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Strategic Configuration of Physical Resources and Urban Mobility Outcomes in Nairobi, Kenya: The Role of Asset Prioritisation, Procurement and Sustainability

Brian Kiptoo Kipsang, Joyce Ndegwa & Thomas Ngui
United States International University – Africa, Kenya

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Abstract
How physical transport assets are prioritised, procured and sustained over their life cycles matters as much as whether they are available. In Nairobi City, congestion, maintenance deficits and safety concerns persist despite substantial infrastructure investment. Anchored in the Resource-Based View and complemented by Resource Orchestration Theory, this study examined the association between the strategic configuration of physical resources and perceived urban mobility outcomes (efficiency, safety and reliability). Strategic configuration comprised asset prioritisation, procurement and asset sustainability practices applied to road infrastructure, fleets, terminals and related equipment. A positivist, cross-sectional descriptive correlational design was adopted. From a population of 765 organisational actors in 25 public, private and international development institutions, a sample of 263, computed with Yamane's formula, was allocated proportionally across three stakeholder strata. Knowledgeable respondents within strata were selected purposively; 220 questionnaires were returned (83.7%) and 214 were analysed. Using descriptive statistics, Pearson correlation and simple linear regression in SPSS version 30, the study found that physical resource configuration was positively associated with perceived urban mobility outcomes (r = .610, p < .001). It accounted for 37.3% of their variance, $F(1, 212) = 125.88$, p < .001; B = 0.305, 95% CI [0.251, 0.359]. Descriptively, asset prioritisation was the least favourably rated phase (M = 3.66), and its lowest-rated item concerned the capacity of data-driven prioritisation to reduce political interference (M = 3.48); asset sustainability was rated highest (M = 3.84). Limitations include; perception-based, single-source, cross-sectional data from a purposive sample limit causal inference and generalisation. Thus, agencies should shield asset prioritisation from political interference through transparent, data-driven criteria and track asset performance against objective mobility indicators.

Introduction

Physical resources form the tangible foundation through which public transport agencies deliver mobility services. Their contribution to performance depends not only on their availability but also on how they are prioritised, acquired, maintained, and deployed to support public objectives (Murimi et al., 2019). In urban mobility systems, these resources include road infrastructure, transport fleets, terminals, depots, maintenance equipment, and traffic control systems. This study

does not focus on any single class of asset, nor on the physical transport network itself, but on how the institutions responsible for these assets manage them. Possessing adequate physical assets does not necessarily guarantee improved mobility outcomes, because the value derived from these assets depends on effective management and on their alignment with transport priorities.

Strategic configuration of physical resources refers to the deliberate prioritisation, procurement and lifecycle management of physical transport assets so that they serve long-term mobility objectives. It comprises three interrelated dimensions. Asset prioritisation ensures that limited resources are directed towards infrastructure and equipment with the greatest operational and public value. Traditional prioritisation methods based on manual inspections and expert judgement may produce inconsistent decisions, whereas data-driven approaches, predictive maintenance and lifecycle assessment can support proactive planning and more informed investment decisions (West et al., 2024). IoT-enabled monitoring and artificial intelligence-based predictive maintenance can support early detection of equipment failure, improve operational reliability, and reduce downtime and maintenance costs (Adimulam et al., 2019). Procurement translates financial allocations into tangible infrastructure and equipment and must balance cost efficiency, accountability, regulatory compliance and innovation (Patrucco et al., 2017; Schotanus & Grandia, 2023). In Kenya, although the Public Procurement and Asset Disposal Act of 2015 provides a regulatory framework, implementation challenges, including delays, inefficiencies and cost overruns, remain concerns within the transport sector (Giathi et al., 2021). Asset sustainability complements these processes by embedding environmental protection, social inclusion, climate resilience and lifecycle maintenance into asset management (Greenwood, 2021).

These considerations are particularly important in Nairobi City, where rapid urbanisation has intensified pressure on transport infrastructure. Dependence on road-based transport, congestion, maintenance deficits, environmental degradation and safety concerns demonstrate the importance of strengthening how physical resources are configured and managed. Strategic prioritisation, transparent procurement, climate-resilient infrastructure and integrated transport planning can help improve asset performance and support more equitable and dependable mobility services. Nevertheless, the effectiveness of these practices depends on their coordinated implementation within the institutional and operational context of Nairobi's urban transport system. The study therefore examines these practices across the public, private and development-partner institutions that plan, finance, build, regulate and operate Nairobi's transport assets. Individual organisational actors within those institutions served as key informants.

