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LUSAKA**

SCHOOL OF SOCIAL SCIENCES AND TECHNOLOGY

**EVALUATING THE EFFECTS OF PUBLIC-PRIVATE PARTNERSHIPS ON
INFRASTRUCTURE DEVELOPMENT: A CASE STUDY OF THE KATUBA
TOLLGATE**

A DISSERTATION

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Fulfillment of the Requirements for the award of a Bachelor of Science
Degree in Public Administration.**

BY

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AUTHOR'S DECLARATION

I, **MIRRIAM PHIRI** (BPA22112994), hereby declare that this dissertation titled:

“EVALUATING THE EFFECTS OF PUBLIC–PRIVATE PARTNERSHIPS ON INFRASTRUCTURE DEVELOPMENT: A CASE STUDY OF THE KATUBA TOLLGATE”

is my original work and has not been submitted in whole or in part for the award of any other degree, diploma or certificate at any university or institution of higher learning. All sources of information used in this dissertation have been fully acknowledged and referenced.

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ABSTRACT

This study evaluated the effects of Public–Private Partnerships (PPPs) on infrastructure development in Zambia, using the Katuba Tollgate as a case study to understand how the PPP model influences efficiency, service delivery, and project sustainability. Guided by the objectives of assessing efficiency, identifying implementation challenges, and proposing strategies for improved PPP performance, the study adopted a qualitative research design. Data were collected from 60 participants through semi-structured interviews and focus group discussions involving government officials, private concessionaire representatives, council authorities, transport operators, and community members, and were analysed using thematic analysis to identify patterns, meanings, and emerging themes. Findings revealed that the Katuba Tollgate PPP improved road maintenance, operational organisation, and revenue collection, yet efficiency remained inconsistent during peak hours due to limited staffing, lane management gaps, and occasional technical delays. Additional challenges included weak institutional capacity for monitoring, bureaucratic processes, and inadequate communication with road users. The study’s implications suggest that PPPs can enhance infrastructure delivery when supported by strong governance, transparent oversight, and effective coordination between stakeholders. It concludes that PPPs hold significant potential for improving Zambia’s road network but require strengthened institutional frameworks and more inclusive engagement to achieve full effectiveness. The study recommends capacity building for monitoring agencies, adoption of advanced tolling technologies, improved community sensitisation, performance-based contracting, and further research comparing multiple PPP toll projects and assessing long-term socio-economic impacts.

Keywords: Public–Private Partnerships; Infrastructure Development; Efficiency; Implementation Challenges; Performance Strategies.

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DEDICATION

This dissertation is wholeheartedly dedicated to my mother, whose unconditional love, sacrifices, and unwavering support have shaped the person I am today. Her strength, resilience, and constant encouragement have been my greatest source of inspiration throughout my academic journey. I also dedicate this work to my entire family, who have stood by me with patience, understanding, and belief in my abilities, even during the most challenging moments. Their guidance, prayers, and emotional support have kept me focused and motivated. To my friends, who offered encouragement, motivation, and companionship throughout this process, I am deeply grateful for your presence in my life. This achievement is a reflection of the collective love, support, and faith of my mother, family, and friends, and it is to them that I dedicate this work with heartfelt appreciation.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Public–Private Partnerships (PPPs) have increasingly become a vital mechanism for financing and managing infrastructure projects worldwide, especially in developing economies where public resources are limited. In Zambia, PPPs have been adopted to enhance infrastructure development through collaboration between the public and private sectors. This study, titled “*Evaluating the Effects of Public-Private Partnership on Infrastructure Development: A Case of Katuba Tollgate,*” seeks to assess how the PPP model has influenced infrastructure delivery, efficiency, and sustainability in the country. By focusing on the Katuba Tollgate along the Lusaka–Ndola dual carriageway, the study evaluates the effectiveness of PPPs in achieving development objectives and explores the challenges and opportunities arising from such partnerships.

1.1 Background of the Study

Infrastructure development forms the backbone of economic growth, national competitiveness, and social advancement in any country. Globally, demand for infrastructure has increased rapidly due to rising populations, accelerated urbanization, and advances in technology, all of which place growing pressure on public budgets and planning systems. Traditional public financing alone has proven inadequate to meet these demands, prompting governments to adopt more sustainable and innovative financing mechanisms. Public–Private Partnerships (PPPs) have emerged as one such mechanism, enabling governments to tap into private sector resources, innovation, and technical expertise while maintaining public oversight. According to the World Bank (2022), PPPs have significantly contributed to infrastructure expansion in countries such as the United Kingdom, Brazil, and India, particularly in the transport, energy, and health sectors where private sector involvement has resulted in improved efficiency, reduced cost overruns, and enhanced service delivery.

