



Land Value Capture for Transportation Infrastructure Financing: A Systematic Literature Review of Transit-Oriented Development and Land-Value Creation

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Abstract

Land Value Capture (LVC) has emerged as a complementary mechanism for financing transportation infrastructure, particularly within Transit-Oriented Development (TOD) areas where transportation investment can enhance accessibility and influence land and property values. However, value creation does not automatically translate into public revenue because effective capture depends on appropriate instruments, regulatory frameworks, institutional capacity, governance, and land-value assessment. This study aims to review literature examining the relationship between transportation investment, land-value creation, LVC, TOD, and transportation infrastructure financing. A Systematic Literature Review (SLR) was conducted using the PRISMA 2020 framework, with literature identified through Scopus, ScienceDirect, Google Scholar, and Garuda. From 214 identified records, 62 duplicates were removed, 152 records were screened, 32 reports were assessed for eligibility, and 10 studies were included in the synthesis. The findings indicate that transportation investment and TOD contribute to land and property value creation through improved accessibility and development, although the magnitude and direction of value changes vary across contexts and property types. The review identifies Betterment Levy, developer exactions, development rights, land-value-based financing, and joint or property development as LVC mechanisms. Overall, LVC has potential to complement transportation infrastructure financing, but implementation requires context-specific instruments and integrated transportation, land-use, fiscal, regulatory, and institutional frameworks.

Keywords: *Infrastructure Financing, Land Value Capture, Land-Value Creation, Transit-Oriented Development, Transportation Investment.*



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INTRODUCTION

Urban transportation infrastructure plays an important role in improving accessibility, supporting economic activity, and shaping the spatial development of cities, yet the expansion of rail-based systems requires substantial and long-term financial resources that conventional public financing may not always be able to provide (Davies, 2025). As cities pursue more integrated and sustainable development, the relationship between transportation investment, land-use change, and economic development has become increasingly important because accessibility improvements can generate benefits that extend beyond the transport system itself (Sharma & Dehalwar, 2025). These benefits create an opportunity to reconsider infrastructure financing through Land Value Capture (LVC), which seeks to recover part of the land-value increment associated with public investment and redirect it toward public purposes (Welch et al., 2025). The economic rationale for LVC is closely related to the relationship between transportation accessibility and land-value creation, as improved access to employment, commercial centers, and urban services can influence the attractiveness and development potential of surrounding land (Medda, 2012). Within this context, Transit-Oriented Development (TOD) provides an important framework for examining how transportation investment can be connected to land-use intensification, economic activity, and potential financing opportunities. The growing international interest in these relationships raises a central question for economic development and infrastructure finance: under what conditions can transportation-induced land-value creation be translated into a reliable and sustainable source of public investment?

The economic rationale for LVC is closely related to the relationship between transportation accessibility and land-value creation, but the existence and magnitude of such value creation cannot be assumed to be uniform across locations, transportation modes, and property markets (Zhang & Yen, 2020). Transportation infrastructure can reduce travel costs, improve access to employment and commercial centers, and increase the attractiveness of locations surrounding transit facilities, creating potential benefits for landowners and developers. Within this context, LVC seeks to capture part of the value generated by public investment through mechanisms such as betterment levies, accessibility-related contributions, development rights, developer exactions, and joint development (Medda, 2012). However, the literature indicates that the relationship between accessibility and land value is not simply a direct or automatic outcome of infrastructure provision, because market conditions, property characteristics, and the spatial distribution of benefits can influence the extent to which value is created and captured. Smith and Gihring (2006) identify value capture as a potential means of financing transit systems, while also highlighting the importance of understanding the institutional and economic conditions that shape its application. This distinction is particularly relevant to TOD, where transportation investment, land-use planning, and development incentives must be coordinated to create conditions in which value capture mechanisms can operate effectively. The resulting analytical challenge is to distinguish between the generation of land value, the identification of beneficiaries, and the actual recovery of value for public infrastructure financing.

This issue is particularly relevant to Transit-Oriented Development (TOD), which integrates transportation infrastructure with land-use and urban development around transit nodes. TOD can create conditions in which improvements in accessibility are accompanied by increased development intensity and economic activity, although the relationship between these processes depends on the characteristics of the surrounding urban environment. Empirical evidence from Jakarta supports this relationship, as Arliani et al. (2024) found that internal accessibility contributed 40% to the TOD index and demonstrated a strong relationship between internal accessibility and value creation, with an R^2 of 0.8430. These findings indicate that accessibility is an important consideration when assessing the potential application of LVC in TOD areas, particularly where development intensity and land-use integration can reinforce the benefits of transportation investment. Research on the financing of TOD also suggests that value capture can be connected to the provision of public infrastructure through negotiated arrangements and development-based financing approaches, rather than being treated solely as a tax mechanism (van der Krabben et al., 2022). In Indonesia, Alvian (2023) examines financing schemes from land value in TOD and illustrates the relevance of land-based financing to the development of transit-oriented areas. The literature therefore suggests that TOD should be understood not only as a spatial planning concept but also as a potential institutional setting in which transportation investment, land-value creation, and infrastructure financing can be linked.

Nevertheless, transportation investment does not necessarily produce uniform increases in land or property values, and the assumption that improved accessibility automatically generates a sufficient financing base remains open to empirical examination. Recent evidence from the Jakarta Mass Rapid Transit (MRT) provides an important counterpoint, as Shimizutani et al. (2026) found that MRT opening had a negative and significant effect on commercial office rents near MRT stations, while no significant effect was observed for residential apartments. The authors suggest that oversupply in the office-property market may have contributed to the negative effect, indicating that property values do not necessarily increase simply as a consequence of urban transit development. This finding highlights the importance of considering property type, market conditions, and local development characteristics when evaluating transportation-induced value creation and the feasibility of LVC. Evidence from Bekasi City further demonstrates that LVC must be examined within the broader context of sustainable urban development, where the relationship between land value, planning, and public investment involves institutional and spatial considerations (Anggara & Wijaya, 2024). Research on land-value measurement also identifies a potential gap between LVC policy and the methods used to assess land-value changes, particularly when measurement practices do not fully correspond to the objectives of value-capture policy (Putri et al., 2023). The challenge is therefore not limited to identifying whether transportation investment generates value, but also concerns whether the resulting value can be measured, captured, administered, and converted into sustainable infrastructure financing.

