing the implementation of LVC and TOD in India. Drawing on interviews with metro authorities, planning bodies, consultants, and private developers, the findings reveal persistent barriers such as fragmented land ownership, limited contractual autonomy, outdated concession models, and a trust deficit between public and private actors. Across Delhi, Mumbai, and Hyderabad, stakeholders pointed to issues of jurisdictional overlap, procedural delays, underutilized TOD incentives, and rigid land-use regulations as key bottlenecks to infrastructure delivery and financial sustainability.

The chapter also reflects on the globally recognized Hong Kong Rail + Property model, which offers valuable lessons for aligning transit infrastructure with land development through institutional integration, financial self-sufficiency, and customer-centric design. However, the replicability of this model in India remains constrained by structural differences in land governance, planning capacity, and urban form. Unlike Hong Kong's centralized and vertically integrated approach, Indian cities face highly decentralized land ownership and complex, multi-tiered regulatory environments that hinder seamless implementation.

Despite these constraints, there is shared recognition across Indian stakeholders that deeper integration between land use and transport planning is essential for building financially resilient and inclusive urban systems. Achieving this requires not just international inspiration but locally grounded reforms that streamline approval processes, improve policy clarity, grant development autonomy to metro agencies, and create transparent mechanisms for reinvesting revenues. For LVC and TOD to fulfill their potential in India, urban growth strategies must go beyond capturing rising land values to creating long-term, equitable value for citizens. This calls for recalibrated governance, stronger institutional collaboration, and a sustained commitment to participatory, context-sensitive urban development.

5. RECOMMENDATION (THE 3-I STRATEGY)

This chapter presents a detailed roadmap for mainstreaming Land Value Creation and Capture (LVCC) as a core non-fare revenue stream for existing and future urban (metro) and regional railway projects in India, aimed at ensuring financial stability and sustainability of the projects. Innovative LVCC using a range of urban planning, design-based, and fiscal instruments can work as a strategic mechanism for promoting urban transit ridership, boosting total revenue, attracting private sector investments, and catalyzing transit-oriented development patterns in urban cores and metropolitan regions of India. These urban transformations, in turn, can help decarbonize urban transportation, improve public health, stimulate the economy, and enhance livability. LVCC mainstreaming in urban development, we argue, is imperative for achieving the level of infrastructure upgrade that is essential to meet both Viksit Bharat@2047 as well as India's Net Zero by 2070 goals.

We present three key recommendations (The 3-I strategy: Invest, Integrate, Intensify) in this chapter, along with details of implementing them (Exhibit 5):

Exhibit 5: Recommendations for financially sustainable development and operations of urban and regional rail systems using land value creation and capture mechanisms (The 3-I strategy)

5.1 Recommendation 1 – Invest – Adopt successful Asian models of land value creation (TOD) and capture

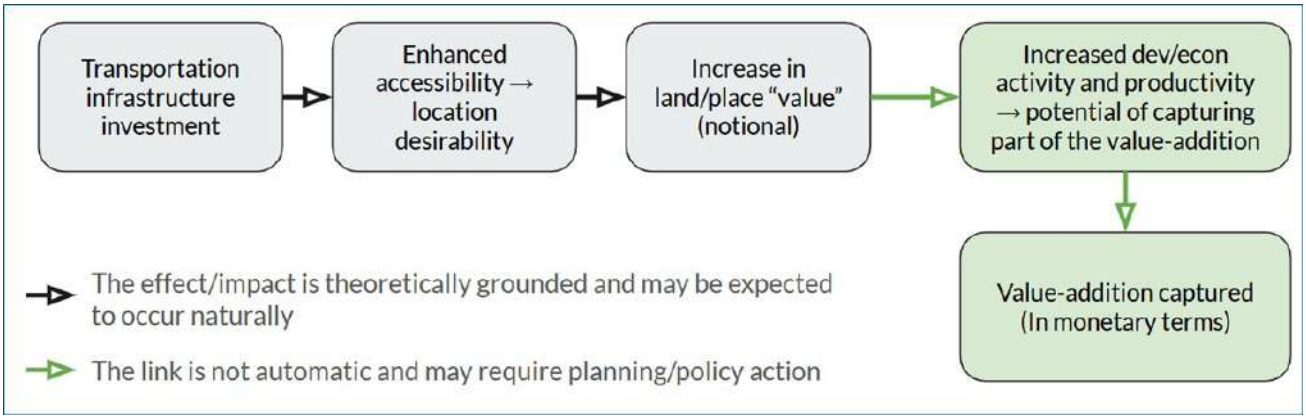
5.1.1 Learning and contextualization as an imperative

We recommend that Indian urban (metro) and regional rail projects derive inspiration from Hong Kong's Rail + Property model (explained in detail earlier in this report) and the Japanese model (detailed further in the following sub-sections) of land value creation (in station areas and TODs around them) and capture in the context of rail development. Both existing as well as planned systems – without or with private sector participation – can adopt and integrate these models in the presence of suitable institutional, policy, and legal support systems. This can help improve the future financial health of the existing systems and thereby both ease public finance burdens and retain private sector participants. The presence of these frameworks along with necessary

legal and policy structures can help encourage private sector investments in new projects by assuring stable and substantial non-fare revenues in the presence of regulations to keep fares affordable in the greater interest of promoting accessibility for the transportation-disadvantaged and boosting low-carbon transportation mode use.

The following Exhibit 6 illustrates that land value creation and capture are not automatic processes; they must be intentionally and strategically designed through the coordinated use of urban planning, public policy, fiscal measures, regulatory frameworks, and design tools. Because land, laws, and policy fall within the jurisdiction of government, it is the responsibility of various levels of government to establish enabling conditions – including the mechanisms to capture land value uplifts generated by infrastructure investments, wherever feasible. Within such a framework, prudent urban and regional rail agencies can, either independently or in partnership with the private sector, develop and operate financially sustainable and affordable systems that serve a broad cross-section of the urban and regional population.

Exhibit 6: The role of planning/policy: Create value, capture it



5.1.2 Learnings from Japan's model – How to develop successful TODs – The "creation" of valuable places and real estate in and around urban and regional rail stations

The section provides a comprehensive overview of Japan's Transit-Oriented Development (TOD) model, detailing its historical evolution from an organic pattern of urban growth to a formalized planning tool addressing urban challenges and supporting sustainable transportation investments. It outlines two distinct models of TOD: Model 1 for high-intensity, vertical development around central stations, and Model 2 for mixed-use development in suburban areas. It explores the "virtuous cycle of railway capital" that financially sustains these projects by reinvesting revenue from land value premiums. Furthermore, the chapter examines several innovative financing mechanisms (such as transferring air rights and using Business Improvement Districts) and legislative measures (including the Land Readjustment Act and the Railway and Redevelopment Act) that support TOD implementation and generates revenues that can support the rail projects that are essential for TODs in the first place. Finally, the chapter uses case studies to illustrate how TOD is applied practically and highlights the institutional support that drives this successful, context-specific urban planning strategy. The chapter is developed based on Japan's TOD Guidebook (2021). Exhibits presented in this section are also taken from the guidebook.