Across the developing world, particularly in Africa, PPPs have become essential for addressing the continent's infrastructure financing deficit. The African Development Bank (AfDB, 2021) estimates the continent's annual infrastructure gap at over USD 100 billion, underscoring the urgent need for alternative financing models. Several African countries, including South Africa, Kenya, and Ghana, have adopted PPPs to develop roads, energy facilities, and water supply systems. These experiences demonstrate that PPPs can increase project sustainability, enhance infrastructure quality, and broaden access to essential services. However, research by Osei-Kyei and Chan (2017) highlights persisting challenges such as weak institutional capacity, inadequate risk-sharing arrangements, corruption vulnerabilities, and limited stakeholder engagement. These impediments show that the success of PPPs is highly dependent on transparent governance, sound legal frameworks, and effective monitoring mechanisms.

In the Zambian context, the adoption of PPPs gained momentum with the enactment of the Public–Private Partnership Act No. 14 of 2009, which institutionalized collaboration between government and private investors in infrastructure development. This legislation aimed to reduce the fiscal burden on government, attract private investment, and enhance the efficiency of public projects. Since its introduction, PPPs have been applied in sectors such as energy, housing, and transport, with toll road projects emerging as a particularly notable area of application. Projects such as the Katuba Tollgate have been introduced to improve road conditions, enhance road safety, and generate sustainable revenue for road maintenance and rehabilitation (Muleya, Zulu, & Nanchengwa, 2019). Through these initiatives, the government seeks to ensure that infrastructure provision becomes more cost-effective and self-sustaining.

Despite these policy intentions, Zambia's PPP experience has not been without challenges. Several projects have faced concerns relating to poor risk allocation, inadequate regulatory enforcement, limited transparency, and inconsistencies in contract monitoring. In the road sector specifically, issues such as toll pricing fairness, accountability in revenue management, and public perceptions of value for money have sparked debate among citizens and civil society actors (Banda & Jeke, 2022). The Katuba Tollgate, situated along the Great North Road—one of Zambia's busiest transport corridors—offers an important case study for assessing how PPPs function in practice. Its location and economic importance make it a critical point for evaluating toll management

efficiency, socio-economic impact, and community perceptions of PPP-led infrastructure development.

The tolling system introduced under this PPP framework was intended to address funding gaps for road maintenance and create a sustainable financing model for Zambia's road network. However, the extent to which these objectives have been achieved remains unclear, particularly in relation to operational efficiency, equity in service delivery, and the long-term socio-economic benefits for both road users and surrounding communities. By examining the Katuba Tollgate, the study provides an opportunity to assess whether PPPs in Zambia are meeting their stated goals, how revenue is being managed, and whether the tolling model enhances or burdens economic activities along the transport corridor.

Furthermore, the government's development priorities, as outlined in Vision 2030 and the Eighth National Development Plan (8NDP), emphasize the need for sustainable infrastructure that supports economic diversification, regional integration, and job creation. These national policies underscore the relevance of evaluating PPP outcomes to ensure that public-private collaborations meaningfully contribute to Zambia's long-term development agenda. As the government continues to pursue infrastructure expansion, evidence-based assessments become essential for guiding future PPP designs, negotiations, and regulatory reforms.

In light of these factors, this study aims to provide a rigorous empirical assessment of the effectiveness of PPPs in enhancing infrastructure development in Zambia, using the Katuba Tollgate as a focal point. By analyzing operational efficiency, governance structures, economic benefits, and public perceptions, the study generates insights that can guide policymakers, private sector actors, and development planners in shaping better PPP models. Ultimately, the findings contribute to strengthening infrastructure governance, promoting accountability, and advancing sustainable development, in line with national priorities and Sustainable Development Goal (SDG) 9: Industry, Innovation, and Infrastructure, which calls for resilient, inclusive, and sustainable infrastructure systems.

1.2 Statement of the Problem

Public–Private Partnerships (PPPs) remain a widely promoted approach for financing and managing infrastructure projects in developing countries, including Zambia. They are intended to mobilize private capital, improve operational efficiency, and relieve fiscal constraints on governments. However, current evidence shows that PPP implementation faces serious challenges that hinder its effectiveness. Osei-Kyei and Chan (2017) observe that poor contractual management, weak institutional capacity, and inadequate stakeholder engagement continue to undermine project outcomes. Similarly, Zawawi et al. (2016) note that unequal risk allocation, limited transparency, and weak regulatory enforcement often result in project delays, cost overruns, and service inefficiencies. These persistent challenges demonstrate that, despite their theoretical benefits, PPPs still struggle to achieve sustainability and value for money in practice.