The Indonesian context further demonstrates the need to connect transportation investment with appropriate value-capture and financing mechanisms. Safaria et al. (2024) conclude that LVC has

potential as an alternative financing scheme for urban railway infrastructure in Indonesia, while identifying the availability of an appropriate regulatory framework as an urgent requirement for implementation. Their findings emphasize the importance of considering cost-benefit analysis, land value, market conditions, sustainability, and public participation when assessing the feasibility of LVC. The literature also identifies specific mechanisms through which value capture may be operationalized, including betterment levies, accessibility-increment contributions, joint development, development impact fees, negotiated exactions, and air rights, each of which involves different institutional requirements and implementation conditions (Medda, 2012). Septiandiani (2022) examines the betterment levy as a mechanism of LVC and highlights the importance of understanding its conceptual, procedural, and implementation dimensions. Berawi et al. (2021) demonstrate the relevance of technological tools to the development of LVC schemes for urban rail transit financing, suggesting that the operationalization of value capture may also require appropriate methods of valuation, information management, and decision support. Evidence from Palembang City further illustrates the potential of LVC as a financial resource for infrastructure development, while indicating that its application must be considered within the specific institutional and development context of the area (Mabrurrotunnisa & Iskandar, 2021). These studies collectively indicate that the central issue is not merely whether LVC exists as a financing concept, but how value creation, measurement, institutional arrangements, and financing mechanisms can be integrated into a coherent framework for transportation infrastructure development.

Despite the growing literature, the existing evidence remains fragmented across different research focuses, including transportation-induced land-value creation, TOD development, LVC instruments, financing models, and regulatory or governance conditions. Some studies concentrate on the effect of transportation investment or accessibility on land and property values, while others examine specific LVC instruments or their potential contribution to infrastructure financing, making it difficult to establish a comprehensive understanding of the relationship between value creation and capture. Recent international research on value capture mechanisms and willingness to pay for urban sustainability further indicates the breadth of the literature and the need to examine how different mechanisms are evaluated across institutional and development contexts (Bidolli et al., 2026). Research on stakeholder relations in LVC also suggests that the implementation of value capture involves complex relationships among public authorities, developers, landowners, and other stakeholders, particularly within decentralized governance systems (Danandjojo et al., 2026). These findings indicate that the literature cannot be adequately synthesized through a single theoretical or empirical perspective, because the feasibility of LVC depends on the interaction between economic benefits, land markets, institutional arrangements, and financing requirements. This study therefore positions itself within the intersection of economic development, accounting, and infrastructure finance by examining how land-value creation can be connected to public financing mechanisms through an integrated review of the existing evidence. The review aims to provide a transparent and reproducible synthesis of the literature, while identifying the regulatory, institutional, and technical conditions that influence the implementation of LVC. It seeks to contribute theoretically by clarifying the relationships among transportation investment, accessibility, land-value creation, TOD, and value capture, and methodologically by organizing fragmented evidence into a systematic framework that can support future empirical research and policy evaluation.

RESEARCH METHODS

This study employed a non-empirical Systematic Literature Review (SLR) to identify, evaluate, and synthesize previous studies concerning Land Value Capture (LVC), Transit-Oriented Development (TOD), transportation investment, land-value creation, and transportation infrastructure financing. The review adopted a conceptual approach that treats transportation-induced accessibility, land-value creation, value-capture mechanisms, and infrastructure financing as interconnected components of a broader economic development and public finance framework, consistent with the established literature on value capture for transport accessibility (Medda, 2012). The review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines, which provide a structured framework for transparently reporting the identification, screening, eligibility assessment, and inclusion of studies (Page et al., 2021). The review was guided by the research question: How does the existing literature describe the relationship between transportation

investment, land-value creation, LVC, and transportation infrastructure financing, particularly in the context of TOD? The literature search was conducted using combinations of keywords related to “Land Value Capture,” “value capture,” “land value,” “Transit-Oriented Development,” “TOD,” “transportation infrastructure financing,” “urban railway financing,” “rail transit,” “property value,” and “land value creation” across Scopus, ScienceDirect, Google Scholar, and Garuda, with Boolean operators AND and OR used to identify both direct LVC studies and studies addressing transportation-related land-value creation as a preceding component of the value-capture process. Studies were considered eligible when they addressed LVC, land-value creation, property-value effects of transportation investment, TOD, transportation infrastructure financing, or land-value-based financing, while studies were excluded when they were unrelated to the review topic, only mentioned LVC or TOD incidentally, lacked substantive findings, or did not provide sufficient information for extraction and synthesis.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Topic	LVC, land-value creation, property value, TOD, transportation investment, or infrastructure financing	Studies unrelated to the review topics
Relationship	Studies examining transportation investment, value creation, value capture, or infrastructure financing	Studies that only mention LVC or TOD incidentally
Context	Urban transportation, railway, MRT/LRT, TOD, land development, or related infrastructure	Contexts unrelated to urban transportation or land-value mechanisms
Study Type	Empirical studies, case studies, policy analyses, conceptual studies, literature reviews, and systematic reviews with relevant findings	Editorials, opinion pieces, and sources without substantive research findings
Information Availability	Studies providing sufficient information for extraction and synthesis	Studies with insufficient data or information
Relevance	Studies contributing to at least one component of value creation, value capture, financing, or implementation	Studies outside the conceptual scope of the review

