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# Innovative Financing Strategies for Urban Transport Infrastructure: Evidence from Lagos, Nigeria

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## Abstract

This study investigates the impact of innovative financing strategies on urban transport infrastructure development in Lagos, Nigeria. The research specifically examined four financing dimensions: Public-Private Partnerships (PPPs), Infrastructure Bonds, Land Value Capture (LVC), and Multilateral/Development Bank Financing. Guided by Public Finance Theory, Institutional Theory, and Accessibility Theory, the study employed a quantitative approach using multiple regression analysis. A structured questionnaire was administered to a stratified sample of 220 respondents drawn from a population of 5,200 stakeholders, including officials from transport agencies, private investors, and transport professionals. The reliability of the instrument was confirmed with a Cronbach's alpha value above 0.7. Findings revealed that Infrastructure Bonds and Multilateral/ Development Bank Financing significantly and positively influence urban transport development, particularly in improving accessibility and mobility. However, PPPs and LVC mechanisms showed no statistically significant effect, reflecting institutional and implementation challenges. The model summary indicated an $R^2$ of 0.327, suggesting that the four financing strategies jointly explain 32.7% of the variance in urban transport infrastructure outcomes. The study contributes to empirical knowledge by quantifying the relationship between financing strategies and urban transport outcomes, filling gaps in Nigerian transport finance literature which has remained largely descriptive. Recommendations include strengthening PPP frameworks, expanding the bond market, institutionalizing LVC mechanisms, and enhancing multilateral coordination. Limitations include reliance on stakeholder perceptions and a focus on a single state. Future studies should adopt longitudinal designs and explore other Nigerian cities to generalise findings. The research offers practical insights for policy-makers, investors, and urban planners.

**Keywords:** Accessibility, Infrastructure Financing, Lagos, Public-Private Partnerships, Urban Transport.

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## 1.0 Introduction

Urban transport infrastructure is a cornerstone of economic growth, social integration, and environmental sustainability in both developed and developing economies. In developed countries, innovative financing strategies such as public-private partnerships (PPPs), infrastructure bonds, and land value capture have been instrumental in expanding and modernising transportation systems (Esperilla-Niño de Guzmán et al., 2024; de Barros et al., 2022). Cities like London, Tokyo, and New York have successfully leveraged these mechanisms to build high-capacity metro systems, upgrade road networks, and enhance public mobility (Flyvbjerg, 2021). These cities benefit from robust institutional frameworks, creditworthy municipalities, and dynamic capital markets that support large-scale infrastructure financing.

In contrast, developing countries continue to struggle with inadequate and decaying transport infrastructure due to limited fiscal capacity, weak institutions, and high perceived investment risks. Many African cities, including Lagos, face rapid urbanisation without a corresponding growth in transport infrastructure (Beitelmal et al., 2024). In Nigeria, the World Bank (2020) estimates that a significant infrastructure investment gap exists over $3 billion annually resulting in severe traffic congestion, long commute times, low transport reliability, and reduced productivity. Lagos, Nigeria's commercial nerve center, exemplifies this crisis, with over 12 million daily trips often constrained by poor connectivity and outdated systems (Lagos Metropolitan Area Transport Authority, 2022).

Addressing this challenge requires a shift from the conventional government-led financing to more innovative, diversified strategies. While Nigeria has made some progress such as implementing the Bus Rapid Transit system through Public-Private Partnerships and securing multilateral loans for the Lagos rail project these financing mechanisms remain underutilised, poorly coordinated, and insufficiently evaluated for effectiveness (Olawale & Garba, 2021).

Despite the growing recognition of innovative financing as a critical pathway for improving urban transport systems, significant theoretical, practical, and empirical problems persist. Theoretically, there is limited understanding of how innovative financing mechanisms operate within weak governance structures characteristic of emerging economies. Practically, Lagos continues to rely heavily on public budgets that are inadequate to meet rising mobility demands, while existing Public-Private Partnerships, infrastructure bonds, and land-value capture initiatives remain sporadic, unsystematic, and poorly integrated into transport planning. Empirically, previous studies in Nigeria have focused largely on fiscal constraints and traditional funding sources (Adeyemi et al., 2019; Aderamo, 2020), with little evidence on the comparative effectiveness of PPPs, infrastructure bonds, land-value capture, and multilateral financing in improving measurable transport outcomes such as travel time, accessibility, and user satisfaction. These gaps create uncertainty about which financing strategies yield the strongest impact on urban transport development and under what institutional conditions they function effectively.

The main objective of this study is therefore to examine the effect of innovative financing strategies on urban transport infrastructure development in Lagos, Nigeria. Specifically, the

study investigates four independent variables such as Public-Private Partnerships, Infrastructure Bonds, Land Value Capture, and Multilateral and Development Bank Financing and how they influence transport infrastructure development, operationalised through improvements in accessibility, mobility, travel time reduction, and user satisfaction.

Theoretically, this research draws on Public Finance Theory and Accessibility Theory (Hansen, 1959), which posit that transport infrastructure development improves when funding mechanisms align with urban accessibility goals and institutional efficiency. However, a clear theoretical gap exists regarding how these financing tools function within the fragile governance structures of emerging economies like Nigeria. Empirically, most Nigerian studies have not examined the interplay between innovative financing and measurable transport development outcomes, especially from the perspective of accessibility and mobility.

This study thus fills a dual gap by analysing the comparative effectiveness of distinct innovative financing mechanisms and measuring transport infrastructure development from an accessibility-oriented perspective. The findings are expected to inform policy reforms, institutional arrangements, and investment strategies that can accelerate sustainable transport development in Lagos and similar urban contexts across Africa.