How did Japan adopt TOD?

It has long been discussed in both academic and planning circles that transport infrastructure shapes and enables the spatial arrangement of urban functions, and vice versa. TOD, as an urban and regional planning approach, builds on this idea of the land use–transport feedback mechanism. It seeks to orient the development of different land uses (residential, commercial, recreational, and others) towards public transit hubs through strategic planning and sustainable infrastructure management. Japan has traditionally been a railway-dependent country, and since the introduction of railways in 1872, the organic pattern of its urban growth has shown a strong inclination towards rail transit infrastructure. In other words, as railway lines extended into metropolitan regions, land use growth tended to cluster around transit infrastructure: city cores expanded along railway tracks, while new towns emerged around newly built stations outside the metropolitan core. Interestingly, TOD as a planning tool largely formalizes this organic feedback mechanism between land use and transit.

Although deliberate attempts to orient commercial and residential developments towards individual railway stations in Japan can be traced back to the 1910s, what is new about the concept is the adoption of this transit-station-oriented model as a multifaceted solution to a host of challenges: population growth in urban areas and the corresponding demand for housing, traffic congestion, urban decay, environmental pollution, and others. Therefore, it is important to understand how Japan has adopted TOD as an all-around problem-solving approach to urban and metropolitan issues.

First, in the Japanese model, TOD has been used not only to densify but also to intensify (through three-dimensional developments) land use around diverse types of railway stations. This has enabled the strategic redistribution of urban population into railway station neighborhoods and along transit corridors. In other words, through micro-scale planning for vertical development of infrastructure, both above and below ground, and a balanced allocation of space for residential, commercial, recreational, and other uses, transit station neighborhoods have been designed to accommodate the growing urban population.

Second, Japanese cities have employed TOD-based designs to reduce traffic congestion and the accompanying environmental pollution by concentrating different land uses within high-intensity developments in transit neighborhoods. This ensures that more people can find their daily activity centers within walking distance of transit stops. The idea is to encourage walking for short-distance commutes while accessing workplaces, residences, shops, and recreation. For medium- and long-distance commutes, people are encouraged to use public transit (i.e. railways in the Japanese case) rather than rely on private vehicles. Thus, on the one hand, high-intensity land use planning encourages walking; on the other hand, a strategically planned and punctual railway system promotes transit use for longer commutes.

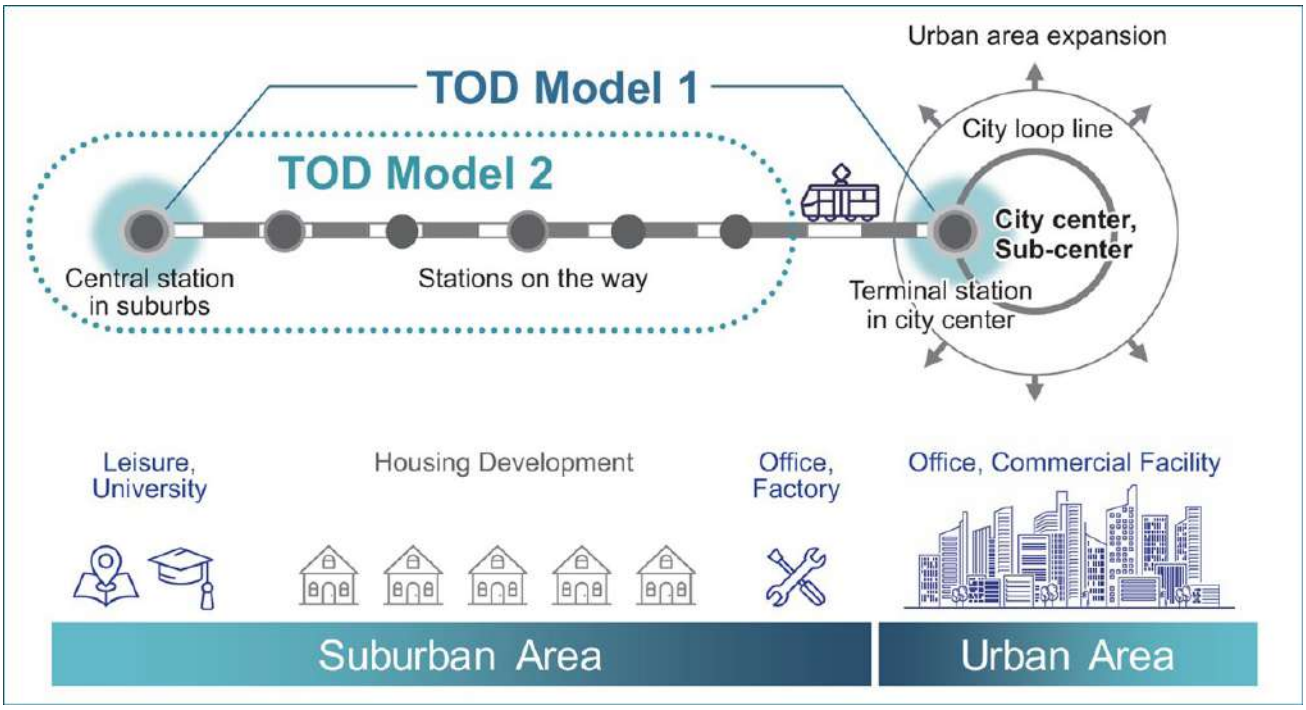
Third, TOD has been adopted as a planning tool to enhance land value around railway stations and along railway corridors. A “virtuous cycle of railway capital” mechanism has been introduced to increase profits from both land use and railway fares. The objective is to benefit all stakeholders, including government agencies, private developers, and railway companies, while ensuring maximum comfort of living for citizens.

Two models of TOD in Japan

As one could expect, there are distinct types of railway stations in Japan, with varying spatial locations within the metropolitan context, various levels of passenger inflow, and diverse land-use conditions in their neighborhoods. These variations require differential strategies to catalyze

TOD in their spatial layout. In practice, Japanese cities and metropolitan regions have adopted two models of TOD (Exhibit 7) to align with the existing conditions of station neighborhoods, such as land-use patterns, market economy, demographic composition, and local policies.

Exhibit 7: Two models of TOD in Japan



Model 1 can be termed "city center/sub-center TOD," where central and/or terminal stations located in urban core areas are redeveloped in accordance with the principles of high-intensity mixed land-use planning. One noteworthy characteristic of such station-area redevelopment is its strategic coordination with the space constraints in station neighborhoods due to their central location. Planning under this model therefore integrates station buildings with high-intensity vertical and underground commercial development, multimodal transport networks, and recreational facilities, not only to generate greater financial value from land but also to create vibrancy in the station neighborhoods.

Model 2, popularly known as "Suburban TOD," involves selecting land along radiating railway networks primarily for high-intensity residential development. The value of land around suburban stations is uplifted and captured by appropriately allocating essential services such as shopping, healthcare, and recreation – all within a framework of high-density development. This results in a "pearl in a necklace" formation, where each railway station neighborhood serves as an independent but integrated nucleus of TOD planning. Unlike Model 1, which addresses space constraints in city-center station neighborhoods, Model 2 seeks to capitalize on the corridor effect of railway lines and the neighborhood effect of railway stations, particularly in suburban areas where vacant, idle, or underdeveloped land is available for strategic interventions.