The study-selection process consisted of identification, screening, eligibility assessment, and inclusion, resulting in 214 records identified from the four databases, 62 duplicate records removed, 152 records screened, 114 records excluded during title and abstract screening, 38 reports sought for retrieval, 6 reports unavailable for retrieval, 32 reports assessed for eligibility, and 10 studies included in the final systematic literature review. The data from the ten included studies were extracted using a standardized framework covering author and publication year, research context or location, methodological approach, research focus, LVC or value-creation mechanism, transportation or TOD context, principal findings, and implementation issues, following the need to examine both the economic and institutional dimensions of value capture (Smith & Gihring, 2006). The extracted information was subsequently organized into comparative tables to identify similarities, differences, and recurring findings across the studies, while particular attention was given to the relationship between land-value creation and the financing of public infrastructure. Because the included studies employed heterogeneous methodological approaches and examined different geographical and institutional contexts, the findings were synthesized using a narrative thematic synthesis rather than a statistical meta-analysis, with quantitative findings retained as reported and interpreted alongside qualitative and conceptual evidence. The thematic synthesis was organized into four interconnected areas: transportation investment, accessibility, and land-value creation; LVC mechanisms; LVC as a transportation infrastructure financing mechanism; and regulatory, institutional, governance, and land-value assessment conditions, reflecting the need to distinguish value generation from the institutional processes through which value can be captured and converted into public financing (van der Krabben et al., 2022). The final ten included studies therefore constituted the evidence base for the subsequent

analysis, while the review's methodological contribution lies in integrating fragmented evidence into a transparent and reproducible framework for understanding how transportation-induced land-value creation can potentially support sustainable infrastructure financing.

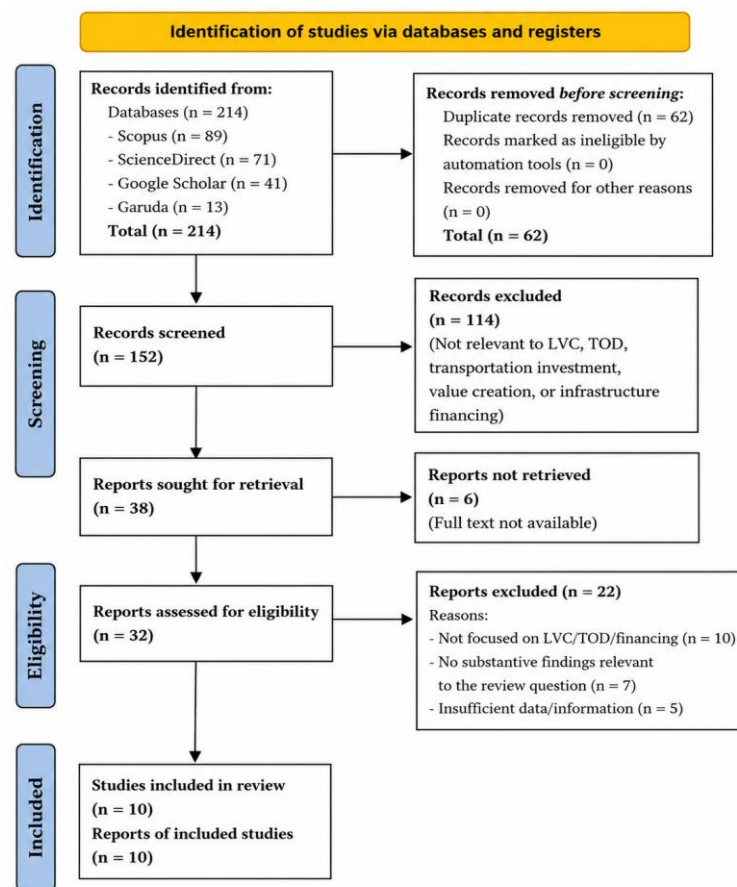


Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process

RESULTS AND DISCUSSION

Characteristics of the Reviewed Studies and Evidence Base

The systematic literature review identified ten studies that met the predetermined inclusion and exclusion criteria and constituted the final evidence base for the analysis. The reviewed literature covers the interconnected themes of land value capture (LVC), transportation investment, transit-oriented development (TOD), land-value creation, and infrastructure financing. The selected studies employ diverse methodological approaches, including case studies, conceptual analyses, policy analyses, systematic literature reviews, regression analysis, and model development. This methodological diversity reflects the multidisciplinary nature of LVC research, which intersects transportation planning, urban development, land economics, public finance, and infrastructure policy. Earlier research positioned LVC as a financing approach that connects increases in land or property values with public investment that generates accessibility improvements, particularly through transportation infrastructure (Medda, 2012). Recent literature has expanded this perspective by examining LVC not only as a financing instrument but also as part of sustainable urban development and broader value-creation processes (Bidolli et al., 2026).

The characteristics of the ten reviewed studies demonstrate that the literature is primarily concerned with the relationship between transportation infrastructure, land-value changes, and mechanisms for converting value increases into infrastructure financing. The evidence base incorporates both studies that directly evaluate LVC as a financing mechanism and studies that examine the antecedent processes through accessibility, TOD, property values, and land-value assessment. Table 2 summarizes the characteristics of the selected studies according to their context, methodology, analytical focus, and principal findings. The table shows that several studies directly address LVC as

an infrastructure financing resource, whereas others investigate the mechanisms that create the value subsequently targeted by LVC. Such variation is important because LVC does not operate independently from transportation investment, accessibility improvement, land development, and property-market responses. The literature therefore provides complementary perspectives for understanding how transportation-generated value can potentially be transformed into public financial resources (Smith & Gihring, 2006). The combination of these perspectives also allows the review to distinguish between the creation of land value and the subsequent capture of that value by public authorities.