Previous studies have examined asset prioritisation in a national asset management agency (Rustanto et al., 2023), procurement practices in Kenyan county road projects (Nyajowi et al., 2024), and physical resource allocation in county service delivery (Shigali & Shitseswa, 2023). None, however, has examined prioritisation, procurement and sustainability together in relation to urban mobility outcomes in Nairobi, which is the gap this study addresses. Its objective was to determine the association between the strategic configuration of physical resources and urban mobility outcomes in Nairobi City, Kenya. It addressed the research question: What is the association between the strategic configuration of physical resources and urban mobility outcomes in Nairobi City, Kenya? The following null hypothesis was tested:

H_{01}: The strategic configuration of physical resources has no statistically significant association with urban mobility outcomes in Nairobi City, Kenya.

Literature Review

Theoretical Review

The study is anchored in the Resource-Based View (RBV), complemented by Resource Orchestration Theory (ROT). The RBV holds that organisations differ in performance because they

control resources that are valuable, rare and imperfectly imitable, and that are supported by the organisation's systems for exploiting them (Barney, 1991). Although the theory was developed to explain competitive advantage among firms, Bryson et al. (2007) show that its logic applies to public organisations once performance is understood as the creation of public value for key stakeholders. Transport agencies do not compete for market share, but they differ in their capacity to turn physical assets into services that meet public needs.

Applied to physical transport assets, the four RBV attributes take the following form. Roads, terminals, depots and fleets are *valuable* when they match travel demand and are kept in serviceable condition. They are *rare* because urban land, capital and construction capacity are scarce. Networks and facilities fixed in particular locations, together with the asset records and maintenance routines built around them, are *not easily imitated*. The *organisation* attribute refers to the prioritisation, procurement and asset management systems through which the assets are deployed and maintained.

ROT adds an account of how managers create value from such resources, through *structuring* the resource portfolio, *bundling* resources into capabilities, and *leveraging* them in practice (Sirmon et al., 2007, 2011). Procurement structures the portfolio by acquiring assets; prioritisation bundles them by directing them to the uses of greatest value; and asset sustainability leverages them by keeping them productive over their life cycle. Neither theory is tested directly in this study, because the attributes and processes were not measured as separate variables. Instead, the two theories provide the rationale for expecting a positive association between physical resource configuration and urban mobility outcomes.

Conceptual Framework

Figure 1 presents the conceptual framework. The independent variable, the strategic configuration of physical resources, comprises asset prioritisation, procurement and asset sustainability; for the inferential analysis, these three dimensions were combined into a single composite score. The dependent variable, urban mobility outcomes, comprises mobility efficiency (the use of road space and transport resources to reduce travel times and congestion), mobility safety (the extent to which infrastructure and enforcement protect road users, including vulnerable groups) and mobility reliability (the predictability and timeliness of travel and services). The framework links the two constructs through hypothesis H_{01}.

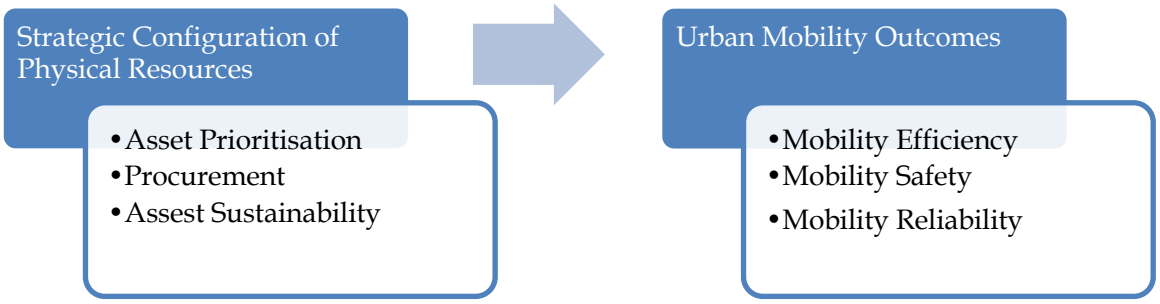


Figure 1: Conceptual Framework

Source. Authors (2026).