In short, while Model 1 induces the development of small land parcels around central stations through commercialization of the station itself, underground development, and leasing of air rights for high-intensity vertical development (mostly for non-residential uses), Model 2 focuses on undeveloped or underdeveloped land along railway lines and around railway stations in suburban areas for mixed-use development.

The virtuous cycle of TOD: A financial model for urban-metropolitan-suburban planning

With more than 90% urbanization rate and the accompanying surge in demand for housing and other urban services, the model of integrating railway infrastructure with high-intensity mixed land-use developments has been adopted in almost all major urban centers in Japan (e.g., Tokyo, Nagoya, Osaka, Yokohama, Kobe, and others). It has been widely acknowledged that the benefits of TOD operate in a cyclical manner. Investment in station infrastructure and railway services increases passenger inflow and induces a value-premium effect on the surrounding land. This value premium, in turn, attracts high-intensity urban development in station areas. Such development encourages more people to live, work, and socialize in transit neighborhoods, which further increases passenger flows to railway stations and raises fare box revenues for railway companies. The revenues generated – both from fare collection and extracted from the land-value premium using suitable taxes and fees – can then be reinvested into railway stations and services. In this way, the cycle continues to reinforce itself.

With the realization of the benefits that TOD brings through integrated land use-transport-based planning at two different spatial scales (Model 1 and Model 2), Japan's TOD has demonstrated some visible strengths.

- Model 1 has helped convert central stations into vibrant city centers. It has shown how station buildings themselves can accommodate large commercial establishments serving both passengers/commuters and non-passengers. It has also provided a model for developing the limited land available around central stations through underground developments and the leasing of air rights, thereby promoting vertical expansion of infrastructure.
- Model 2 has helped demonstrate how underutilized or idle land parcels along radiating railway corridors and around suburban railway stations can be systematically redeveloped in line with TOD principles. It emphasizes that suburban railway landscapes – where larger tracts of land are available for development – require a differential approach from that applied to central station neighborhoods, where space constraints are more acute.

Another important strength of Japan's TOD model is its contextual nature. A "one-size-fits all" approach has not been adopted for distinct types of railway stations. In fact, a highly contextual TOD approach has been adopted for different stations and their districts. Wherever land is available and mobilization of resources possible, a new TOD cluster has been planned with new residential buildings, commercial establishments, and others. Wherever new land development was not possible, retrofitting and redevelopment of existing infrastructure took place. Such flexibility not only ensures long-term sustainability but also increases the applicability of Japan's TOD model in a variety of other spatial contexts.

TOD development mechanisms

TODs are large-scale, capital-intensive ventures. From building or redeveloping station infrastructure to making land adjustments in station neighborhoods, substantial capital investment is required at various stages of planning, implementation, and management. Japan has adopted several innovative financing mechanisms to support such capital-intensive ventures. Although these financial mechanisms are not entirely new, the way Japan has applied them in the context of TOD is worth highlighting. It is also important to note that, regarding financing, a "one-size-fits-all" approach was avoided, as different railway companies and local governments adopted context-specific strategies to develop their TODs.

Exceptional Floor Area Ratio District

Following the governing law on the Exceptional Floor Area Ratio District Regulation, several TOD cases (e.g., Tokyo Station area) have formed Exceptional Floor Area Ratio Districts. Such districts represent regulated zones delineated through urban planning to encourage high-intensity vertical development by making optimum use of building floor area that would otherwise remain unused. Under this regulation, floor area ratios are permitted to be transferred between non-adjacent building sites within the same district. In this way, air rights can be bought and sold between buildings within each zone. The transfer of air rights between buildings allows authorities to generate additional revenue from vertical construction.

Business Improvement District

Another TOD development model is area management in the form of a Business Improvement District (BID), as seen in the case of Osaka City, where residents and real estate agents collaborate to create a favorable environment for constructing and managing high-density infrastructure. In the BID system, an integrated operation and management authority is established in each district. This authority receives funds from the government, and the government collects revenue by charging real estate companies. The principal role of the BID is to oversee areas of infrastructure management that were previously handled separately by real estate owners and the government. In this way, the overall cost of infrastructure management has been reduced.

Beneficiary contributions

A widely used model of financing TOD infrastructure is known as Beneficiary Contributions, as adopted in the Minato Mirai 21 District in Yokohama City, where the local government charges an extra fee in advance to those agencies that directly benefit from public investment, such as railways. Particularly in the case of constructing railways or redeveloping stations, developers and landowners along the railway line and around the stations – who are expected to receive significant value premiums – are required to share a small fraction of the capital expenditure. These contributions help develop TOD areas, which, in turn, help attract intense development activities that can, in the longer term, generate non-fare revenues for rail infrastructure if value uplifts are appropriately captured.

Joint financing

One of the most popularly adopted models of activating station area redevelopment ventures since the post-war period has been the Public-Private Joint-Financed Mechanism. This model originated when the Japanese government sought financial assistance from private investors to redevelop railway stations that had been affected by the Second World War. In return, private companies intended to utilize the station buildings for business and commercial purposes. This model is still very popularly used across Japan, where station spaces are leased to private operators for commercial development, and the revenue extracted from that is reinvested in railway services and infrastructure management.

Privately requested station

A contemporary form of property development in station neighborhoods is known as the Privately Requested Station. In this case, new railway stations are constructed along an existing network entirely with private capital, as private companies may request the construction of a station at a particular location that benefits their business. Both commercial firms and real estate agents may invest directly in the construction of a station, serving their respective establishments by attracting residents, customers, or both.

CASE STUDIES

Case 1: Architectural marvel meets engineering excellence in Tokyo station

Tokyo Station is situated in central Tokyo and in 2018 it served about 1.36 million passengers each day through 30 platforms and three railway companies. The Marunouchi building, designed in 1910 in a Western architectural style, was heavily damaged during World War II when the third floor and the roof were destroyed. For decades it remained as a two-story structure since building materials were scarce and proposals for new construction were debated without resolution. Public interest in preservation gradually increased and the structure was recognized as "Living Heritage," which paved the way for its restoration (Exhibit 8). The works, completed in 2012, reinstated the red-brick facade after detailed study, preserved and reused the original steel frame, and introduced seismic isolation for safety.

Exhibit 8: High-density high-rise mixed-use development around Tokyo railway station

The key interventions leading to successful station area development are as follows:

- Exceptional FAR District Regulation: The development of this project relied on the first application of the Exceptional FAR District Regulation in the area. Under this system the unused air rights above the station building were sold to nearby office developments, and the revenue was used both to fund the heritage restoration and to support functional renewal in the surrounding blocks.
- Urban design and landscaping: The second intervention sought to ease congestion at the Marunouchi station square. Conceived as a symbolic forecourt to the Imperial Palace, it had become crowded as buses and taxis occupied the frontage. A three-and-a-half-year redevelopment reorganized circulation by creating transport squares to the north and south with bus stops, taxi stands, and underground access. As an immediate consequence, the

pedestrian zone expanded from 5,300 m² to 11,800 m², while Zelkova trees and landscaping enhanced environmental image of the station square. The axial view was preserved so the restored red-brick building remained the focal point.