Table 2. Characteristics of the Reviewed Studies

No	Author(s) and Year	Context/ Location	Method	Main Focus	Principal Findings
1	Mabrurrotunnisa & Iskandar (2021)	Palembang, Indonesia	Case study/ literature-based analysis	LVC as an infrastructure financing resource	LVC has potential as an alternative financing source for infrastructure development but requires institutional and policy support.
2	Septiandiani (2022)	Indonesia	Conceptual and literature review	Betterment Levy as an LVC instrument	Betterment Levy can capture part of the increase in land value but requires reliable land-value data, appropriate valuation procedures, and institutional readiness.
3	Putri, Wahyuddin, & Amarrohman (2023)	Indonesia	Policy and land-value analysis	LVC and Land Value Zone (ZNT)	Land-value measurement is important for identifying land-value increments and determining the potential for value capture.
4	Alvian (2023)	Bubulak, Indonesia	Case study	Land-value-based financing in TOD	Land value within TOD areas can potentially be utilized to finance area development and transportation infrastructure.
5	Anggara & Wijaya (2024)	Bekasi, Indonesia	Systematic literature review and content analysis	LVC for sustainable urban development	The literature emphasizes LVC instruments, regulation, and governance, including air rights, Betterment Levy, and developer exaction.
6	Safaria, Najid, & Firdausy (2024)	Indonesia; urban railway	Literature-based analysis/comparative experience	LVC as an urban railway financing mechanism	LVC represents a potential alternative financing mechanism for urban railway development, while

						regulatory readiness remains critical.
7	Arliani, Sjafruddin, Santoso, & Winarso (2024)	TOD areas in Jakarta	TOD analysis regression	index and	Accessibility and value creation	Internal accessibility contributed 40% to the TOD index, while the relationship between TOD characteristics and value creation produced an R^2 of 0.8430.
8	Shimizutani, Suzuki, & Yamada (2026)	Jakarta MRT	Empirical analysis		Transportation investment and property values	MRT investment was associated with changes in property-market outcomes, with significant negative effects on commercial office rents but no significant effect on residential apartment values.
9	Wulan, Izzatusholekha, & Zhafarina (2026)	Urban TOD areas	Land-value analysis		TOD and land-value increases	TOD development is associated with increases in Zona Nilai Tanah, indicating a relationship between TOD development and land-value creation.
10	Berawi, Suwartha, Salim, Saroji, & Sari (2021)	Urban rail transit	Model/application development		LVC for urban rail transit financing	The study develops an LVC scheme linking land-value increases generated by urban rail development with transportation financing requirements.

The studies summarized in Table 2 indicate a strong emphasis on the financing implications of transportation-induced land-value changes. Maburutunnisa and Iskandar (2021), Alvian (2023), Safaria et al. (2024), and Berawi et al. (2021) directly position LVC as a potential source of infrastructure financing, although they differ in their analytical approaches and proposed mechanisms. Other studies focus on the processes that make value capture possible, particularly land-value measurement, accessibility improvement, and TOD development. Putri et al. (2023) and Septiandiani (2022), for instance, emphasize the importance of identifying and measuring changes in land value before determining the feasibility of capturing such increments. This indicates that the financing function of LVC depends on an identifiable value-creation process and a reliable basis for assessing the resulting increase in land value. LVC consequently represents a sequence in which transportation investment may generate accessibility benefits, accessibility may influence land or property values, and appropriate institutional mechanisms may seek to recover a portion of those gains.

A further characteristic of the evidence base is the diversity of geographical and institutional contexts represented in the reviewed literature. Although many selected studies focus on Indonesia, their analytical concerns address broader LVC issues, including transportation financing, land-value assessment, TOD, development rights, accessibility, and institutional implementation. The studies on urban railway and TOD demonstrate that the relationship between transportation investment and land value is influenced by the spatial and institutional context in which infrastructure is implemented. Arliani et al. (2024), for example, identify internal accessibility as an important component of TOD and demonstrate a strong relationship between TOD characteristics and value creation. Wulan et al. (2026)

similarly identify an association between TOD development and changes in Zona Nilai Tanah, reinforcing the relevance of land-value changes in transit-oriented areas. These findings are consistent with the broader literature synthesized by Sharma and Dehalwar (2025), which positions TOD as an urban development approach with implications extending beyond transportation accessibility toward economic development. At the same time, the evidence from the Jakarta MRT demonstrates that transportation investment does not necessarily generate uniform property-market outcomes, as Shimizutani et al. (2026) found a significant negative effect on commercial office rents and no significant effect on residential apartment values.

The methodological diversity of the reviewed studies also affects the interpretation of the available evidence. Empirical approaches provide measurable evidence concerning accessibility, land values, and property-market responses, while conceptual and policy-oriented studies provide insights into mechanisms, institutional requirements, and implementation challenges. Berawi et al. (2021) adopt a model-development perspective to connect land-value increases generated by urban rail development with transportation financing requirements. Anggara and Wijaya (2024), in contrast, synthesize different LVC instruments while emphasizing the interaction between financing mechanisms, regulation, and governance. This distinction indicates that the feasibility of LVC cannot be evaluated solely from the magnitude of land-value appreciation because value creation must also be connected to an appropriate institutional mechanism for public recovery. Purwadita et al. (2024) reinforce this perspective by examining LVC policy in relation to investment performance, indicating the importance of evaluating whether value-capture arrangements can support the financial objectives of infrastructure projects. The evidence base therefore combines market-oriented, spatial, financial, and institutional perspectives rather than relying on a single analytical dimension.