Empirical Review

Asset Prioritisation Configuration

Governments in developing countries often manage significant state assets directly, making asset prioritisation essential for effective public service delivery. Rustanto et al. (2023) examined how Indonesia's Directorate of State Asset Management could determine key elements and prioritisation tools for a national state asset optimisation strategy. They proposed that a simple calculation combining the Balanced Scorecard (BSC) and Analytic Hierarchy Process (AHP) would support prioritisation decisions. The study administered a questionnaire survey to 131 multistakeholder respondents and established that the most important alternative for asset optimisation was efficient maintenance of assets, followed by investing in competitive human resources. The study concluded that combining BSC and AHP offers a pragmatic, low-complexity prioritisation tool that developing-country asset management agencies can adopt without extensive technical infrastructure. This underscores the need to align prioritisation with government strategic instruments and the importance of comprehensive datasets on asset performance. Without systematic prioritisation, public resources risk being misallocated, undermining service delivery.

In the United States, Chitturi et al. (2021) reviewed project prioritisation programmes at 21 transport agencies and identified Virginia's SMART SCALE programme as a standout case. Through an objective, outcome-based and publicly transparent scoring process, it had lowered average project costs while funding a broad range of multimodal projects. The study drew three lessons for other agencies seeking to modernise their prioritisation: adopting flexible funding programmes, conducting outcome-oriented evaluations, and explicitly maximising benefits per dollar spent. While these frameworks originate in high-income settings, they offer useful insights for low- and middle-income countries seeking to institutionalise transparent, performance-based prioritisation. However, transferring such models requires careful contextual adaptation, given differences in data availability, governance capacity and institutional maturity.

Regionally, asset prioritisation is also central to East African Community (EAC) integration efforts. Adero and Aligula (2012) argue that prioritising pipeline infrastructure could reduce costs and enhance petroleum transport safety, that railway modernisation could boost freight efficiency and generate reinvestment opportunities, and that inland waterways, though underutilised, represent potential low-cost alternatives if properly developed. This illustrates how prioritisation across modes can unlock synergies within a transport system, but it also reflects political realities: investments often favour high-visibility projects such as highways over less visible but high-impact assets such as rail or waterways. Prioritisation decisions are therefore as much political as technical.

Shigali and Shitseswa (2023) examined how strategies for allocating physical resources affect the delivery of public services in Vihiga County, Kenya, drawing on asset-based views and systems theories. The study established a significantly positive relationship between asset allocation strategies and service delivery, with government regulation strengthening this relationship, and recommended that county governments strengthen regulatory frameworks around asset allocation. Nevertheless, reliance on survey perceptions raises questions about causality: better allocation may drive improved delivery, or high-performing counties may simply be better at both. This reflects a broader empirical gap, as few studies rigorously test the mechanisms linking prioritisation frameworks to service outcomes in African contexts.

Procurement Configuration

The procurement of goods and services plays a pivotal role in shaping organisational performance, particularly in the public-sector, where infrastructure projects dominate national development agendas. As organisations face increasing pressure to deliver superior services under tight

budgets, effective procurement strategies become indispensable for long-term success (Ofori et al., 2025). These strategies span cost management, supplier relationship management, sustainable sourcing and innovation-driven procurement, aiming collectively to improve efficiency, reduce waste and drive competitiveness (Brammer & Walker, 2011). However, mistakes in procurement strategy can produce infrastructure that is either too costly or of insufficient quality. Moreover, on-time, on-budget delivery is not necessarily an indicator of effective procurement, as it may mask inefficiencies or compromises in value (OECD, 2021).

Kenyan evidence further illuminates procurement–performance linkages. Nyajowi et al. (2024), examining project procurement management practices and the performance of road construction projects in Homa Bay County, Kenya, found significant positive effects of procurement planning and risk management practices on project performance. While this underscores the value of structured procurement, the study's local scope raises questions about scalability across counties with varying governance capacities. Moreover, qualitative dimensions such as corruption and political interference were not fully explored, pointing to a research gap in understanding how procurement reforms intersect with entrenched institutional weaknesses.

In Uasin Gishu County, Kenya, Saya and Onyango (2024) examined project contractors' capacity and its effect on the performance of road construction projects. Adopting a descriptive research design, the study targeted 195 employees, comprising resident engineers, assistant engineers, materials technicians, works inspectors, surveyors, project managers, procurement staff, administrators and accountants. A majority of respondents (80.7%) agreed that staff management affects project performance. The study concluded that contractor capacity, encompassing financial, technical and human resource dimensions, is a significant determinant of road construction project performance, reinforcing the argument that procurement outcomes depend heavily on the competence of the contractors selected, not only on the formal procurement process.