- Underground commercial development: The third intervention revitalized underground space for pedestrian movement and commerce. The station included 17,600 m² of commercial facilities and extended its underground network with retail and pedestrian passages. This created weather-protected access to nearby destinations. At the same time, the project reflected the strategy of Japanese railway companies to combine transport with profitable side businesses. This integration proved central to the success of TOD.

The redevelopment of Tokyo Station reflects the Model 1 type of TOD, as it corresponds to high-intensity, mixed-use development at a major urban terminal through vertical and underground developments. The project made use of both existing structures, underground space, and idle land in the heart of the city. The restoration of the Marunouchi station building helped preserve its cultural heritage and thereby reinforced the station's symbolic role as Tokyo's primary gateway. It showed efficient land utilization within a dense urban context. Financing through the sale of unused air rights under the Exceptional FAR District Regulation demonstrated how hidden development potential could be used to fund both heritage restoration and wider urban renewal. Together, these changes show how urban TOD works by blending transportation with cultural, commercial, and community spaces to create vibrant, connected urban areas.

The Tokyo station has shown improvements in accessibility and comfort, which in turn attracted more passengers and visitors. The presence of new commercial areas increased business activity and rental income, and this raised the overall value of the surrounding land. The gains gave railway companies additional financial resources. These resources were then reinvested in improvements to transport infrastructure and public facilities. This process not only reinforced the attractiveness of the station area but also sustained the flow of people and capital. Over time, the cycle created a self-sustaining model. Railway services, real estate development, and urban renewal supported each other. Together they ensured long-term growth.

Case 2: Reimagining the city center at Takanawa through TOD

Takanawa Gateway Station was developed as part of the Shinagawa urban transformation project in Tokyo. The station opened temporarily in 2020 and became fully operational in 2024. The redevelopment plan was structured around three core interventions that aimed to unlock the full potential of this central site.

- Release of land for development: The first was effective land use through the reallocation of railway facilities, which involved relocation of the Shinagawa Depot and the release of prime central land for large-scale development.
- Seamless pedestrian connectivity: The second was the integration of the station and the urban space, realized through a continuous pedestrian network and a series of plazas that linked the station seamlessly with its surrounding districts.
- Business center: The third was the creation of a large-scale international business base, where office towers, cultural facilities, and a foreigner-friendly station interiors were designed to attract global enterprises and support international exchange.

Together, these measures ensured that the project was not only about station modernization but also about transforming a railway site into a new gateway for metropolitan and international activities (Exhibit 9).

Exhibit 9: Takanawa Gateway station redevelopment

Like Tokyo station, the redevelopment of the Takanawa Gateway Station and its neighborhood also followed the imperatives of Model 1 TOD. This model prioritizes dense and multifunctional development at central terminals to integrate transport with business, culture, and public space. The project converted underused railway land into a vibrant mixed-use district. This way, the project shows how the urban TOD model can reshape a city center. The integration of high-rise office towers and cultural facilities with a modern station interior positioned the site as both a transport hub and a strategic business destination. At the same time the pedestrian-focused design reinforced connectivity across neighboring districts. This made the station a physical and symbolic gateway within the metropolitan fabric.

The reallocation of railway land created space for new commercial and office developments. This step increased land values and at the same time generated surplus income from rental and real estate businesses. The revenues were then invested in modernizing station facilities, improving public spaces, and transport services. In addition, the redevelopment enhanced accessibility and created attractive urban spaces. These improvements encouraged higher passenger flows and greater business activity in the station district. Over time, this created a self-reinforcing system where transport operations and urban development supported each other. The Takanawa Gateway project thus illustrates the ability of railway companies to link operational efficiency with real estate development.

Case 3: TOD at Minato Mirai 21 – Turning a transit station into a city within a city

The Minato Mirai 21 (MM21) District in Yokohama was planned as a large-scale urban redevelopment project. It transformed former shipyard land and freight yards into a vibrant city center. Its purpose was to strengthen Yokohama's role as an international business and cultural hub while easing the city's dependence on Tokyo. The project advanced through three central strategies.

- Land readjustment: The first was the development of the MM21 District and the Minatomirai Line through collaboration between public and private stakeholders. The city, the national government, Kanagawa Prefecture, private landowners, and the Urban Renaissance Agency worked together to carry out land readjustment. At the same time, they ensured that railway construction was aligned with urban development. This collaboration made it possible to share responsibilities and unify fragmented sites into one coherent district.

- Station as gateway: The second strategy was the integrated development of Minatomirai Station and the surrounding complex. The station was placed directly beneath Queen's Square so that transport could be connected with retail, cultural, and office functions. This design created seamless pedestrian flows and therefore established the station as a central gateway for the district.
- Strategic demand creation: The third strategy was the temporary use of land during phased development. Before full construction was completed, vacant land was used for offices, exhibitions, and cultural activities. This approach added vitality to the district during the transition period. At the same time, it ensured that demand was established before the final development. Collectively, these efforts reshaped the district into a dynamic, multifunctional urban hub, seamlessly integrating business, leisure, culture, housing, and tourism to create a vibrant and cohesive community (Exhibit 10).

Exhibit 10: MM21 District before (left) and after (right) redevelopment

The redevelopment of MM21 and the Minatomirai Line reflects the principles of the Model 1 TOD. This model focuses on creating dense and multifunctional districts that are directly connected to a central station. The project brought together railway construction, land readjustment, and district planning. At the same time, it created a cohesive urban core. The collaboration among multiple stakeholders made it possible to align the financial, planning, and design aspects of the project into a single strategy. As a result, MM21 emerged as Yokohama's second city center, balancing Tokyo's dominance in the metropolitan area while enhancing the city's global image.

Case 4: Toyama's station area redevelopment as a model of compact growth in suburban centers

Toyama Station is a major transport hub in Toyama City, located on the Hokuriku Shinkansen and served by four railway companies with 15 platforms. The station became the focal point of a compact city development strategy that sought to reverse population decline and revitalize the core of a suburban center. The project advanced through three central strategies.

- Vibrant public space: The first strategy was the redevelopment of the station square and the creation of an elevated walkway. While improving the functionality and design of the neighborhood, it created an open public space that enhanced the attractiveness of the city center.

- Station-city connectivity: The second strategy was the introduction of a highly convenient light rail transit (LRT) network to strengthen connectivity between the station and the rest of the city. The LRT was developed alongside the opening of the Shinkansen and the elevation of

conventional railway tracks. This integration allowed passengers to transfer seamlessly between regional and local modes of transport.

- Financial incentives for locating near the station: The third strategy was the promotion of residential development along public transport lines. This was supported by financial incentives that encouraged citizens to move from suburban areas into the city center. Therefore, it helped to concentrate population and services around the transport core.