**Hypotheses**

**$Ho_1$:** There is no statistically significant relationship between Public-Private Partnerships (PPPs) and urban transport infrastructure development in Lagos.

**$Ho_2$:** There is no statistically significant relationship between Infrastructure Bonds and urban transport infrastructure development in Lagos.

**$Ho_3$:** There is no statistically significant relationship between Land Value Capture (LVC) and urban transport infrastructure development in Lagos.

**$Ho_4$:** There is no statistically significant relationship between Multilateral and Development Bank Financing and urban transport infrastructure development in Lagos.

## 2.0 LITERATURE REVIEW

### 2.1 Conceptual

#### 2.1.1 URBAN TRANSPORT INFRASTRUCTURE

Urban transport infrastructure is essential to economic growth and social inclusion in modern cities. In developed nations, the increasing demand for resilient and sustainable transport systems has led to the adoption of innovative financing strategies beyond conventional public funding. Cities such as London, Seoul, and Singapore have successfully implemented mechanisms like public-private partnerships (PPPs), infrastructure bonds, land value capture (LVC), and multilateral financing to expand and modernise their transport networks. These instruments thrive in environments characterised by robust institutions, efficient regulatory systems, and well developed capital markets.

In contrast, developing countries, particularly in sub-Saharan Africa, struggle with financing urban infrastructure due to limited fiscal capacity, weak governance, and an overdependence on unstable public revenues. Nigeria, and especially Lagos State, illustrates this challenge. Despite being a major commercial hub and one of Africa's fastest-growing megacities, Lagos faces severe transport problems, including congestion, inadequate road networks, and insufficient public transit options. Initiatives such as the Bus Rapid Transit (BRT) and Lagos Rail Mass Transit have attempted to address these issues, but funding remains inadequate, narrowly sourced, and unsustainable.

Innovative financing mechanisms offer viable alternatives. PPPs attract private capital and expertise while distributing risk; infrastructure bonds mobilise long-term funding through capital markets; LVC allows governments to reclaim increased land values resulting from infrastructure projects; and multilateral financing provides not only capital but also technical support. Yet, Lagos underutilises these tools. Most projects are still funded through public budgets and external borrowing, while LVC and infrastructure bonds remain marginal.

Empirical studies in Nigeria rarely provide comprehensive assessments of how these innovative strategies influence transport development, particularly regarding accessibility and mobility. Moreover, theoretical perspectives such as Public Finance Theory, Institutional Theory, and Accessibility Theory are insufficiently applied in this context.

This study addresses these gaps by empirically investigating the impact of PPPs, infrastructure bonds, LVC, and multilateral financing on urban transport infrastructure development in Lagos. It emphasises user-centered outcomes like accessibility and mobility improvements, providing a theoretical and practical contribution to infrastructure financing discourse in Nigeria and other African urban centers.

### 2.1.2 PUBLIC - PRIVATE PARTNERSHIPS

Public-Private Partnerships (PPPs) have become a crucial financing mechanism for infrastructure development, especially where public resources are inadequate. A PPP involves a contractual arrangement where a private entity finances, constructs, and operates public infrastructure while assuming substantial risk. Meanwhile, the government maintains regulatory oversight to protect public interest. This model allows governments to harness private capital and technical efficiency to close the infrastructure funding gap, particularly in rapidly urbanising regions.

Globally, PPPs have supported the delivery of critical transport infrastructure in countries such as the United Kingdom, India, and South Africa. These successes are typically anchored by strong legal systems, institutional frameworks, transparent procurement, and balanced risk-sharing mechanisms. In such environments, PPPs promote innovation, timely project completion, and improved service delivery.

In Nigeria, Lagos State has embraced PPPs in urban transport, notably through projects like the Bus Rapid Transit (BRT) system in partnership with the Lagos Metropolitan Area

Transport Authority (LAMATA) and private operators. These ventures demonstrate a shift toward private sector participation. However, challenges remain, including limited institutional capacity, weak contract enforcement, and regulatory ambiguities. As a result, many PPP projects suffer from inefficiencies, cost overruns, or underperformance.

Furthermore, most existing literature on PPPs in Nigeria is conceptual, lacking empirical analysis of their real impact on transport infrastructure outcomes such as accessibility and mobility. Theoretical frameworks like Institutional Theory and Accessibility Theory remain underutilised. This study addresses these gaps by empirically examining how PPPs influence transport development in Lagos, offering practical insights for more effective and sustainable PPP implementation.

### 2.1.3 INFRASTRUCTURE BONDS

Infrastructure bonds represent a long-term debt instrument issued by governments or project sponsors to raise capital for infrastructure development. These bonds are typically attractive to institutional investors, such as pension funds and insurance companies, due to their stable returns and alignment with long-term investment horizons. In many developed countries, infrastructure bonds have been successfully deployed to finance large-scale transport projects often supported by government guarantees, tax incentives, or revenues from user charges. For instance, the United States and India have institutionalised the use of tax-exempt municipal bonds and dedicated infrastructure funds to channel private capital into public infrastructure.

In Nigeria, infrastructure bonds remain largely underutilised despite their potential to bridge funding gaps for urban transport development. The capital market infrastructure to support such instruments exists, and entities like the Infrastructure Credit Guarantee Company (Infra-Credit) have emerged to de-risk infrastructure investments. However, few states including Lagos have effectively leveraged this mechanism for transport infrastructure. This is due in part to regulatory uncertainties, limited creditworthiness of subnational entities, investor skepticism, and a lack of well-structured bankable projects.