Asset Sustainability Configuration

The lack of formal sustainability assessment indicators limits the ability of governments to evaluate infrastructure projects against environmental and social benchmarks. Kapatsa et al. (2023) identified 24 sustainability indicators applicable to road infrastructure projects in Tanzania. The highest-ranked included worker health and safety training, provision of personal protective equipment, site barriers, waste collection and assignment of health and safety officers, and a qualitative component introduced air quality monitoring as a new dimension. These results suggest that sustainability is often narrowly equated with occupational health and safety, with less attention to ecosystem integrity, climate resilience or intergenerational equity.

Despite widespread endorsement of sustainable construction, highway projects in many countries remain unsustainable in practice. Aljboor et al. (2023) sought to identify barriers affecting sustainability implementation in Jordan's highway construction projects, including a lack of sustainability education, poor communication among team members and unfamiliarity with the necessary techniques and skills. They concluded that sustainability must be financially supported and embedded within a legislative framework to be implemented effectively, because voluntary or informal adoption is insufficient.

According to Kahangirwe and Vanclay (2024), although sealing roads in Sub-Saharan Africa reduced dust and improved local transport, extensive land acquisition caused physical and economic displacement, disrupted livelihoods and triggered gender-based violence, child exploitation and project-induced in-migration. Compensation delays and inadequate community engagement eroded trust, which in turn delayed projects and escalated costs. Such findings show that sustainability failures are not merely environmental but also social and political. In Kenya, systemic challenges such as weak policy enforcement, technological inertia and limited community involvement continue to undermine outcomes, and Suprayoga et al. (2020) show that

institutional barriers impede the use of sustainability assessment in road planning. None of these studies examines asset sustainability within urban mobility institutions in Kenya.

Method

Research Philosophy and Design

The study was guided by a positivist research philosophy, which emphasises objective measurement, empirical observation and statistical testing of theoretically derived hypotheses (Hasan et al., 2024; Mustofa, 2023; Park et al., 2020). This philosophy was appropriate because the study examined the relationship between the strategic configuration of physical resources and urban mobility outcomes using standardised questionnaire items and quantitative analytical procedures. A cross-sectional, descriptive correlational survey design was employed, and no variable was manipulated (Creswell & Creswell, 2022). Pearson correlation measured the strength and direction of the association, and simple linear regression estimated the proportion of variance in outcomes associated with physical resource configuration. Because data were collected at a single point, the design captures stakeholders' assessments of asset management practices at one time; it cannot trace how procurement, prioritisation and maintenance unfold over an asset's life cycle, and it supports conclusions about association, not causation. Data were collected electronically through Google Forms over a two-week period in February, 2026, with follow-up reminders.

Population and Sampling

The target population comprised 765 individual organisational actors, identified from the human resource records of 25 institutions in Nairobi's urban mobility ecosystem. The institutions fell into three stakeholder categories: public-sector agencies, private-sector organisations and international development partners (Table 1). Organisational actors were staff whose roles involved urban mobility planning, financing, regulation, procurement, infrastructure development, asset management, implementation or coordination.

The sample size was computed using Yamane's (1973) formula, $n = N / (1 + Ne^2)$, with $N = 765$ and $e = .05$, giving $n = 263$, and the sample was allocated to the three strata in proportion to their share of the population. Within each stratum, respondents were selected purposively according to their knowledge of asset planning, procurement and maintenance. The final stage of selection was therefore non-probability. Yamane's formula assumes simple random sampling, so the computed size was treated as a minimum target rather than a guarantee of precision. The parametric tests used rest on assumptions about the distribution of model residuals, which were examined, rather than on the sampling method. Generalising the estimates to the wider population, however, does require probability sampling, and this is acknowledged as a limitation.