Together, these measures transformed Toyama Station into the anchor of a compact city model. The project combined mobility, accessibility, and urban regeneration.

The redevelopment of Toyama Station reflects the principles of Model 2 – suburban TOD. It was designed to suit the needs of a provincial city. The strategy did not aim to create a dense urban terminal. Instead, it linked suburban railway services with light rail to form a compact city plan. Residents were encouraged to live within walking distance of transport lines. This supported efficient land use and reduced reliance on private cars. At the same time, the integration of the light rail with Shinkansen services strengthened Toyama's role as a regional hub. Intercity and local travel were brought together in one seamless system. The case shows how Suburban TOD can guide smaller cities facing decline by aligning transport with compact and sustainable urban form.

Investments in the station square, elevated walkways, and LRT lines improved accessibility and convenience for those traveling to the station. As a result, more people began to use public transport, which strengthened the position of local transit operators. Passenger growth also increased land values around the station. At the same time, financial support for residential relocation attracted new households to the city center. Their arrival created additional demand for shops, services, and cultural facilities, thereby generating new revenue streams. These revenues were reinvested into the expansion and modernization of the transport network. In this way, the cycle of reinvestment reinforced both the financial and social foundations of Toyama's compact city strategy. It also demonstrated how public transport can serve as the backbone of urban regeneration (Exhibit 11).

Exhibit 11: Toyama railway station area

TOD legislations

It is evident from the preceding discussion that by the early 21st century, rail-based TOD had become a highly influential planning approach in cities, metropolitan regions, and suburban areas across Japan. However, as one might expect, TOD-driven urban redevelopment and regeneration require continuous adjustments and readjustments to existing land use patterns along railway lines and around railway stations. This holds true for both operational railway networks and those planned for future development. In this context, it is important to highlight the legislative support offered to various stakeholders – both public and private – in undertaking land adjustment and reorganization efforts to catalyze TOD at multiple scales. Some of the key legislative measures introduced in Japan to facilitate TOD are as follows:

- **Land readjustment:** The Land Readjustment Act supports developers in integrating residential land with public facilities by modifying the spatial arrangement of different land uses in transit districts. In line with the provisions of the Act, landowners in a transit neighborhood contribute a small parcel of their land to the development agency, depending on the location and size of their holdings. In this way, different landowners provide developers with a portion of their land in exchange for readjusted plots. The developer reorganizes land use in multiple ways. The readjusted parcels that landowners receive are generally smaller than their original plots, with the excess land extracted by developers for further development. The readjusted land can be allocated for public utility facilities such as parks, or part of it can be reserved for the high-density development of residential or commercial establishments.
- **FAR premiums:** The Special Urban Renaissance District regulation is a special measure that grants Floor Area Ratio (FAR) premiums to developers in designated neighborhoods if they agree to incorporate specific functions within their development projects. When real estate development plans comply with the provisions of this law, developers in urban renaissance districts may receive FAR premiums exceeding 400 percent, which in turn facilitates both the intensification and diversification of land use.
- **Streamlined land acquisition near rail:** The Railway and Redevelopment Act is a special measure designed to integrate railway construction with housing development in metropolitan areas. It provides legislative support to local governments and railway companies to acquire land in potential development zones before the construction of railway infrastructure begins. This makes it a forward-looking Act, as it enables authorities to plan for land use along railway routes and around stations well in advance of construction. In accordance with its provisions, local governments first prepare a basic plan outlining the railway route, station locations, priority development zones, and target completion dates. Based on this plan, local governments and railway companies secure land in advance, and then in later phases implement land readjustment projects, and build public facilities around new stations. These measures, in turn, stimulate both residential and commercial development in newly build transit districts.

These initiatives facilitate the planning, development, and management of high-intensity mixed land use in rail transit station neighborhoods and along railway corridors, thereby laying the foundation for catalyzing TOD at multiple spatial scales.

Institutional support and coordination

TOD is a complex planning tool and requires financial support, technological assistance, a strong human-resource base, and legislative backing from a variety of institutions – both public and

private. The Government of Japan has played a pivotal role in this regard. Different ministries, through several bilateral conferences, G2G meetings, and policy support, have contributed to the creation of a pan-Japan TOD environment.

Semi-governmental organizations such as the Urban Renaissance Agency, in which the Government of Japan is the principal stakeholder, have provided technical support in feasibility studies and the preparation of master plans. City and metropolitan governments have also shared a substantial proportion of responsibilities, particularly in preparing local area planning proposals, conducting public consultations, and mobilizing land and other resources.

Private actors have likewise been encouraged to participate as active partners in TOD implementation projects. Railway companies, real estate developers, engineering firms, and other private players have served as important stakeholders in project execution. In addition, several government-funded corporations, including the Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development (JOIN), the Japan Bank for International Cooperation (JBIC), and the Japan International Cooperation Agency (JICA) have played a bridging role while aligning the interests of government actors, private players in Japan, and international capital.

5.1.3 Bottom-line

Hong Kong and Japan, relatively high-income contexts where public transit, particularly urban and regional railways, has achieved remarkable success in passenger volumes, are powerful examples of how the value of railway stations and their surrounding spaces can be realized in diverse ways. In these contexts, railway stations are not mere transport facilities; they have evolved into multimodal hubs where various transport modes and urban functions converge. In Japan, for example, where space is constrained, rail agencies have pursued three-dimensional growth by exploiting air rights and underground spaces. Where land was available or land use reorganization allowed, strategic planning unlocked surplus land for high-density, mixed-use development. Where land was more abundant, it was acquired in advance, prior to the introduction of railways, with a forward-looking vision for TOD.

Overall, through contextual planning and development mechanisms, Hong Kong and Japan have shown how engineering innovation, strategic planning, institutional collaboration, and creative funding can transform ambitious TOD visions into tangible outcomes, delivering lasting benefits to citizens, governments, and private enterprises alike.

5.1.4 Takeaway for India: “Create” valuable station areas

For India, the lesson is clear: urban and regional rail projects must be accompanied by proactive land policies, early land assembly, and integrated station-area planning, supported by innovative financing and strong institutional coordination. By adapting these principles to its own urban context, Indian cities can unlock significant long-term economic value from its rail investments.

5.2 Recommendation 2 – Integrate – Implement UMTA 2.0

5.2.1 Context: The recommendation of the IIMA-TIF (2023) report

The IIMA-TIF report of 2023, "Strategies to Improve the Financial Performance of Metro Rail Systems in India," recommended the institutionalization of the UMTA 2.0 model as a critical urban transportation planning, financing, and management reform. The report proposed significant changes in the institutional structure and major expansions in the functions, responsibilities, and financial powers of the existing Unified Metropolitan Transport Authority (UMTA) model and additionally proposed the establishment of a dedicated Unified Metropolitan Transport Fund (UMTF) as the sole city-level fund for multimodal transport infrastructure and associated systems. It provided general guidance and an overarching framework to help design appropriate policies and processes for effective implementation of UMTA 2.0.