The reviewed studies also reveal a progression from identifying transportation-related value creation toward determining how such value can be captured and utilized for infrastructure financing. Research on accessibility and TOD establishes potential sources of land-value increases, while studies on land-value assessment provide the basis for identifying and measuring those increments. Studies concerning Betterment Levy, developer exaction, air rights, development-based mechanisms, and land-value-based financing subsequently address alternative pathways for converting value creation into financial resources. This sequence corresponds with the conceptual foundation of LVC, whereby public investment generates accessibility or development benefits that may increase private land or property values and subsequently create opportunities for public value recovery (van der Krabben et al., 2022). The evidence also demonstrates that LVC should not be treated as a single standardized mechanism because its application varies according to transportation characteristics, land-market conditions, development patterns, regulatory arrangements, and institutional capacity. The international systematic review by Bidolli et al. (2026) further highlights the diversity of value-capture mechanisms and the relevance of willingness to pay in assessing their feasibility for sustainable urban development. These characteristics provide the analytical basis for examining the next thematic dimension, namely the relationship between transportation investment, accessibility, TOD, and land-value creation.

Transportation Investment, Accessibility, TOD, and Land-Value Creation

Transportation investment can generate changes in urban land value through improvements in accessibility, travel efficiency, and connectivity between locations. The development of rail transit, MRT, BRT, and related transportation infrastructure can reduce travel barriers and increase the attractiveness of areas that previously had lower levels of accessibility. Improved accessibility may subsequently influence the location decisions of households, firms, developers, and investors, creating additional demand for land and property. This relationship forms an important foundation for understanding why transportation infrastructure can generate economic value beyond its direct mobility function. Medda (2012) explains that improved transport accessibility can produce land-value increases that provide an economic basis for value capture. The magnitude of such increases, however, depends on how strongly improved accessibility is translated into changes in urban development and property-market demand.

Accessibility functions as an intermediary mechanism between transportation investment and land-value creation rather than representing an automatic consequence of infrastructure provision. A transportation project may improve physical connectivity, but the resulting land-value effect depends on whether users perceive the accessibility improvement as sufficiently beneficial to alter location

preferences and development decisions. Arliani et al. (2024) provide empirical evidence of this relationship by showing that internal accessibility contributed 40% to the TOD index and that the resulting model produced an R^2 value of 0.8430 in explaining value creation. This finding indicates that accessibility constitutes a substantial component of the spatial characteristics associated with value creation in TOD areas. The evidence also suggests that the connection between transportation and land value becomes stronger when infrastructure improvements are accompanied by internal connectivity and supportive spatial development. Transportation investment therefore becomes economically significant when enhanced accessibility is integrated with land-use patterns that allow accessibility benefits to be capitalized into land and property markets.

The role of TOD becomes particularly important because it integrates transportation accessibility with higher-density, mixed-use, and development-oriented land-use patterns. Rather than treating transportation infrastructure as an isolated mobility facility, TOD creates a spatial framework through which accessibility improvements can influence development intensity and land-market attractiveness. Sharma and Dehalwar (2025) identify TOD as an important urban development approach that connects transportation accessibility with broader economic development outcomes. Arliani et al. (2024) further demonstrate that accessibility within TOD areas is closely associated with value creation, indicating that the spatial organization surrounding transit can strengthen the economic effects of transportation investment. TOD can therefore function as a mechanism that transforms improved accessibility into more persistent changes in land-use demand and development potential. The relationship is particularly relevant to LVC because a stronger connection between transit accessibility and land-value creation expands the potential value base from which public authorities may seek to recover part of the infrastructure investment.

The reviewed evidence also demonstrates that transportation investment does not generate identical effects across different property markets. The Jakarta MRT evidence is particularly important because Shimizutani et al. (2026) found a significant negative effect of MRT opening on commercial office rents while identifying no significant effect on residential apartment values. This finding challenges the assumption that improved accessibility necessarily produces immediate appreciation across all property categories. Commercial property may respond to broader market conditions, including existing supply, vacancy, demand conditions, and the competitive position of individual locations. Residential property may similarly respond according to household preferences, neighborhood characteristics, accessibility benefits, and the timing of development responses. The contrasting outcomes indicate that transportation-induced land-value creation is conditional rather than universal, and that the economic effect of accessibility must be evaluated according to property type and market structure.

Table 3. Key Evidence on Transportation, TOD, and Land-Value Creation

No.	Evidence/Relationship	Key Finding	Implication for Land-Value Creation
1	Accessibility and TOD	Internal accessibility contributed 40% to the TOD index; the relationship with value creation produced an R^2 of 0.8430.	Accessibility represents an important mechanism connecting TOD characteristics with value creation.
2	TOD and land value	TOD development is associated with increases in Zona Nilai Tanah.	Integrated transit and land development can strengthen the potential for land-value appreciation.
3	Transportation investment and commercial property	Jakarta MRT opening had a significant negative effect on commercial office rents.	Transportation investment does not necessarily increase value in all commercial property markets.
4	Transportation investment and residential property	Jakarta MRT opening had no significant effect on residential apartment values.	Accessibility improvements may not immediately translate

			into residential property-value increases.
5	BRT and property values	The impact of BRT on land and property values varies across contexts.	Transportation-induced value creation is context-dependent rather than uniform.
6	Transportation accessibility and LVC	Improved accessibility can generate land-value increases that provide a potential basis for value capture.	Accessibility is an important prerequisite for establishing a potential LVC value base.