Table 1: Population and Sample Distribution by Stakeholder Stratum

Stratum	Institutions	Population (*N*)	Sample (*n*)
Public-sector	Nairobi Metropolitan Area Transport Authority (NaMATA); Kenya Urban Roads Authority (KURA); Kenya Roads Board; Kenya National Highways Authority; Nairobi City County Government (Transport and Public Works); Public Procurement Regulatory Authority; National Transport and Safety Authority (NTSA); Public Private Partnership Directorate; Engineers Board of Kenya; Kenya Railways Corporation; National Environment Management Authority; National Construction Authority (12)	479 (62.6%)	165
Private sector	Matatu owners' associations; Critical Mass Nairobi (cycling movement); investment banks; Kenya Private Sector Alliance; Kenya Association of Building and Civil Engineering Contractors (5)	183 (23.9%)	63
International development partners	World Bank Group; Japan International Cooperation Agency; African Development Bank Group; European Investment Bank; German Development Bank; French Development Agency; Department for International Development Kenya; China Exim Bank (8)	103 (13.5%)	35
Total	**25 institutions**	**765 (100%)**	**263**

Note. Source: human resource departments of the participating institutions (2025). Samples were allocated in proportion to each stratum's share of the population.

The unit of analysis were the organisations, acting as a key informant on the asset management practices of Nairobi's mobility institutions and on mobility outcomes in the city. Because respondents are nested within institutions, their observations are not fully independent.

Instrument, Validity and Reliability

Primary data were collected using a structured questionnaire comprising standardised, closed-ended items (Cheung, 2021), rated on a five-point scale (1 = strongly disagree to 5 = strongly agree). Physical resource configuration was measured by four items on asset prioritisation, four on procurement and three on asset sustainability, all reproduced in Table 2. Urban mobility outcomes were measured by items on efficiency, safety and reliability. To limit social desirability and self-serving bias, the items were framed as general statements about practices in Nairobi's mobility system rather than as ratings of the respondent's own institution. In addition, the questionnaire was self-administered and confidential, and respondents were drawn from private-sector and development-partner institutions as well as from implementing agencies. Social desirability was not measured directly.

Before the main study, the questionnaire was pilot-tested with 26 respondents (10% of the sample) drawn from urban mobility-related organisations that did not form part of the main study (Cooper & Schindler, 2019). Minor revisions were then made to item clarity and sequencing. Face and content validity were established through expert review. Pilot reliability, assessed with Cronbach's alpha, was $\alpha = .921$ for physical resource configuration and $\alpha = .665$ for urban mobility outcomes, the latter below the conventional threshold of .70 (Taber, 2018).

Data Analysis

The collected data were cleaned, coded and analysed using SPSS version 30. Descriptive statistics, including means and standard deviations, summarised respondents' assessments. The three dimensions were combined into a composite physical resource configuration score, which was treated as interval-level data (Norman, 2010). Pearson's correlation examined the direction and strength of the association, while ordinary least squares simple linear regression assessed the statistical relationship between physical resource configuration and urban mobility outcomes.

Linearity, normality and homoscedasticity were examined before estimation; multicollinearity does not arise with a single predictor. Statistical significance was assessed at the 5% level. The regression model was specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

where Y represents urban mobility outcomes, X_1 represents the composite physical resource configuration score, β_0 is the constant, β_1 is the regression coefficient, and ε is the error term.

Ethical Considerations

The study received ethical clearance from the Institutional Scientific and Ethics Review Committee (ISERC) of the United States International University–Africa (approval no. USIU-A/ISERC/US1221-2025). A research licence was issued by the National Commission for Science, Technology and Innovation (NACOSTI; licence no. 348383), and an introductory letter was obtained from the School of Business. Permission to collect data from staff was obtained from the participating institutions. Participation was voluntary, informed consent was obtained before respondents proceeded to the questionnaire, and respondents could withdraw at any point without penalty. Identifiers were replaced with codes, and responses were reported only in aggregate. Data were stored on password-protected devices accessible only to the research team and were handled in line with Kenya's Data Protection Act, 2019.

Results

This section first presents the response rate and respondent profile, then descriptive statistics for the three dimensions of physical resource configuration shown in Figure 1, followed by the regression diagnostics and the inferential tests of H_{01}.

Descriptive Statistics

Response Rate and Respondent Profile

Of the 263 questionnaires administered, 220 were returned (83.7%), and 214 usable responses (81.4% of the sample) were retained for the inferential analysis. Of the 220 respondents, 47.7% were from public-sector agencies, 25.5% from private-sector transport operators or companies, 24.5% from international development partners or NGOs and 2.3% from financial institutions, so development partners were over-represented relative to their 13.5% share of the population. In terms of involvement, 43.7% were directly involved in implementing or operating urban mobility projects, 18.6% in planning and policy and 16.8% in indirect roles such as research or consultancy, while 20.9% reported no direct involvement in urban mobility activities.