In this report, we emphasize that urban transport in Indian cities demands a fundamental institutional shift to deliver seamless, multimodal, and, most importantly, financially sustainable systems. We contend that the effective implementation of land value creation and capture, i.e., the creation of vibrant TODs and the establishment of LVC mechanisms to support urban (metro) and regional rail systems is possible only under a UMTA 2.0 type model. This report therefore calls for urgent reforms to translate UMTA 2.0 into reality.

Recall that UMTA 2.0 concept proposed in the IIMA-TIF report envisages transforming UMTAs from coordinating agencies into fully empowered authorities that plan, own, fund and finance (along with other government and private partners), build, operate, and regulate all transport networks in their jurisdictions. The model emphasizes integration, autonomy, and accountability to deliver inclusive, resilient, and low-carbon mobility.

The five pillars of the UMTA 2.0 are as follows:

1. Institutional transformation: UMTAs should take responsibility of the ownership, planning, development, operations, funding and financing, and regulation of all intra-city and regional (metropolitan region level) transport systems – public and private modes alike – and be empowered to govern land use related matters that impact and are impacted by transportation infrastructure.
2. Coverage and governance: All million-plus cities must form UMTAs within fixed timelines, with urgent adoption in metro cities; smaller cities within close proximity and/or in the same state may form joint UMTAs initially. Each UMTA will be headed by an independent CEO/MD with a board including state, central, municipal, and expert representatives.
3. Integrated planning and service delivery: UMTAs should promote seamless multimodal travel, coordinated operations across modes, public transit and non-motorized transport, EV adoption, inclusive "complete streets," and contextual solutions aligned with goals of carbon neutrality, inclusivity, and resilience. They must have the mandate and powers to ensure coordinated land use and transport planning and to implement TODs and LVC mechanisms within TODs and other designated zones.
4. Financial autonomy and revenue powers: UMTAs should creatively generate funds via local taxes, congestion charges, value capture, PPPs, and green bonds, while gaining autonomy to set and revise fares, road-use charges, and parking fees through transparent, scientific mechanisms overseen by independent committees.

5. Unified funding framework: Each UMTA should operate a Unified Metropolitan Transport Fund (UMTF), pooling fares, non-fare revenues, borrowings, and grants, with cross-subsidization across modes as needed; central support should flow from a National Urban Transport Fund (NUTF) through performance-based, formula-driven, and competitive allocations adjudicated by independent committees.

5.2.2 The Transport for London (TfL) model as a benchmark

TfL as the empowered unified multimodal transport agency for London

Transport for London (TfL), established under the Greater London Authority Act 1999, is a functional body of the Greater London Authority (GLA). The structure and functions of TfL align closely with those envisaged under the UMTA 2.0 framework. TfL integrates and manages London's multimodal transport system, operating the Underground, trams, river services, non-motorized transport infrastructure and systems, and buses (through contracts). It also administers rail concessions and manages the Elizabeth line infrastructure. It is the highway/traffic authority for the TfL Road Network, oversees road user charging (congestion charge, ULEZ, etc.), licenses taxis/private hire vehicles, provides strategic planning and advice, and acts as a statutory consultee on planning matters. TfL's subsidiaries sit under Transport Trading Ltd. for commercial activities. Places for London develops its property portfolio. TfL collaborates with the GLA, boroughs, Department for Transport, Office of Rail and Road, Network Rail, police, London TravelWatch, etc., to ensure that it can deliver integrated and coordinated services within a complex, multi-level governance environment. TfL's revenues are derived from fares, grants, road charges, commercial income, property, and borrowing (including green bonds). Value capture tools to fund multimodal transportation infrastructure and operations include the Mayoral CIL, S106 obligations, and the Business Rate Supplement that is used extensively in Crossrail's funding model.

Efficient coordination of transport and land-use planning through a single transport body (TfL)

TfL demonstrates how a unified city-level transport authority is essential for integrated planning and financing. As a statutory consultee on planning and policy actions affecting its network, TfL can require the alignment of land-use and transport as a continuous urban and regional development process, thereby ensuring that the larger goals of sustainable transportation promotion are achieved in a financially sustainable manner. Strategic policies such as the Mayor's Transport Strategy and the London Plan sets spatial planning strategies and sustainability goals, which TfL then operationalizes, creating predictable conditions for developers.

TfL's unique role as both transport operator and major landowner allows it to create and capture land and property value uplifts. The tools that TfL adopts include: Planning obligations (S106) to secure developer-funded transport and other infrastructure works; City-level levies (e.g., MCIL, Business Rate Supplement) used to finance systems such as Crossrail; Direct development and joint ventures through its property arm, Places for London, which develops land/real estate at or near stations, generating rents and sales receipts, and; Borrowing against future property income to front-load investment. This coordinated framework enables TfL to convert land value uplifts into transport investments, with systems such as Crossrail and many station-area housing and mixed-use projects providing evidence of effectiveness.

TfL's structure and private investment

Transport for London (TfL) has been able to attract private-sector equity participation primarily through PPP structures. The most prominent example is the Silvertown Tunnel (opened in 2025), delivered under a design-build-finance-maintain concession with the Riverlinx consortium. Riverlinx secured the contract for the tunnel in 2019 through a competitive procurement process. The consortium raised majority of the project's funding via private finance, drawing on international equity investors. Riverlinx is expected to recover its investment through toll revenues over 25 years (linked to operational performance), after which the tunnel transfers to TfL. Historically, TfL has used equity-based PPPs for Underground upgrades via Tube Lines and Metronet, but both failed financially and were taken back in-house. By contrast, projects such as the Docklands Light Railway and London Cable Car operate under franchise or concession models, with private operators running services but without equity stakes. TfL, therefore, uses PPPs in transit selectively, balancing equity capital with public ownership.

TfL and LVC

A report by Transport for London & Greater London Authority (2017) emphasizes that capturing the uplift in land and property values generated by new urban and regional transport projects is critical for financing infrastructure in dense urban and metropolitan contexts such as London. The report suggests that the current mechanisms, particularly development taxation and direct public development activities, have significant limitations. The report reviews existing tools and explores three reform pathways: better taxation, enhanced direct development, and a combined model.

Limitations of current mechanisms

The Community Infrastructure Levy (CIL), introduced in 2010, is a flat-rate tax on development space, making it regressive. Rates are set conservatively to maintain project viability and typically yield only 4-12% of transport-induced planning gain. Adjustments to the rate are slow and insensitive to market shifts. Section 106 Agreements are bespoke developer contributions that can generate higher resources but are slow and unpredictable. The shortcomings of existing mechanisms are especially pronounced for multi-location schemes like the Crossrail where benefits are dispersed across many sites and developers across the city/region.

SUGGESTED REFORMS

Better development taxation:

- Zonal CIL: Applying higher rates around specific transport hubs and rail stations could help capture value uplifts more effectively. However, higher rates may introduce risks related to developer pushback on viability and profitability and increase the "holdout problem" where landowners delay development.
- Zonal Planning Gain Supplement (PGS): A proposed charge based on the uplift between existing and consented use values could replace the CIL. However, past attempts to implement PGS faced objections over valuation subjectivity, administrative complexity, and potential for excessive rates.