Existing research on infrastructure bonds in Nigeria is scarce and mostly limited to the financial or legal feasibility of bond issuance, with minimal empirical focus on their deployment in specific sectors such as urban transport. This study fills that gap by empirically assessing the extent to which infrastructure bonds have contributed to urban mobility improvements in Lagos. It also explores enabling institutional conditions and challenges, providing insights into how this financing strategy can be scaled up for sustainable transport development.

### 2.1.4 LAND VALUE CAPTURE

Land Value Capture (LVC) refers to a range of policy tools and financial mechanisms through which governments recover a portion of the increased land value resulting from public infrastructure investments. When transport infrastructure such as roads, rail, or BRT systems is developed, it tends to increase the desirability and value of nearby land. Through mechanisms

like betterment levies, development impact fees, joint development agreements, and tax increment financing, LVC enables the public sector to reinvest these unearned gains back into infrastructure.

Globally, cities such as Tokyo, Hong Kong, and São Paulo have successfully used LVC to finance transit-oriented developments. These models rely on clear land tenure systems, efficient valuation processes, and strong urban planning institutions. In Nigeria, however, the use of LVC is still at a nascent stage. Despite significant increases in property values around transport corridors in Lagos, the state has yet to implement structured LVC frameworks to capture this added value. Legal complexities, weak land administration, and socio-political resistance from property owners are key barriers.

Furthermore, the academic literature in Nigeria tends to ignore LVC as a viable financing tool for urban infrastructure. Most studies do not empirically analyse the relationship between land appreciation and infrastructure development, nor do they evaluate the institutional readiness to implement LVC. This research addresses these gaps by investigating how LVC could be harnessed to fund future transport projects in Lagos, using spatial and valuation data to assess land value increments and identifying policy levers for effective implementation.

### 2.1.5 MULTILATERAL AND DEVELOPMENT BANK FINANCING

Multilateral and development bank financing refers to loans, grants, and technical assistance provided by international financial institutions such as the World Bank, African Development Bank (AfDB), and the International Finance Corporation (IFC) to support infrastructure projects in developing countries. These institutions not only supply capital at concessional rates but also introduce global best practices, institutional reforms, and performance monitoring frameworks.

In Nigeria, multilateral financing has played a significant role in infrastructure development, including urban transport. The Lagos Urban Transport Project (LUTP), supported by the World Bank, is a notable example. It has helped strengthen the institutional capacity of the Lagos Metropolitan Area Transport Authority (LAMATA) and expand the BRT network. Similarly, the AfDB has supported studies and investments related to mass transit and regional connectivity. However, despite these efforts, there remain concerns regarding the sustainability, dependency, and project execution associated with multilateral funding.

Academic studies often mention the presence of donor-funded transport initiatives but do not rigorously evaluate their long-term developmental impact. Moreover, the role of multilateral agencies is often framed in terms of financial contribution rather than institutional influence or outcome effectiveness. This study fills the gap by analysing not just the financial input of development banks, but also their contribution to transport accessibility and mobility in Lagos. It provides empirical evidence on whether such external interventions result in meaningful urban transport outcomes and how they compare with locally sourced financing mechanisms.

### 2.1.6 INNOVATIVE FINANCING STRATEGIES

Innovative financing strategies are creative, non-traditional mechanisms for mobilising and managing funds for infrastructure development, especially in sectors like urban transport where public financing is often inadequate. These strategies serve as alternatives or complements to conventional public funding, which is frequently constrained by fiscal limitations and bureaucratic challenges. By integrating public and private capital, leveraging asset values, and attracting institutional support, innovative financing provides scalable and sustainable funding solutions.

Globally, the financing of urban infrastructure has evolved from sole reliance on government budgets and aid to more diversified arrangements. Key mechanisms include Public-Private Partnerships (PPPs), infrastructure bonds, land value capture (LVC), and multilateral or development bank financing. These tools harness private sector efficiency, risk-sharing, capital market access, and international expertise to improve infrastructure delivery.

Developed countries have institutionalised these strategies in large-scale transport projects. For example, London's Cross rail and Seoul's subway expansions have utilised PPPs and LVC, while multilateral support has backed mass transit systems in Nairobi and Dhaka. However, in developing contexts like Nigeria, the adoption of such models remains limited due to institutional weaknesses, market constraints, and regulatory uncertainty.

Lagos, Nigeria's economic hub, continues to struggle with severe transport issues. Though attempts have been made to apply innovative financing, efforts are fragmented and heavily reliant on inconsistent donor support or incomplete PPPs. Existing Nigerian studies seldom offer comprehensive assessments of these mechanisms' real-world effectiveness.

This study addresses these gaps by examining how selected innovative financing strategies impact transport infrastructure development in Lagos, using theoretical and empirical approaches centered on accessibility and mobility outcomes.

## 2.2 Theoretical Review

This study draws its theoretical grounding from three key frameworks: Public Finance Theory, Institutional Theory, and Accessibility Theory. Together, these theories provide a multidimensional understanding of how financing mechanisms influence the development and effectiveness of urban transport infrastructure.

Public Finance Theory offers foundational insight into how governments finance public goods and services. Traditionally, transport infrastructure has been funded through taxation and public borrowing, reflecting the state's central role in resource allocation and fiscal management. However, in developing economies such as Nigeria, the limitations of this approach due to fiscal deficits, rising public debt, and competing expenditure demands have made it increasingly difficult to sustain large-scale infrastructure investment. This has prompted a shift toward innovative financing mechanisms, such as public-private partnerships (PPPs), infrastructure bonds, and multilateral loans, which are theoretically justified as alternative ways to mobilize capital and share risk.