Asset Prioritisation Configuration

Asset prioritisation recorded a dimension mean of 3.66, the lowest of the three dimensions (Table 2). Respondents rated most highly the statement that prioritising infrastructure assets based on performance data enhances service delivery (M = 3.77, SD = 1.16), followed by the statements that asset prioritisation frameworks improve the efficiency of resource allocation (M = 3.70, SD = 1.22) and that balancing cost efficiency with equity ensures underserved areas benefit from mobility investments (M = 3.70, SD = 1.20). The statement that data-driven prioritisation reduces political interference had the lowest mean (M = 3.48, SD = 1.32) and the largest dispersion. This suggests that, while respondents acknowledge data-driven approaches, they are least convinced that such approaches insulate project selection from political influence.

Procurement Configuration

Procurement recorded a dimension mean of 3.73. Technology-enabled procurement systems reducing costs (M = 3.76, SD = 1.23) and procurement reforms improving governance despite implementation gaps (M = 3.76, SD = 1.19) received the highest ratings. The contribution of effective procurement planning to cost-efficient project completion was rated at M = 3.75 (SD =

1.22), while outsourcing and supplier partnerships received the lowest rating (M = 3.64, SD = 1.14). Because the reform item combines an improvement with a persisting gap, agreement with it also signals that respondents see implementation weaknesses.

Asset Sustainability Configuration

Asset sustainability recorded the highest dimension mean (M = 3.84). Sustainable asset management ensuring long-term service delivery goals recorded the highest item mean (M = 3.88, SD = 1.16), followed closely by regular maintenance of transport assets (M = 3.87, SD = 1.28). Incorporating sustainability considerations into mobility projects had the lowest mean (M = 3.77, SD = 1.18), although it still indicated general agreement.

Taken together, the descriptive results suggest that respondents regard the prioritisation phase, and particularly its exposure to political interference, as the least secure part of physical resource configuration, and the sustainability phase as the most secure. Table 2 presents the item and dimension means.

Table 2: Descriptive Statistics for Physical Resource Configuration Items

Dimension and item	*M*	*SD*
Asset prioritisation	**3.66**	**–**
Asset prioritisation frameworks in urban transport improve the efficiency of resource allocation.	3.70	1.22
Data-driven prioritisation reduces political interference in transport project selection.	3.48	1.32
Prioritising infrastructure assets based on performance data enhances service delivery in urban mobility.	3.77	1.16
Balancing cost efficiency with equity ensures underserved areas benefit from mobility investments.	3.70	1.20
Procurement	**3.73**	**–**
Effective procurement planning contributes to cost-efficient completion of urban mobility projects.	3.75	1.22
Technology-enabled procurement systems reduce costs.	3.76	1.23
Outsourcing and supplier partnerships enhance efficiency in project delivery.	3.64	1.14
Procurement reforms in Kenya have improved governance, but implementation gaps still hinder performance.	3.76	1.19
Asset sustainability	**3.84**	**–**
Regular maintenance of transport assets enhances the long-term sustainability of urban mobility systems.	3.87	1.28
Incorporating sustainability considerations improves project outcomes in mobility systems.	3.77	1.18
Sustainable asset management ensures long-term service delivery goals.	3.88	1.16
Average of the three dimension means	**3.74**	**–**

Note. Items were rated from 1 (strongly disagree) to 5 (strongly agree). Dimension means (in bold) are averages of the item means.

Inferential Statistics

Regression Assumptions

Three diagnostic plots were examined before estimation; to keep within the journal's limit on tables and figures, they are summarised here and are available from the corresponding author. The scatterplot of physical resource configuration against urban mobility outcomes revealed a positive upward trend with no curvilinear pattern, so the linearity assumption was satisfied. The histogram of physical resource configuration scores was approximately bell-shaped, with slight deviations at the lower end that were not substantial enough to indicate a serious violation of normality. The plot of standardised residuals against standardised predicted values showed residuals randomly dispersed around zero with no funnel-shaped pattern, so the homoscedasticity

assumption was satisfied. Independence of observations could not be assumed, because respondents were nested within institutions.