Intensification of direct development ("Rail + Property" model):

- Hong Kong's MTR model: In this model, the railway authority captures uplift by developing station adjacent land, either by itself or under joint development agreements, granted at pre-scheme values.

- Options for implementing the model:
    - Strategic land acquisition: Requires major funding and carries risks if projects fail. Moreover, speculative buying can inflate costs.
    - Land pooling: Public-private joint ventures can help consolidate land, but opportunities are relatively rare.
    - Compulsory Purchase Orders (CPOs): These legal powers can help assemble land but cannot be used solely for value capture. Land must be used for public interest projects, and therefore this must be used as a last resort.

The Development Rights Auction Model (DRAM):

The DRAM merges taxation and direct development. The concept is that around new transport zones (rail stations), the rail authority sets proposed land-use plans and "no scheme" values. Landowners within the designated zone are then required to choose among three options:

1. Join an auction where pooled development rights are sold, with uplift shared between landowners and the authority.
2. Self-develop but pay a high zonal CIL equivalent to auction returns.
3. Retain current use.

The advantage of DRAM is that it provides transparent pricing, monetization opportunities for non-developers, and faster revenue than CIL. It addresses viability uncertainty while lowering fiscal risks for public agencies. Modelling results estimate that DRAM could help capture nearly double the value uplift compared to CIL, raising the effective value extraction rate substantially.

The Transport for London & Greater London Authority (2017) report recommends the exploration of the DRAM as a practical integrated TOD and LVC mechanism in areas with high development potential and fragmented land ownership. DRAM offers a promising pathway for Indian cities to implement land value capture in the context of major urban and regional rail development projects.

5.2.3 UMTA (the UMTA 2.0 model) as an imperative for effective land value creation and capture in India

UMTA background

A TfL-type UMTA model (i.e., the UMTA 2.0 model) is indispensable for Indian cities and metropolitan regions to transform metro and regional rail systems into engines of sustainable urban and regional growth. Without integrated transport and land use planning and governance, TOD and LVC will remain as fragmented experiments and largely under-exploited as a substantial non-fare revenue stream with significantly large positive externalities for people and places.

As discussed throughout this report, Indian cities face rapid urbanization, congestion, and funding challenges for public transport systems. Fare box revenues rarely cover even O&M, leaving projects fiscally unsustainable. Internationally, Hong Kong's Rail + Property model and TfL's property and commercial arms illustrate how station-led development, TOD strategies and LVC can secure non-fare revenues efficiently. Although India has been experimenting these ideas, outcomes remain piecemeal due to weak institutional coordination. A redefined UMTA 2.0 model, combining statutory authority, financial powers, and unified ownership, can bridge this gap.

Why UMTA for TOD and LVC?

An UMTA structure, we argue, is critical to deliver the institutional certainty and integration essential for TOD and LVC. Much like TfL in London, India's UMTA model must move from being a passive coordinator to an empowered regulator, planner, and financier of metropolitan mobility.

The key objectives and functions of UMTAs that can directly help TOD and LVC include: Preparing and updating Comprehensive Mobility Plans (CMPs); Coordinating transport and land use planning across jurisdictions; Managing a dedicated Unified Transport Fund (UTF); Promoting multimodal and last-mile connectivity (metro, bus, NMT, regional rail); Streamlining fare, ticketing, and regulatory structures, and; Institutionalizing data-driven planning and public information systems.

UMTA for stimulating station-area development

UMTA as a single-window authority can unlock the full potential of metro and regional rail station areas. TfL's integrated station developments and MTR's "rail + property" approach show that only a unified entity can systematically link transit investments with high-intensity real estate development.

UMTA, given its authority and legal/policy powers discussed earlier in the report, can engage in: strategic TOD planning by identifying priority stations for high-density, mixed-use TODs; preparing station area masterplans with higher FAR, land pooling, and affordable housing quotas; coordinating with other city and regional land use and transport plans to ensure integration, and; strategically phasing TOD implementation in sync with transit expansion.

UMTAs can act as umbrella agencies for all joint development projects, reducing fragmented tenders by various agencies. Standardized contracts, long term leases, and transparent valuations can attract large developers and institutional investors.

LVC instruments and the UMTA-UTF

A TfL-type UMTA structure can design, enforce, and ring-fence LVC instruments such as: betterment levies and impact fees imposed on new developments benefiting from metro/ regional rail access; Tax Increment Financing (TIF) in TOD zones, hypothecating future tax gains; premium FAR charges for higher-density developments in station areas; joint development lease revenues and sale/lease of air rights, and; commercial monetization of retail, advertising, naming rights, and parking. All such revenue flows can be channeled by the UMTA into the dedicated UTF (the unified urban transport fund), ensuring transparent, effective, and strategic recycling of beneficiary payments into transit investment. This type of ring-fencing mirrors TfL's diversified revenue model.

Stakeholder alignment via TOD+LVC by UMTAs

A TfL-style UMTA can provide a platform to align diverse stakeholders by implementing TOD+LVC effectively. LVC by the UMTA can reduce fiscal burden of the central government while advancing its national goal of sustainable urbanization. State governments can expand their tax base as the UMTAs capture uplift in land values. City governments can benefit from higher property tax revenue shares, enhanced public realm, and overall improvement in the quality of urban life. Metro and regional rail systems gain from predictable non-fare revenues and higher ridership through TOD integration. Private developers and investors can get access to prime transit-accessible land and real estate with regulatory certainty and risk-sharing frameworks. In fact,

UMTAs can activate private sector participation in station development and rail projects by assuring institutional clarity and predictable cashflows. A TfL-type UMTA can de-risk projects and standardize partnerships. And finally, citizens can enjoy better connectivity and a range of amenities associated with TOD.

The bottom-line is that strengthening the UMTA model into UMTA 2.0 is critical for India's metro and regional rail systems to achieve the financial sustainability levels of TfL London or MTR Hong Kong. Fragmented governance cannot deliver integrated TOD or LVC.

5.3 Recommendation 3 – Intensify – Activate station area (re)development and prioritize PPPs

We argue that there is an urgent need to immediately prioritize and implement intensive (re)development activities in and around existing and planned metro and regional rail stations, following the models discussed earlier in the report. While relatively larger-scale TOD implementation and zonal LVC initiatives must continue, and while the UMTA 2.0 model must evolve, it is necessary for metro and regional rail agencies – with appropriate local, state, and central government support and facilitation – to urgently initiate the process of activating station and station-vicinity (re)development to the extent possible, using existing or readily available resources (land and property) to generate or expand the real estate-linked non-fare revenue base.

In the immediate term, this effort will help improve the financial health of existing and planned systems. In the longer term, it will help establish Indian context-specific models of station-area (re)development that can be mainstreamed and standardized, while also instilling confidence among private investors to partner as major shareholders in PPP-type metro and regional rail development projects.

The following sections offer a framework with relevant guidance for Indian urban (metro) and regional rail authorities (SPVs) to activate station-area (re)development for achieving multiple concurrent goals. It integrates elements such as strategic planning, legal and policy enablement, institutional capacity building, project structuring, and risk mitigation.