The problem is particularly evident in sub-Saharan Africa, where PPP performance gaps continue to affect infrastructure delivery. Mathews (2018) explains that many PPP projects fail to meet operational expectations because of limited technical oversight and inadequate evaluation mechanisms. Muleya, Chitundu and Nkulukusa (2019) further highlight that the lack of systematic post-implementation assessment prevents policymakers from determining whether PPPs genuinely improve infrastructure outcomes. This absence of empirical monitoring widens the accountability gap and limits the capacity to refine PPP frameworks. Consequently, the continued adoption of PPPs without strong evidence of performance raises concern about their actual contribution to infrastructure development and economic growth.

In Zambia, the introduction of the Public–Private Partnership Act No. 14 of 2009 was meant to institutionalize private participation in public infrastructure development. Yet, despite several PPP initiatives, results remain mixed. Projects such as the Katuba Tollgate along the Lusaka–Ndola dual carriageway have generated substantial toll revenues—estimated at over K4 billion annually according to the National Road Fund Agency (NRFA, 2023)—but concerns persist about maintenance quality, traffic congestion, and equitable revenue utilization. Banda and Jeke (2022) and Muleya et al. (2019) report that many toll projects fail to translate financial success into visible public benefits due to weak governance and accountability structures. The persistence of such inefficiencies shows that PPPs in Zambia have not fully delivered the expected improvements in infrastructure quality and social welfare. Therefore, it becomes imperative to assess the actual

effectiveness of PPP projects such as Katuba Tollgate to determine their impact on infrastructure development and to provide policy guidance for improving PPP frameworks in Zambia.

1.3 Research objectives

1.3.1 General Objective

To evaluate the effects of Public-Private Partnerships on infrastructure development: A case study of the Katuba Tollgate.

1.3.2 Specific Objectives

- I. To assess the efficiency of the Katuba Tollgate project implemented through a PublicPrivate Partnership.
- II. To identify the challenges encountered in the implementation of the Katuba Tollgate PPP project.
- III. To determine strategies for enhancing the performance of future PPP infrastructure projects in Zambia.

1.3.3 Research Questions

- I. How has the Katuba Tollgate project, implemented through a PPP arrangement, impacted infrastructure development in terms of efficiency and service delivery?
- II. What challenges were encountered during the implementation of the Katuba Tollgate PPP project?
- III. What strategies can be employed to improve the performance of future PPP infrastructure projects in Zambia?

1.4 Justification of the Study

This study is significant because it provides an empirical evaluation of the effectiveness of Public-Private Partnerships in delivering infrastructure projects in Zambia, with a specific focus on the Katuba Tollgate. It examines the efficiency, operational challenges, and socio-economic impact of the project, offering insights into how PPP arrangements influence service delivery, road quality, and revenue management. The findings inform policymakers and government agencies on the strengths and weaknesses of current PPP practices, enabling improvements in regulatory

frameworks, risk allocation, and project oversight. Private sector participants benefit from a better understanding of operational challenges and best practices, supporting more effective collaboration in infrastructure projects. Additionally, the study fills a gap in local academic literature by providing evidence-based analysis of PPP outcomes, enhancing knowledge on sustainable and accountable infrastructure development in Zambia. This aligns with SDG 9: Industry, Innovation, and Infrastructure, which promotes resilient infrastructure, sustainable industrialization, and innovation.

1.5 Scope of the Study

The study focuses specifically on the Katuba Tollgate project as a case of Public-Private Partnership implementation in Zambia's road sector. It examines the efficiency, operational performance, challenges, and socio-economic impact of the project, particularly on service delivery and road infrastructure quality. The research scope is limited to the planning, implementation, and operational phases of the Katuba Tollgate project up to the present time. Data collection is restricted to stakeholders directly involved in the project, including government agencies, private partners, and local communities. The study does not extend to other PPP projects or sectors outside the road infrastructure domain, ensuring a detailed and context-specific analysis.

1.6 Limitations of the Study

The study encountered several limitations that influence the research process. First, access to comprehensive project data may be restricted due to confidentiality agreements or institutional policies. Second, time constraints may limit the depth of data collection and fieldwork. Third, the reliability of stakeholder responses may vary, introducing potential bias in qualitative assessments. Fourth, financial and logistical constraints may restrict the scope of primary data collection. Finally, the focus on a single case study, Katuba Tollgate, may limit the generalizability of findings to other PPP projects, although the study provides valuable insights applicable to similar contexts within Zambia.

1.7 Definition of Key Terms

Public-Private Partnership (PPP):

A contractual arrangement between a government institution and a private sector entity in which both parties share responsibilities, risks, and benefits in the financing, construction, operation, and maintenance of public infrastructure. In this study, a PPP refers to the collaborative arrangement used in the development and operation of the Katuba Tollgate.