The evidence summarized in Table 3 demonstrates that the transportation–land-value relationship consists of several interconnected stages rather than a simple direct causal relationship. Transportation investment can improve accessibility, but the extent to which accessibility generates land-value appreciation depends on TOD characteristics, land-use integration, property-market conditions, and development demand. Zhang and Yen (2020) demonstrate through a meta-analysis that the effects of BRT on land and property values vary across contexts, reinforcing the importance of contextual conditions in interpreting transportation-induced value creation. The quantitative evidence from Arliani et al. (2024) provides strong support for the importance of accessibility, whereas the findings of Shimizutani et al. (2026) demonstrate that market responses can differ substantially by property type. Land-value appreciation is therefore more likely when transportation investment produces meaningful accessibility improvements that are supported by compatible land-use patterns and sufficient market demand. Conversely, limited demand, property-market imbalances, unsuitable development patterns, or weak integration between transportation and land use may prevent improved accessibility from being fully capitalized into land or property values.

A critical synthesis of the reviewed literature indicates that transportation investment should be understood as a potential catalyst for land-value creation rather than a direct guarantee of land-value appreciation. The strongest value-creation pathway emerges when transportation infrastructure improves accessibility, TOD integrates that accessibility with development opportunities, and the surrounding property market has sufficient demand to capitalize the resulting benefits. Evidence from Arliani et al. (2024) supports the importance of accessibility through the 40% contribution to the TOD index and the R^2 of 0.8430, while evidence from Shimizutani et al. (2026) demonstrates that transportation investment may produce weak or even negative effects in specific property segments. The contrast between these findings indicates that accessibility must be considered together with market structure, land-use intensity, development readiness, and property characteristics. The potential for land-value appreciation consequently varies according to whether transportation investment produces a sufficiently strong and marketable accessibility benefit. This interpretation is consistent with the broader LVC literature, which treats value creation as a prerequisite for capture rather than assuming that every transportation investment automatically generates recoverable financial value (Welch et al., 2025). The distinction is fundamental for transportation financing because the feasibility of LVC depends not merely on the existence of transportation-induced accessibility improvements but on the extent to which those improvements generate identifiable and capturable changes in land or property value.

Land Value Capture Mechanisms and Transportation Infrastructure Financing

The reviewed literature distinguishes land-value creation from land value capture as two interconnected but conceptually different processes in transportation infrastructure financing. Land-value creation refers to increases in land or property values that may arise from public investment, improved accessibility, changes in land use, or expanded development opportunities. Land value capture, in contrast, refers to institutional and financial mechanisms through which a portion of these value increases can be recovered by the public sector to support infrastructure provision or other public purposes. This distinction is important because an increase in land value does not automatically become fiscal revenue available to the government. Medda (2012) explains that transportation accessibility can generate land-value increases that provide a potential basis for value capture, while Smith and Gihring (2006) establish the broader connection between value capture and transit financing. LVC therefore

represents a process that begins with value creation and requires an additional institutional mechanism to transform part of that value into usable financial resources.

Betterment Levy or development charge represents one of the most direct mechanisms for recovering a portion of value generated by public intervention. The mechanism is based on the principle that landowners or beneficiaries contribute part of the value increase attributable to infrastructure investment or planning intervention. Septiandiani (2022) explains that the implementation of Betterment Levy requires comparison of land values before and after an intervention to establish the basis for determining the relevant value increment. Putri et al. (2023) similarly emphasize the importance of land-value measurement, particularly through Zona Nilai Tanah (ZNT), for identifying land-value differences that may become the basis for capture. Anggara and Wijaya (2024) further identify Betterment Levy as one of several LVC instruments that can connect increases in land value with sustainable urban development financing. The effectiveness of this mechanism consequently depends on reliable land-value information, transparent valuation procedures, and sufficient institutional capacity to determine and collect the appropriate contribution.

The literature also identifies developer exaction, air rights, and development rights as mechanisms that capture value through changes in development opportunities rather than relying exclusively on direct fiscal charges. Developer exaction requires developers to provide financial contributions, land, or infrastructure in association with development approvals or benefits received from public investment. Air rights and development rights can capture value generated by additional development intensity or the authorization to utilize valuable development capacity around transportation infrastructure. Anggara and Wijaya (2024) identify developer exaction and air rights as important LVC instruments alongside Betterment Levy. These mechanisms are particularly relevant in areas where transportation investment increases development potential and creates benefits that can be shared between public authorities and private developers. Their implementation nevertheless requires clear rules concerning development rights, contribution obligations, benefit distribution, and the relationship between private development gains and public infrastructure needs.

The reviewed literature further identifies land-value-based financing and joint or property development as mechanisms that connect transportation investment more directly with land and real-estate markets. Land-value-based financing uses increases in land value as a potential financial resource, while joint or property development integrates transportation infrastructure with commercial or real-estate development to generate additional revenue. Alvian (2023) demonstrates the potential of land-value-based financing within a TOD context, while Berawi et al. (2021) develop an LVC scheme linking land-value increases with financing requirements for urban rail transit. Safaria et al. (2024) similarly position LVC as a potential financing mechanism for urban railway development and emphasize the importance of regulatory support. These approaches extend LVC beyond conventional tax-based instruments by treating land development and commercial opportunities as components of the transportation financing structure. The financing potential is therefore closely related to whether transportation investment creates sufficient development opportunities and whether these opportunities can be organized into financially viable arrangements.