5.3.1 Strategic vision and planning

Roadmap for station selection and preparation:

- Station identification: High-ridership, well-connected stations with available land.
- Comprehensive land mapping: Map SPV-owned, public, and private parcels to identify consolidation opportunities.
- Market feasibility and commercial viability: Undertake demand assessments and benchmark against global TOD cases.
- Design framework implementation: Plan for compact, mixed-use, high-density, walkable station areas. Integrate pedestrian pathways, last-mile access, and multimodal connections.

Benchmarking and best practices for value creation model and capture potential:

- Hong Kong MTR: Land granted by government at pre-rail values; monetization of air rights and joint development fund rail development/expansion.
- Tokyo: Land readjustment, vertical integration of retail, housing, and offices directly above stations.
- Singapore: Integrated land use and transit planning; long-term land leases auctioned after government pre-acquisition.

5.3.2 Legal and policy enablement

Land and air rights:

- States must grant and notify air rights and other development rights to SPVs.
- Air rights should be bundled with adjoining parcels for joint development.
- Long-term leases should be transparently permitted to give investors' confidence.

Land acquisition and consolidation:

- Preferred approaches: Land pooling, readjustment, or voluntary sale.
- Compulsory acquisition: Where unavoidable.
- Government land should be transferred to SPVs via appropriate arrangements.

Zoning and development control:

- State/local bodies should notify TOD zones with higher FAR/FSI and mixed-use.
- Building approvals for metro-linked developments should be fast-tracked.

5.3.3 Institutional reform and human resource development

Organizational reform for SPVs:

- Real estate development cell: Create a dedicated unit to strategize, structure, and manage property development.
- Multidisciplinary expertise: Recruit urban planning, legal, and financial specialists embedded in SPV teams.
- Land acquisition team: Recruit and train a dedicated group to coordinate with state and local authorities.

5.3.4 Project structuring and developer engagement

Responsibility distribution:

- Land and air rights: Should be retained by the SPV; developers to receive long-term lease or license.

- Planning: SPV should handle station integration and the overall TOD framework; developer to design and develop buildings.
- Regulatory approvals: SPV should work with authorities; developer to manage construction/ marketing.
- Financing: Developer should contribute full/majority capital; SPV to provide low-cost land rights and institutional backing.
- Revenue sharing: SPV to secure fixed lease rents, minimum guarantees, or a share of gross income; developers to retain residual earnings.

Revenue models:

- Fixed lease rent + revenue share.
- Minimum guarantee + revenue share.
- Hybrid annuity model.

Developer incentives/value proposition:

- Higher purchasable FAR/FSI in station areas and TOD zones.
- Stamp duty/tax concessions.
- Development-ready, clear-title parcels.
- Branding as "Transit Premium Locations."
- Direct integration with metro concourses for commercial value.
- High-footfall, prime sites with no land acquisition risk.
- For tenants/users: "Zero last-mile" access, premium amenities, modern mixed-use environments.

5.3.5 TOD/LVC related requirements for potential private investors in rail projects

Investor demands:

- Exclusive long-tenure rights over station/rail-adjacent land including stations to directly monetize real estate and capture value uplift.
- Upfront transfer of station-adjacent land parcels and air rights, priced at pre-rail rates.
- Guaranteed development rights such as pre-approved high FAR, mixed-use zoning, etc.
- Regulatory certainty in terms of zoning approvals, protection from reversal/dilution of FAR, and autonomy in selecting developer partners.
- Baseline incentives such as concessions on stamp duty, development premiums, tax relief on materials, and single-window clearance.
- Rights in locations with predictable real estate returns through phased development, leasing, and sales tied to metro connectivity and high footfall.
- Transaction flexibility including the ability to structure development agreements or lease models with sub-developers and tenants.
- Risk mitigation via legal empowerment of SPV and statutory backing from central policy in matters related to land and approvals.

Government/SPV safeguards:

- Public interest: Mandatory quotas for affordable housing, public amenities, universal accessibility, and ESG compliance.
- Minimum development obligations: Enforced timelines (e.g., X% to be built within Y years) to avoid land hoarding.
- Exit controls: Lock-in for equity divestment.
- Revenue sharing: Station-top/adjacent development revenue sharing with SPV/government for city services and negative development impact mitigation.
- Performance monitoring: Contractual obligations for timely rail construction, O&M standards, and phased TOD delivery.

Land value creation and capture, through intensive and strategic station area (re)development, are critical for the financial sustainability of India's metro and regional rail systems and can unlock significant non-fare revenues while shaping modern, transit-oriented urban centers. The central government may help metro and regional rail SPVs activate this process by designing and issuing model policies and guidance documents, conditioning metro funding on credible TOD+LVC based non-fare revenue strategies, supporting states in land assembly and zoning reforms, and facilitating investor confidence through appropriate communication of reforms. Done right, this approach can immediately transform existing and planned stations into hubs of economic vitality, enabling Indian transit systems to grow sustainably.

5.4 Conclusion

This report establishes Land Value Creation and Capture (LVCC) not as an optional financing innovation, but as an imperative for the long-term financial sustainability of India's urban and regional rail systems. As India expands capital-intensive, high-quality, rail-based public transport while maintaining affordable fares, LVCC offers a structurally sound pathway to convert transit-induced land value gains into predictable, recurring, and substantial non-fare revenues. International and Indian experience demonstrate that when LVCC is creatively integrated with transit-oriented development patterns, robust institutions, and transparent valuation, it can simultaneously strengthen project viability, crowd in private capital, and shape compact, inclusive, and low-carbon urban growth.

The report's central contribution lies in translating LVCC from concept to implementable strategy through the proposed 3-I framework: Invest, Integrate, and Intensify. By adopting proven Asian TOD and LVC models, by integrating land use, transport, and finance through an empowered unified metropolitan institution (UMTA), and by intensifying station-area redevelopment via PPPs, governments can unlock the full economic potential of transit infrastructure. Linking central funding, such as the Urban Challenge Fund, to credible LVCC assessments and robust plans can further catalyze systemic reform at state and city levels.

The LVCC framework and the proposed 3-I strategy are equally applicable to High-Speed Rail (HSR), where stations can anchor high-intensity, mixed-use regional growth hubs, enabling systematic land value capture to support capital costs and enhance financial viability of HSR projects.

Ultimately, mainstreaming LVCC positions urban and regional public transport not merely as a mobility service, but as a long-term public asset and a powerful engine of economic prosperity and sustainable development, aligned with India's Viksit Bharat@2047 and Net Zero 2070 ambitions.

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AI STATEMENT

Artificial intelligence tools were used in limited capacities, including improving grammar, refining readability, enhancing clarity of expression, and facilitating literature exploration. They were not used to generate original research, analyze data, or develop arguments or conclusions. This report contains the authors' authentic and original contributions where necessary and reflects the authors' own analysis, interpretation, and ideas. All outputs were reviewed and verified, and the responsibility rests with the authors.

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