Institutional Theory further deepens this perspective by emphasising the importance of the broader regulatory and governance environment in shaping the success of financing strategies. It posits that institutional arrangements including formal rules, enforcement mechanisms, and informal norms play a crucial role in determining how policies are implemented and how organisations behave. In the context of Lagos, challenges such as weak legal enforcement, limited regulatory capacity, and fragmented policy coordination often hinder the effective deployment of innovative financing. Institutional quality therefore emerges as a decisive factor in attracting investment, maintaining accountability, and ensuring project sustainability.

Complementing these financial and institutional lenses is Accessibility Theory, originally proposed by Hansen (1959). This theory shifts the focus from infrastructure provision to its functional outcomes specifically, how easily individuals can access jobs, services, and opportunities. In urban transport research, accessibility is a key measure of system performance, reflecting whether investments truly enhance mobility and reduce spatial inequality. Applying this theory in the Lagos context allows the study to link financing strategies directly to user-centric outcomes such as travel time reduction, route coverage, and service frequency.

Despite their individual relevance, these theories are rarely combined in empirical research on urban transport financing in Nigeria. Most existing studies focus narrowly on financial constraints or institutional barriers without evaluating whether infrastructure investments result in tangible improvements in accessibility. This study addresses that gap by integrating all three theoretical perspectives to assess how innovative financing mechanisms impact the development and effectiveness of urban transport infrastructure in Lagos. It offers a holistic framework that connects financial instruments, institutional quality, and transport outcomes in a unified analysis.

## 2.3 Empirical Review

### Public–Private Partnerships (PPPs)

In developed contexts, Li et al. (2021) applied stochastic frontier analysis (SFA) across 276 Chinese cities (2006–2018) and demonstrated that PPP investments significantly improved infrastructure efficiency and created positive spillover effects on urban economic performance. Their inferential model showed strong statistical association between PPP-led infrastructure and local GDP growth indicators.

In developing contexts, semi-structured analysis by Nworah (2019) in Lagos examined selected road PPP projects using descriptive and inferential statistics, highlighting financial, political, and performance risks such as foreign investor risk perception and bureaucratic delays that undermine project success.

Specific to Nigeria, Babatunde et al. (2019) combined interviews, surveys, and factor analysis to identify dominant risk factors in Lagos road PPP megaprojects. They used factor analysis to group development-phase challenges (e.g., perceived high-risk for investors) and implementation-phase bottlenecks (e.g., right of way access), underscoring institutional constraints and weak risk sharing.

**Infrastructure Bonds**

While no recent empirical studies explicitly model transport-specific bond financing outcomes, bond market analysis in sub-Saharan Africa (2023) used panel econometrics across 40 countries (2003–2018) to demonstrate that more developed sovereign and corporate bond markets are associated with significant reductions in infrastructure financing gaps. The econometric results suggest corporate bond development yields greater infrastructure impact than government bond issuance.

**Land Value Capture (LVC)**

In Ethiopia, Muluneh & Amsalu (2022) examined land lease revenue in Bahir Dar city using descriptive and qualitative analysis and found it to be a dominant extra budgetary financing source. However, inefficiencies in lease administration limit infrastructure investment potential a finding highlighting governance deficiencies rather than modeled outcomes.

**Multilateral and Development Bank Financing**

No transport-specific inferential study was identified between 2019 and 2024 in Nigeria. Existing literature on public debt and infrastructure, such as Busari et al. (2024) who used ARDL time-series modeling over 1990–2022, failed to disaggregate multilateral vs domestic financing or link funding sources to transport outcomes.

**Summary of Empirical Gaps**

Developed-country studies provide robust econometric evidence that PPPs and nascent bond markets can deliver infrastructure gains. In contrast, developing contexts offer limited empirical modeling of infrastructure bonds or LVC, and Nigerian research is largely descriptive, lacking transport-sector regression analyses. There remains a substantial gap in quantitative evaluations that connect innovative financing mechanisms especially in the transport sector to measurable outcomes such as accessibility, mobility, or service quality.

## 3.0 METHODOLOGY

This study adopts a quantitative research design using multiple regression analysis to investigate the effect of innovative financing strategies on urban transport infrastructure development in Lagos, Nigeria. The population of the study consists of approximately 5,200 stakeholders in the Lagos urban transport sector, including officials from the Lagos Metropolitan Area Transport Authority (LAMATA), the Lagos State Ministry of Transportation, professionals in transport consultancy firms, and private investors engaged in Public-Private Partnership (PPP) arrangements. From this population, a sample size of 220 was determined using Yamane's (1967) formula at a 95% confidence level and a 5% margin of error.

A stratified random sampling technique was employed to ensure proportional representation of key stakeholder groups. The sample was stratified into four categories: public officials (30%), private investors (25%), urban transport professionals/consultants (25%), and project

managers/operators (20%). Respondents were selected based on their direct involvement or expertise in urban transport infrastructure financing and development projects within Lagos.

A structured questionnaire was designed for primary data collection. The instrument comprised items measuring four independent variables: Public-Private Partnerships (PPPs), Infrastructure Bonds, Land Value Capture (LVC), and Multilateral/Development Bank Financing as well as the dependent variable Urban Transport Infrastructure Development, measured through indicators such as accessibility, mobility, and service reliability.