Correlation and Regression Analysis

As shown in Table 3, physical resource configuration was positively correlated with urban mobility outcomes, $r = .610$, $n = 214$, $p < .001$, 95% CI [.52, .69], a moderate-to-strong association. Higher ratings of physical resource configuration were associated with more favourable ratings of mobility efficiency, safety and reliability.

In an ordinary least squares simple linear regression, physical resource configuration accounted for 37.3% of the variance in urban mobility outcomes ($R^2 = .373$, adjusted $R^2 = .370$), and the model was statistically significant, $F(1, 212) = 125.88$, $p < .001$. The remaining 62.7% of the variance is attributable to factors not included in the model. The unstandardised coefficient was $B = 0.305$ ($SE = 0.027$, $\beta = .610$), $t(212) = 11.22$, $p < .001$, 95% CI [0.251, 0.359]: respondents whose physical resource configuration score was one point higher rated urban mobility outcomes about 0.31 points higher, on average. The estimated equation is:

$$\textit{Urban Mobility Outcomes} = 2.463 + 0.305 \times \textit{(Physical Resource Configuration)}$$

Because $p < .001$, the null hypothesis H_{01} was rejected. The strategic configuration of physical resources has a statistically significant positive association with urban mobility outcomes in Nairobi City, Kenya.

Table 3: Correlation and Regression of Urban Mobility Outcomes on Physical Resource Configuration

Panel A. Correlation and model summary						
Pearson correlation	$r = .610$, $n = 214$, $p < .001$, 95% CI [.52, .69]					
Model summary	$R = .610$, $R^2 = .373$, adjusted $R^2 = .370$, SE of the estimate = 0.507					
Panel B. Analysis of variance						
Source	***SS***	***df***	***MS***	***F***	***p***	
Regression	32.409	1	32.409	125.88	< .001	
Residual	54.582	212	0.257			
Total	86.992	213				
Panel C. Regression coefficients						
Predictor	***B***	***SE***	***β***	***t***	***p***	**95% CI for *B***
(Constant)	2.463	0.086		28.79	< .001	[2.294, 2.632]
Physical resource configuration	0.305	0.027	.610	11.22	< .001	[0.251, 0.359]

Note. n = 214. Ordinary least squares estimates; dependent variable: urban mobility outcomes. The 95% CI for r uses Fisher's z transformation, and the CIs for the coefficients are computed as B ± t(.975, 212) × SE. CI = confidence interval.

Discussion

The study found a moderate-to-strong, positive and statistically significant association between physical resource configuration and urban mobility outcomes ($r = .610$, $B = 0.305$, $p < .001$). Physical resource configuration accounted for about 37% of the variance in perceived outcomes. It is therefore a significant correlate of mobility performance, but not its defining predictor: nearly two thirds of the variance lies outside the model. The direction of the result is consistent with Rustanto et al. (2023) and Rueda-Benavides et al. (2022), who show that structured asset prioritisation can improve infrastructure efficiency and service delivery, and with Adero and Aligula (2012), who link coordinated infrastructure investment to transport safety and cost efficiency. It also accords with Shigali and Shitseswa (2023), who found in Kenya that physical resource allocation was associated with better public service delivery.

The unexplained variance is consistent with Ajayi et al. (2024) and Saya and Onyango (2024), who argue that the effectiveness of infrastructure investment depends on supporting systems such as

cost management, contractor capacity and institutional coordination. Similarly, Love et al. (2021) and Kadefors et al. (2021) emphasise that infrastructure performance depends not only on the availability of physical assets but also on institutions' ability to manage complexity, uncertainty and sustainability requirements through procurement. In descriptive terms, respondents' high ratings of procurement planning and digital procurement are consistent with Nyajowi et al. (2024), Mbugua et al. (2021) and Udoette et al. (2024), who show that structured procurement planning, performance measurement and appropriate procurement methods are associated with better project outcomes. Their recognition of persisting implementation gaps echoes the cost overruns, delays and weak contractor performance documented by Rwamba and Sang (2020) and Asada et al. (2024).

On asset sustainability, respondents' strong endorsement of regular maintenance and lifecycle management is consistent with Lendra et al. (2024) and Suprayoga et al. (2020), who link sustainable infrastructure practices to long-term performance and resilience. At the same time, Kapatsa et al. (2023) and Aljboor et al. (2023) show that weak enforcement, limited funding and inadequate institutional capacity often constrain sustainability in practice. Challenges of this kind in Nairobi, such as maintenance backlogs, may help explain why physical resource configuration does not account for more of the variance, although they were not measured here. Because the three dimensions were combined into one score, the study cannot show whether prioritisation, procurement or maintenance matters more; the comparisons in this paragraph and the one above describe respondents' ratings rather than tested effects.