Table 4. Land Value Capture Mechanisms Identified in the Reviewed Studies

No.	LVC Mechanism	Description	Key References
1	Betterment Levy / Development Charge	Captures part of the increase in land value generated by public investment or planning intervention.	Septiandiani (2022); Anggara & Wijaya (2024)
2	Developer Exaction	Requires developers to contribute cash, land, or infrastructure to support public infrastructure needs associated with development.	Anggara & Wijaya (2024)
3	Air Rights / Development Rights	Captures value generated from additional development intensity or development rights in valuable urban areas.	Anggara & Wijaya (2024)

4	Land-Value-Based Financing	Uses increases in land value as a potential financing resource for infrastructure or area development.	Putri et al. (2023); Alvian (2023)
5	Joint / Property Development	Integrates transportation infrastructure with commercial or property development to generate additional financing resources.	Berawi et al. (2021); Safaria et al. (2024)
6	Development-Based LVC	Utilizes land development, land sales or leases, and development opportunities associated with transportation infrastructure.	Safaria et al. (2024); Anggara & Wijaya (2024)
7	Value Creation / Self-Financing	Utilizes value generated within TOD areas as a potential source for supporting infrastructure financing.	Arliani et al. (2024)

The mechanisms summarized in Table 4 demonstrate that LVC should be understood as a family of financing approaches rather than a single standardized instrument. Betterment Levy and development charges primarily rely on fiscal recovery of identifiable value increments, whereas developer exaction and development rights operate through development processes and changes in development potential. Land-value-based financing and joint/property development operate more directly through land and real-estate markets, making them particularly relevant to TOD areas with substantial development potential. van der Krabben et al. (2022) emphasize that value capture in TOD involves negotiation concerning public infrastructure provision and the distribution of development benefits, highlighting that financial mechanisms are inseparable from institutional arrangements. The diversity of mechanisms indicates that instrument selection should correspond to the source of value creation, characteristics of the land market, development structure, and authority available to implement capture. LVC consequently requires alignment between the type of value generated and the mechanism used to recover it rather than applying the same instrument across different transportation projects.

A critical limitation concerns the conversion of estimated land-value increments into actual and sustainable public revenue. An increase in land or property value may exist without being immediately taxable, collectible, or monetizable by the public sector because of valuation uncertainty, market fluctuations, ownership structures, regulatory constraints, and institutional limitations. Maburutunnisa and Iskandar (2021) identify institutional and policy challenges in utilizing LVC as an infrastructure financing resource, while Safaria et al. (2024) emphasize regulatory readiness as an important condition for urban railway applications. Purwadita et al. (2024) further indicate the importance of evaluating LVC policy in relation to investment performance rather than assuming that the existence of a capture mechanism automatically produces optimal financial outcomes. The literature therefore suggests that LVC should be assessed based on the extent to which created value can be measured, legally captured, collected, and directed toward transportation infrastructure financing. This distinction is fundamental because the potential land-value increment represents an economic opportunity, whereas actual revenue requires a functioning institutional, regulatory, and financial mechanism capable of converting that opportunity into realized resources.

Institutional, Regulatory, Governance, and Implementation Conditions

The implementation of land value capture depends not only on the existence of land-value increases but also on the regulatory framework that enables public authorities to identify, claim, and utilize those increases. Regulation establishes the legal authority, capture instruments, valuation procedures, beneficiary obligations, and allocation mechanisms required to transform land-value creation into public revenue. Safaria et al. (2024) identify regulatory readiness as a critical condition for applying LVC to urban railway financing, indicating that financial potential cannot be realized when the legal basis for capture remains uncertain. Anggara and Wijaya (2024) similarly identify regulation as one of the central themes in the LVC literature, alongside instruments and governance. The regulatory dimension is particularly important because LVC involves interactions between public investment and privately held land or property rights. A weak or fragmented regulatory framework can therefore create

uncertainty concerning who is entitled to capture value, how much can be captured, and how the resulting revenue should be directed toward transportation infrastructure.

Governance represents a second critical condition because LVC requires coordination among public authorities, landowners, developers, transportation agencies, and other stakeholders affected by infrastructure development. The process involves competing interests because transportation investment may generate benefits for private property owners while simultaneously creating obligations to contribute toward public infrastructure costs. Danandjojo et al. (2026) emphasize the importance of stakeholder relations in LVC within decentralized governance, demonstrating that institutional relationships influence how value-capture arrangements are developed and implemented. van der Krabben et al. (2022) similarly emphasize negotiation in financing TOD through value capture, particularly in relation to the provision of better public infrastructure and the distribution of development benefits. These perspectives indicate that LVC cannot be implemented effectively through a purely technical calculation of land-value increments. Institutional coordination is required to establish shared expectations, negotiate contributions, resolve competing interests, and maintain legitimacy throughout the implementation process.

Land-value assessment constitutes another fundamental requirement because the amount of value available for capture must be identified before an appropriate financing mechanism can be applied. Zona Nilai Tanah provides an important basis for identifying spatial differences in land values and assessing changes associated with infrastructure or development interventions. Putri et al. (2023) emphasize the relationship between LVC policy and ZNT-based land-value measurement, while Septiandiani (2022) highlights the importance of valuation procedures in implementing Betterment Levy. The reliability of land-value assessment directly affects the credibility and fairness of the capture mechanism because inaccurate valuation may lead to inappropriate contribution levels or disputes among affected stakeholders. The assessment process therefore needs to account for differences in location, accessibility, land use, development potential, and market conditions rather than relying on generalized estimates. Accurate and transparent valuation provides the informational foundation connecting transportation-induced value creation with the institutional decision to capture part of that value.

Table 5. Institutional and Implementation Conditions for LVC

No.	Institutional/Implementation Condition	Key Issue	Implication for LVC Implementation
1	Regulatory Framework	Legal basis, authority, procedures, and allocation of captured value	Provides legitimacy and certainty for implementing LVC instruments.
2	Governance and Stakeholder Relations	Coordination and negotiation among government, developers, landowners, and transportation stakeholders	Determines the feasibility of agreements and distribution of development benefits.
3	Land-Value Assessment	Availability and reliability of land-value data and valuation procedures	Establishes the basis for identifying and calculating value increments.
4	Institutional Capacity	Technical expertise, administrative capability, and inter-agency coordination	Supports consistent implementation, monitoring, and revenue management.
5	Political and Public Acceptance	Perceptions of fairness, transparency, contribution obligations, and public benefits	Influences the legitimacy and sustainability of LVC policies.
6	Distributional Considerations	Allocation of costs and benefits among affected groups	Determines whether LVC produces equitable infrastructure financing outcomes.