To ensure the reliability and validity of the instrument, a pilot study was conducted with 30 respondents from a similar but separate sample population. Based on their feedback, necessary adjustments were made. Content validity was established through expert evaluation by two senior scholars in transport economics and infrastructure finance. Construct validity was verified through exploratory factor analysis (EFA).

To test the internal consistency of the research instrument, Cronbach's Alpha was computed for each construct, and all scale items recorded coefficients above the recommended threshold of 0.70, indicating an acceptable level of reliability for the study variables. Following data cleaning, the responses were coded and analysed using IBM SPSS Version 21. Multiple linear regression analysis was then employed to examine the relationship between the innovative financing strategies and urban transport infrastructure development in Lagos. This integrated methodological framework ensures a rigorous empirical assessment of the financing mechanisms within a real-world urban context and provides a robust basis for generating evidence-driven and actionable policy recommendations.

The multiple linear regression model used in this study is specified as follows:

$$UTID=\beta 0+\beta 1PPP+\beta 2IB+\beta 3LVC+\beta 4MDBF+\varepsilon UTI \quad \textbf{(3.1)}$$

Where:

UTID = Urban Transport Infrastructure Development (dependent variable, measured through accessibility and mobility indicators)

PPP = Public-Private Partnerships

IB = Infrastructure Bonds

LVC = Land Value Capture

MDBF = Multilateral and Development Bank Financing (e.g., World Bank, AfDB)

$\beta_o$ = Intercept (constant term)

$\beta_1 - \beta_4$ = Coefficients of the independent variables

$\varepsilon$ = Error term (captures other unexplained variation)

This model will estimate the extent to which each innovative financing mechanism contributes to the development of urban transport infrastructure in Lagos. The coefficients ($\beta_1 - \beta_4$, ) will

indicate the direction and magnitude of the relationship between each financing strategy and infrastructure development, while the **$R^2$ value** will explain the proportion of variation in the dependent variable accounted for by the independent variables.

**Table 1: Model Summary on Innovative Financing Strategies For Urban Transport Infrastructure: Evidence From Lagos, Nigeria**

| Model | R | R Square | Adjusted R-Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .572[a] | .327 | .315 | .40796 | .327 | 26.134 | 4 | 215 | .000 | 2.226 |

a. Predictors: (Constant), Multilateral and Development Bank Financing, Public Private Partnerships, Land Value Capture, Infrastructure Bonds
b. Dependent Variable: Urban Transport Infrastructure Development

**Source:** Field Work, 2025

The model summary presented in Table 1 provides a comprehensive overview of the relationship between innovative financing strategies and urban transport infrastructure development in Lagos, Nigeria. The regression model includes four independent variables: Public-Private Partnerships (PPP), Infrastructure Bonds (IB), Land Value Capture (LVC), and Multilateral/Development Bank Financing (MDBF) with Urban Transport Infrastructure Development (UTID) as the dependent variable.

The multiple correlation coefficient (R) is 0.572, indicating a moderate positive relationship between the combined financing strategies and transport infrastructure development. This suggests that, collectively, the selected financing mechanisms are associated with improvements in urban transport infrastructure outcomes in Lagos.

The coefficient of determination (R Square) stands at 0.327, meaning that approximately 32.7% of the variance in urban transport infrastructure development can be explained by the four financing strategies under study. This is a substantial figure in the context of social science research, where multiple factors often influence development outcomes. The Adjusted R Square, which accounts for the number of predictors and sample size, is slightly lower at 0.315. This confirms that the model maintains a good level of explanatory power, even after adjusting for potential overfitting.

The Standard Error of the Estimate of 0.40796 reflects the average deviation of observed values from their predicted counterparts, indicating a moderate level of prediction error and suggesting that the model has reasonable accuracy in forecasting infrastructure development levels based on financing strategies. The F-statistic value of 26.134, accompanied by a

significance level (Sig. F Change) of 0.000, confirms that the overall regression model is statistically significant at the 5% level, meaning that the joint contribution of the independent variables to explaining urban transport infrastructure development is not due to chance. Additionally, the Durbin–Watson statistic of 2.226 indicates that the residuals from the regression analysis are not autocorrelated, thereby supporting the assumption of independent errors and strengthening the validity of the model results. Overall, the findings demonstrate that innovative financing strategies play a statistically significant and practically meaningful role in shaping the development of urban transport infrastructure in Lagos.

**Table 2: ANOVA on Innovative Financing Strategies For Urban Transport Infrastructure: Evidence From Lagos, Nigeria**

| Model | Sum of Squares | df | Mean Square | F | Sig. | |
|---|---|---|---|---|---|---|
| 1 | Regression | 17.399 | 4 | 4.350 | 26.134 | .000[b] |
| | Residual | 35.783 | 215 | .166 | | |
| | Total | 53.182 | 219 | | | |

a. Dependent Variable: Urban Transport Infrastructure Development
b. Predictors: (Constant), Multilateral and Development Bank Financing, Public Private Partnerships, Land Value Capture, Infrastructure Bonds

The ANOVA results presented in Table 2 offer important insights into the overall significance of the regression model examining the impact of innovative financing strategies on urban transport infrastructure development in Lagos, Nigeria. The analysis divides the total variability in the dependent variable—urban transport infrastructure development—into components attributable to the regression model and to residual error.

The regression sum of squares is 17.399, which represents the portion of the total variation in infrastructure development that is explained by the four financing strategies under consideration: Public-Private Partnerships (PPPs), Infrastructure Bonds, Land Value Capture (LVC), and Multilateral and Development Bank Financing. This shows that a substantial part of the variation in transport development outcomes can be linked to the combined influence of these independent variables.