Several alternative explanations for the overall association should be considered, and the design cannot rule them out. First, reverse causality is possible, since institutions operating better-performing transport systems may find it easier to prioritise, procure and maintain assets well. Second, because the same respondents rated both constructs at the same time, part of the association may reflect common-method variance (Podsakoff et al., 2003) or a general belief that good asset management benefits mobility. Third, broader institutional capacity may shape both asset management practices and mobility outcomes.

From a theoretical perspective, the results are consistent with the RBV and with its application to public organisations (Barney, 1991; Bryson et al., 2007), and with ROT's emphasis on how resources are structured, bundled and leveraged (Sirmon et al., 2007, 2011). They suggest that, for urban mobility agencies, the value of physical assets is associated with how they are prioritised, procured and sustained rather than with their mere possession. Because the RBV attributes and orchestration processes were not measured directly, the study shows an association that the theories would predict rather than a test of the theories.

Conclusion

The study concludes that the strategic configuration of physical resources has a statistically significant, positive and moderate-to-strong association with urban mobility outcomes in Nairobi City, Kenya, and the null hypothesis H_{01} was therefore rejected. Stakeholders who rated the prioritisation, procurement and sustainability of transport assets more favourably also rated the efficiency, safety and reliability of the transport system more favourably. Physical resource configuration accounted for about 37% of the variance in perceived outcomes, so other institutional and operational factors also play a substantial part.

Descriptively, asset prioritisation, and especially its vulnerability to political interference, was the least favourably rated phase, while regular maintenance and sustainable asset management were rated most favourably. Because the data are cross-sectional perceptions and the dimensions were not tested separately, these findings indicate stakeholders' priorities and an association. They do not show that management practices cause long-term functionality, continuity of service delivery or equity in the transport system.

The findings should be interpreted in light of several limitations. The cross-sectional, correlational design supports conclusions about association only and cannot capture how procurement, prioritisation and maintenance change over an asset's life cycle. Both constructs were measured with self-reported perceptions from a single-source at one time. This exposes the results to common-method bias (Podsakoff et al., 2003) and to social desirability or self-serving bias among officials of implementing agencies, neither of which was tested. Urban mobility outcomes were perception-based rather than empirical transport metrics, and their pilot reliability ($\alpha = .665$) was below .70. Several items assert the effect being studied, and no factor analysis was conducted.

Respondents were also nested within 25 institutions, but observations were treated as independent; because clustering can make standard errors too small (Cameron & Miller, 2015), precision may be overstated. Selection within strata was purposive, the achieved sample departed from the proportional allocation, about one fifth of respondents reported no direct involvement in urban mobility, and non-response bias was not assessed, all of which limit generalisation beyond the sampled institutions and Nairobi. Finally, the model contains a single composite predictor without covariates, so it cannot show which dimension matters most.

Further research should measure outcomes with empirical transport metrics, such as commute times, congestion indices, National Transport and Safety Authority crash data and road-condition surveys, and combine them with asset records. Future studies should also estimate multiple regression models with prioritisation, procurement and sustainability as separate predictors, together with multilevel models that account for institutional clustering. Longitudinal or case-study designs could trace asset life cycles, and studies could compare the views of implementing agencies with those of external stakeholders to assess self-serving bias.

Because physical resource configuration as a whole was associated with more favourable perceived mobility outcomes, the Nairobi City County Government, the Ministry of Roads and Transport, KURA and NaMATA should adopt an integrated asset management framework. Within the next planning cycle, it should link prioritisation decisions, procurement records and maintenance schedules to objective indicators of mobility performance, so that the effect of configuration practices can be monitored directly.

In light of the lowest-rated item, KURA, NaMATA and the Kenya Roads Board should publish the criteria and scores used to prioritise transport projects, so that data-driven prioritisation is visibly insulated from political interference. Drawing on the procurement and sustainability items, the Public Procurement Regulatory Authority and implementing agencies should complete the digitalisation of procurement and address the implementation gaps respondents identified, while the Kenya Roads Board should protect funding for routine maintenance within lifecycle asset management plans.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author on reasonable request.

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