The conditions summarized in Table 5 demonstrate that the feasibility of LVC depends on an institutional chain connecting regulation, land-value assessment, governance, administrative capacity, and social acceptance. Regulatory authorization without reliable land-value assessment may provide legal authority but insufficient information for determining the amount to be captured, while accurate valuation without stakeholder coordination may generate technically defensible estimates that remain difficult to implement. Mabrutunnisa and Iskandar (2021) identify institutional and policy challenges as constraints on the utilization of LVC for infrastructure development, illustrating the gap between financial potential and implementation capacity. Danandjojo et al. (2026) further highlight stakeholder relations as an important dimension of LVC governance, particularly where responsibilities and authority are distributed across different levels of government. Institutional capacity is also required to conduct land-value assessments, determine eligible capture areas, design contribution mechanisms, monitor development activity, and manage captured revenue. Anggara and Wijaya (2024) identify governance as a recurring dimension of LVC implementation, while Safaria et al. (2024) emphasize institutional and regulatory preparedness in applying LVC to transportation financing.

Political and public acceptance represents another important condition because LVC redistributes part of the economic benefits associated with public investment between private beneficiaries and the public sector. Landowners and developers may perceive capture requirements as additional financial burdens when the relationship between infrastructure benefits and contribution obligations is not clearly communicated. Mabrutunnisa and Iskandar (2021) identify public complaints and institutional challenges as relevant considerations in LVC implementation, indicating that acceptance can affect the practical sustainability of financing arrangements. The distributional dimension is also important because transportation investments may generate unequal benefits across locations, property types, and socioeconomic groups. A capture mechanism perceived as unfair may weaken political support even when its financial rationale is technically sound. Effective LVC therefore requires coordination among transportation planning, land-use planning, taxation, property valuation, and infrastructure financing institutions, together with transparency concerning the origin of value increases, contribution levels, revenue utilization, and distribution of infrastructure benefits.

The critical synthesis indicates that a major research gap lies in the fragmentation between studies examining transportation-induced value creation and those addressing the institutional mechanisms required to capture and utilize that value. Existing research provides evidence concerning accessibility, TOD, land-value changes, LVC instruments, and infrastructure financing, but these dimensions are frequently examined separately rather than as an integrated financing framework. Bidolli et al. (2026) broaden the discussion through an international systematic review of value-capture mechanisms and willingness to pay, while Welch et al. (2025) demonstrate the wider relevance of LVC for financing public policy objectives. An integrated interpretation therefore positions LVC as a multi-stage financing system in which transportation investment creates accessibility benefits, accessibility interacts with TOD and land-use conditions, and resulting land or property-value changes establish a potential capture base. The realization of this potential requires reliable valuation, appropriate regulation, institutional coordination, stakeholder engagement, and mechanisms for collecting and allocating captured revenue. LVC should consequently be evaluated not simply by whether transportation investment increases land value, but by whether the resulting value can be identified, attributed, captured, collected, and directed toward transportation infrastructure, providing an integrated conceptual basis for understanding LVC as a financing mechanism rather than merely a land-value recovery instrument.

CONCLUSION

This systematic literature review examined the relationship between transportation investment, land-value creation, Land Value Capture (LVC), Transit-Oriented Development (TOD), and transportation infrastructure financing based on the synthesis of 10 selected studies. The findings indicate that transportation investment can generate accessibility improvements that contribute to land and property value creation, while TOD can strengthen the interaction between transportation accessibility, land use, and urban development. However, the magnitude and direction of value changes vary across locations, property types, development conditions, and market characteristics, indicating that land-value appreciation cannot be assumed to occur uniformly following transportation investment.

The review further identifies several LVC mechanisms, including Betterment Levy or Development Charge, developer exactions, development rights, land-value-based financing, and joint or property development, which can provide alternative or complementary sources of transportation infrastructure financing. The existence of land-value increases, however, does not automatically produce public revenue because value creation and value capture represent different stages within the financing process. Effective LVC implementation requires reliable land-value assessment, appropriate capture instruments, clear regulatory frameworks, institutional capacity, stakeholder coordination, governance arrangements, and sufficient public acceptance. LVC can consequently be positioned as an integrated financing approach that connects transportation investment, accessibility improvement, land-value creation, and the recovery of a proportion of resulting economic benefits for infrastructure provision.

The review also demonstrates that the effectiveness of LVC depends on the extent to which transportation planning, land-use planning, property valuation, regulation, and infrastructure financing are coordinated within a coherent institutional framework. Context-specific differences in land markets, development intensity, property responses, regulatory capacity, and stakeholder interests require LVC instruments to be designed according to local conditions rather than applied through a uniform financing model. The conceptual contribution of this review lies in positioning LVC as a multi-stage process linking transportation investment with accessibility, TOD and land-use development, land or property-value changes, capture mechanisms, and the allocation of captured revenue to infrastructure financing. The findings also highlight a persistent research gap concerning the measurement of actual value-capture revenues and the extent to which observed increases in land or property values can be effectively converted into sustainable transportation financing. Future research should strengthen empirical assessment of value increments and actual revenues generated through different LVC instruments. Comparative studies across Indonesian cities are also needed to examine how institutional, regulatory, market, and spatial conditions influence the performance of LVC mechanisms. Further investigation should assess how captured value can be transparently and equitably reinvested into transportation infrastructure, particularly within TOD areas, to strengthen the long-term financing capacity and sustainability of urban transportation development.

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