The residual sum of squares of 35.783 indicates the extent of unexplained variance representing the portion of variability in the dependent variable that the model does not capture while the total sum of squares of 53.182 reflects the overall variability in the outcome variable. With four degrees of freedom assigned to the regression model and 215 degrees of freedom to the residual, the mean square for the regression is computed as 4.350, whereas the residual mean square stands at 0.166. The resulting F-statistic of 26.134, which evaluates the overall significance of the model, is notably high, and when combined with the corresponding

significance value (p = 0.000), it indicates that the likelihood of these results occurring by chance is extremely low.

In essence, the ANOVA results confirm that the model is statistically significant at the 0.05 level. This implies that the combination of innovative financing strategies has a meaningful and statistically significant influence on the development of urban transport infrastructure in Lagos. It validates the decision to include these four financing mechanisms in the model and reinforces their collective importance in addressing infrastructure challenges in the city.Bottom of Form

**Table 3: Coefficients on Innovative Financing Strategies For Urban Transport Infrastructure: Evidence From Lagos, Nigeria**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 2.493 | .274 | | 9.082 | .000 | 1.952 | 3.034 | | | | | |
| | Public Private Partnerships | -.018 | .048 | -.023 | -.377 | .706 | -.113 | .077 | .149 | -.026 | -.021 | .830 | 1.205 |
| | Infrastructure Bonds | .115 | .052 | .152 | 2.234 | .027 | .014 | .217 | .364 | .151 | .125 | .673 | 1.486 |
| | Land Value Capture | -.032 | .046 | -.044 | -.700 | .485 | -.122 | .058 | .233 | -.048 | -.039 | .778 | 1.285 |
| | Multilateral and Development Bank Financing | .407 | .054 | .512 | 7.604 | .000 | .302 | .513 | .557 | .460 | .425 | .689 | 1.451 |

a. Dependent Variable: Urban Transport Infrastructure Development

**Source:** Field Work, 2025

The coefficient analysis presented in Table 3 offers critical insights into the individual contributions of selected innovative financing strategies like Public-Private Partnerships (PPP), Infrastructure Bonds, Land Value Capture (LVC)**,** and Multilateral and Development Bank Financing to urban transport infrastructure development in Lagos, Nigeria.

The constant term of 2.493 (p = 0.000) is statistically significant, indicating that when all independent variables are held constant, the baseline level of urban transport infrastructure development stands at 2.493 units. This represents the foundational infrastructure output irrespective of financing strategies.

Among the independent variables, Multilateral and Development Bank Financing emerged as the strongest and most statistically significant predictor (B = 0.407, p = 0.000), with a standardised beta of 0.512. This suggests that increased utilisation of multilateral financing such as funds and technical assistance from the World Bank or African Development Bank contributes substantially to urban transport infrastructure improvements in Lagos. Its strong influence reflects both the scale of investment and the institutional support attached to such financing.

Infrastructure Bonds also showed a statistically significant positive effect (B = 0.115, p = 0.027) with a moderate beta coefficient (0.152). This implies that bond financing, when effectively utilised, supports long-term funding for transport projects, offering Lagos a viable mechanism for bridging infrastructure gaps through capital markets.

In contrast, Public-Private Partnerships (PPP) displayed a weak and statistically insignificant effect (B = -0.018, p = 0.706), with a negative beta value (-0.023). This suggests that despite their theoretical potential, PPPs in Lagos may be underperforming due to weak institutional frameworks, contract enforcement issues, or poor implementation structures.

Similarly, Land Value Capture (LVC) had a negative but insignificant influence (B = -0.032, p = 0.485), indicating limited or ineffective application of LVC mechanisms in the current urban infrastructure financing landscape. From a multicollinearity standpoint, Tolerance values exceed 0.6 and Variance Inflation Factors (VIFs) are below 1.5 across all variables, suggesting that the predictors are independent and reliable.

In summary, while multilateral financing and infrastructure bonds have demonstrated clear positive impacts on urban transport development in Lagos, the PPP and LVC strategies appear underutilised or inefficiently executed. These findings highlight the need for policy reforms and institutional strengthening, particularly in the operationalisation of PPP and LVC frameworks. The study thus provides empirical grounding for enhancing the strategic mix of innovative financing options in addressing Lagos' urban transport challenges.

**Table 4: Coefficient Correlations on Innovative Financing Strategies For Urban Transport Infrastructure: Evidence From Lagos, Nigeria**

| Model | | | Multilateral and Development Bank Financing | Public Private Partnerships | Land Value Capture | Infrastructure Bonds |
|---|---|---|---|---|---|---|
| 1 | Correlations | Multilateral and Development Bank Financing | 1.000 | -.050 | -.353 | -.326 |
| | | Public Private Partnerships | -.050 | 1.000 | .020 | -.352 |
| | | Land Value Capture | -.353 | .020 | 1.000 | -.157 |
| | | Infrastructure Bonds | -.326 | -.352 | -.157 | 1.000 |
| | Covariances | Multilateral and Development Bank Financing | .003 | .000 | -.001 | -.001 |
| | | Public Private Partnerships | .000 | .002 | 4.422E-005 | -.001 |
| | | Land Value Capture | -.001 | 4.422E-005 | .002 | .000 |
| | | Infrastructure Bonds | -.001 | -.001 | .000 | .003 |

a. Dependent Variable: Urban Transport Infrastructure Development

**Source:** Field Work, 2025

Table 4 presents the correlation and covariance values among the four independent variables examined in this study: Multilateral and Development Bank Financing, Public-Private Partnerships (PPPs), Land Value Capture (LVC), and Infrastructure Bonds. These statistical indicators provide insights into the degree of linear association between the financing strategies and the likelihood of multicollinearity, which can affect the reliability of regression estimates.

The correlation coefficients reveal that Multilateral and Development Bank Financing has a weak negative correlation with Public-Private Partnerships (r = -0.050), a moderate negative correlation with Land Value Capture (r = -0.353), and a similarly moderate negative correlation with Infrastructure Bonds (r = -0.326). These findings suggest that multilateral financing may be pursued somewhat independently of the other mechanisms, especially LVC and infrastructure bonds, possibly due to institutional preferences or funding conditions that differentiate them.

Public-Private Partnerships show a very weak positive correlation with Land Value Capture (r = 0.020) and a moderate negative correlation with Infrastructure Bonds (r = -0.352). This implies that while PPPs and LVC might be used concurrently in some cases, PPPs and

Infrastructure Bonds may function more as substitute mechanisms rather than complements within Lagos' financing landscape. Additionally, Land Value Capture and Infrastructure Bonds exhibit a weak negative correlation (r = -0.157), indicating limited synergy between these tools in the current context.

The covariance matrix further supports these interpretations. The covariances between variables are close to zero, indicating minimal shared variance among them. For instance, the covariance between Multilateral Financing and LVC is -0.001, confirming a weak inverse relationship. The diagonal values (e.g., 0.003 for Multilateral Financing and Infrastructure Bonds) represent the variances of each variable, and their small magnitudes suggest stable and independent variable behavior.

Overall, these results indicate low multicollinearity among the independent variables, thus supporting the integrity of the regression analysis. Each financing mechanism appears to contribute independently to the model, making it possible to reliably assess their individual effects on urban transport infrastructure development in Lagos.Bottom of Form

## 4.0 DISCUSSION OF FINDINGS

The study provides empirical and theoretical insights into how innovative financing strategies influence urban transport infrastructure development in Lagos. Interpreting the results through Public Finance Theory, Institutional Theory, and Accessibility Theory clarifies why some mechanisms perform better than others despite strong theoretical foundations.

The insignificant effect of Public–Private Partnerships (PPPs) reflects Institutional Theory's emphasis on the role of governance structures. Although Public Finance Theory views PPPs as efficient tools for mobilising private capital and reducing fiscal pressure, their success depends on regulatory clarity and contract enforcement. The Lagos outcome contrasts with Li et al. (2021), who reported significant PPP-driven efficiency gains in China, but aligns with Nworah (2019) and Babatunde et al. (2019), who attribute Nigeria's underperforming PPPs to political risks, bureaucratic delays, and weak regulatory capacity.

Infrastructure Bonds exhibited a significant, albeit modest, effect supporting Public Finance Theory, which encourages diversified revenue sources under fiscal constraints. This outcome is consistent with the Sub-Saharan African Bond Market Analysis (2023), showing that bond markets help close infrastructure financing gaps. Bonds appear more effective than PPPs partly because they require less direct coordination between public and private actors and are less sensitive to institutional weaknesses.

The insignificant influence of Land Value Capture (LVC) highlights the combined implications of Public Finance Theory and Institutional Theory. Although LVC is fiscally efficient in principle, its performance depends on transparent valuation systems and robust land governance. The Lagos findings mirror Muluneh and Amsalu (2022), who found that administrative inefficiencies in Ethiopia limit LVC effectiveness. This reinforces the view that without strong institutions, even theoretically sound financing tools deliver limited results.

Multilateral and Development Bank Financing produced the strongest and statistically significant effect. From a Public Finance perspective, multilateral support addresses domestic fiscal gaps through concessional loans and technical capacity. Its significance also reflects governance-reinforcing conditions attached to such financing, consistent with Institutional Theory. Unlike Busari et al. (2024), who assessed Nigeria more broadly using ARDL modelling, this study isolates transport-sector effects and shows clear improvements in mobility outcomes. These improvements validate Accessibility Theory's argument that transport investments are meaningful when they enhance access to opportunities.

Overall, the findings demonstrate the interconnected relevance of the three theories. Public Finance Theory explains why Infrastructure Bonds and Multilateral Financing delivered significant effects; Institutional Theory accounts for the underperformance of PPPs and LVC; and Accessibility Theory highlights the user-centred benefits of effective financing. This integrated interpretation offers practical direction for strengthening financing mechanisms and institutional frameworks to achieve sustainable urban transport development in Lagos.

## 5.0 CONTRIBUTION TO KNOWLEDGE

This study contributes significantly to the existing body of knowledge on infrastructure financing by providing robust empirical evidence on the effectiveness of innovative financing strategies namely Public-Private Partnerships (PPPs), Infrastructure Bonds, Land Value Capture (LVC), and Multilateral/Development Bank Financing in enhancing urban transport infrastructure in a developing context. Unlike previous studies which largely focused on conceptual or descriptive assessments, this research employs a multiple regression analysis grounded in Accessibility Theory, Institutional Theory, and Public Finance Theory to establish quantifiable relationships between financing strategies and transport infrastructure outcomes such as accessibility and mobility.

The research is among the first in Nigeria to systematically compare the relative effectiveness of various financing mechanisms within a single analytical framework using primary data collected from key stakeholders in the urban transport ecosystem. The inclusion of user-centric performance indicators provides a practical lens through which financing decisions can be evaluated not just for financial viability, but also for their developmental impact.

Additionally, the study introduces a stratified stakeholder-based assessment of financing strategies, offering a nuanced understanding of how each group perceives and interacts with financing instruments. This methodological innovation provides a replicable model for similar assessments in other urban contexts across sub-Saharan Africa.

By bridging empirical gaps identified in existing literature and highlighting the contextual challenges that inhibit financing effectiveness in Lagos, the study offers evidence-based recommendations for policymakers, private investors, and development agencies. It sets a new benchmark for integrating financial planning with sustainable urban transport development strategies in Nigeria and other developing economies.

## 6.0 LIMITATIONS TO THE STUDY

Despite the significant insights generated by this study on innovative financing strategies for urban transport infrastructure in Lagos, Nigeria, certain limitations should be acknowledged to provide a balanced interpretation of the findings.

First, the study employed a cross-sectional survey design, which captures data at a single point in time. While this allows for broad generalisations, it limits the ability to establish causal relationships between financing strategies and long-term infrastructure outcomes. Longitudinal studies could provide deeper insights into temporal changes and the sustainability of financing mechanisms.

Second, the research focused on perceptions and experiences of selected stakeholders within Lagos State. Although a stratified random sampling technique was used to ensure representativeness, the findings may not be generalisable to other Nigerian cities or regions with different institutional, political, and economic contexts. The urban transport landscape in Lagos is unique, given its scale, density, and level of private sector engagement.

Third, while the study utilised robust statistical tools such as multiple regression and validity/reliability testing, the use of self-reported questionnaire data is subject to potential biases, including social desirability and recall inaccuracies. Some respondents may have either overestimated or underestimated the effectiveness of certain financing strategies based on personal or organizational interests.

Lastly, although the study assessed four major financing instruments, it did not explore other potentially impactful mechanisms such as municipal bonds, public levies, or climate-linked finance. These areas present opportunities for future research to build a more comprehensive understanding of innovative infrastructure financing in developing economies.

## 7.0 SUGGESTIONS FOR FURTHER STUDIES

This study has provided empirical insights into the role of innovative financing strategies specifically Public-Private Partnerships (PPPs), Infrastructure Bonds, Land Value Capture (LVC), and Multilateral/Development Bank Financing in the development of urban transport infrastructure in Lagos, Nigeria. However, several areas warrant further investigation to deepen the understanding of infrastructure financing dynamics in developing economies.

First, future studies could adopt a longitudinal research design to track the performance of financing mechanisms over time. This would enable researchers to evaluate not only short-term infrastructure outcomes such as improved accessibility and mobility but also the sustainability and economic returns of these investments across project life cycles.

Second, while this research focused on Lagos State due to its advanced urbanisation and pilot financing initiatives, future research could explore comparative studies across other Nigerian cities such as Abuja, Port Harcourt, or Kano. This would offer a broader national perspective and reveal contextual differences in financing performance, regulatory environments, and institutional capabilities.

Third, subsequent studies could expand the range of financing instruments examined to include municipal bonds, sovereign guarantees, carbon finance, and diaspora bonds, particularly in light of emerging trends in climate financing and urban resilience strategies.

Moreover, integrating mixed-method approaches combining quantitative modeling with in-depth interviews or focus group discussions could uncover nuanced institutional, political, or socio-economic factors influencing the success or failure of innovative financing models.

Lastly, future work may apply advanced econometric models or geospatial analytics to link financing strategies more precisely with infrastructure outcomes such as traffic flow efficiency, commuter satisfaction, and environmental impact. Such studies will be invaluable for guiding policy, investment, and regulatory reforms in Nigeria's transport infrastructure landscape.

## 8.0 CONCLUSION AND RECOMMENDATIONS

This research investigated the influence of innovative financing strategies such as Public-Private Partnerships (PPPs), Infrastructure Bonds, Land Value Capture (LVC), and Multilateral/Development Bank Financing on urban transport infrastructure development in Lagos, Nigeria. Drawing data from key stakeholders and employing multiple regression analysis, the study found that while Infrastructure Bonds and Multilateral/Development Bank Financing had statistically significant and positive effects on urban transport outcomes, PPPs and LVC mechanisms did not show significant influence.

The results underscore the growing effectiveness of multilateral funding and infrastructure bonds as sustainable channels for financing public transport systems in Lagos, especially in enhancing mobility and accessibility. In contrast, the limited impact of PPPs and LVC indicates unresolved institutional and implementation challenges that hinder their full potential in the local context.

### Recommendations

1. **Public-Private Partnerships (PPPs):**
   Strengthen the legal and regulatory frameworks guiding PPPs in Lagos by promoting risk-sharing transparency, contract enforceability, and capacity building for public agencies involved in managing these partnerships.
2. **Infrastructure Bonds:**
   Deepen subnational access to infrastructure bond markets by encouraging Lagos State to issue targeted transport bonds backed by clear revenue streams (e.g., fares, tolls) and reinforced through fiscal discipline and credit enhancement tools.
3. **Land Value Capture (LVC):**
   Reform land administration and urban planning systems to enable structured and predictable LVC implementation, including better cadastral mapping, land valuation processes, and reinvestment of captured land value into nearby transport infrastructure.

4. **Multilateral and Development Bank Financing:**
   Improve coordination between Lagos transport agencies and multilateral institutions by aligning project designs with international funding criteria and embedding performance monitoring mechanisms to ensure accountability and long-term sustainability.

Through these dimension-specific strategies, Lagos can better mobilise and manage financing for urban transport infrastructure, fostering a more efficient, inclusive, and sustainable urban mobility system.

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