Infrastructure Development:

The process of planning, financing, constructing, operating, and maintaining physical facilities such as roads and tollgates that support economic activities and public service delivery. In this study, infrastructure development refers to improvements in road quality, toll facilities, and service delivery associated with the Katuba Tollgate project.

Tollgate Infrastructure:

A road facility established to collect user fees from motorists in order to finance road maintenance, rehabilitation, and management. In this study, the term refers specifically to the Katuba Tollgate located along the Lusaka–Ndola dual carriageway.

Road Infrastructure Efficiency:

The extent to which road infrastructure is operated and maintained in a manner that ensures smooth traffic flow, reduced congestion, timely service delivery, and effective utilisation of resources. In this study, it relates to the operational performance of the Katuba Tollgate under the PPP arrangement.

PPP Implementation:

The process through which a Public–Private Partnership project is planned, executed, managed, and monitored in accordance with contractual and regulatory frameworks. In this study, PPP implementation refers to how the Katuba Tollgate project was executed, operated, and overseen by both public and private stakeholders.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a comprehensive review of literature relevant to Public-Private Partnerships (PPPs) and their role in infrastructure development. It examines empirical studies that explore the efficiency, implementation challenges, and strategies for improving PPP projects, with a focus on road infrastructure in developing countries, particularly Zambia. The chapter aims to contextualize the study within existing knowledge, identify key patterns and lessons from previous research, and highlight gaps that justify the current investigation. The literature reviewed includes empirical evidence from similar PPP projects, allowing for a critical understanding of factors influencing project performance, stakeholder engagement, and socioeconomic outcomes. The chapter concludes by synthesizing these findings and outlining the research gaps that the study seeks to address.

2.1 Empirical Literature Review

2.1.1 Efficiency of the Katuba Tollgate PPP Project

Public-Private Partnerships (PPPs) have gained global prominence as a mechanism to deliver infrastructure projects efficiently, particularly in countries facing fiscal constraints. Evidence from the United Kingdom illustrates that PPPs, through the Private Finance Initiative (PFI), improve operational efficiency by linking payments to performance indicators, ensuring that private contractors adhere to quality standards and project timelines (Grimsey & Lewis, 2004). Research demonstrates that this approach reduces delays and enhances long-term maintenance, highlighting the capacity of private sector expertise to complement public resources effectively.

Experience in Canada further confirms that PPP-managed highways consistently achieve faster project completion and lower lifecycle costs compared to traditionally managed public projects (Yescombe, 2017). The structured oversight mechanisms and rigorous performance monitoring employed in Canadian road concessions ensure that operational inefficiencies are minimized, and deviations from planned maintenance or construction schedules are promptly addressed. These

examples suggest that efficiency in PPPs is strongly correlated with clear contractual frameworks and accountability mechanisms.

In Spain, PPP toll road projects demonstrate how private sector participation fosters operational precision and adherence to project milestones. Empirical studies indicate that Spanish highway concessions, particularly those in the Valencia region, achieve high compliance with construction and maintenance schedules due to clearly defined performance-based obligations (Roumboutsos & Anagnostopoulos, 2009). The ability to monitor private operators closely and enforce contractual penalties for underperformance contributes to measurable efficiency gains, demonstrating the importance of institutional oversight in PPP success.

Japan's experience with urban transport PPPs underscores the importance of integrating innovation with governance to improve efficiency. Findings show that combining private technical expertise with public regulatory oversight leads to reduced costs, enhanced operational performance, and higher user satisfaction in projects such as urban toll road developments (Yescombe, 2017). This illustrates that efficiency is not solely dependent on financial inputs but also on the operational management capacity and regulatory environment.

African PPP projects reveal a mix of successes and constraints in achieving efficiency. South Africa's N3 and N4 toll highways, for instance, show that private sector management of construction and maintenance contributes to timely project delivery and improved road quality (Osei-Kyei & Chan, 2015). However, studies also highlight that efficiency is highly dependent on institutional support and governance. Projects in countries with weak regulatory frameworks often experience cost overruns and service inconsistencies, demonstrating that efficiency gains are not uniform across the continent (Marques & Berg, 2011).

Kenya's Thika Superhighway exemplifies how PPPs can enhance operational efficiency by combining private expertise with public oversight. Research indicates that structured maintenance schedules and revenue-driven management reduce delays and improve road service quality (World Bank, 2018). However, inefficiencies occasionally arise due to regulatory bottlenecks and coordination challenges, showing that operational performance is influenced by both technical and institutional factors.

Nigeria's Lekki-Epe Expressway, a toll road developed under a PPP, demonstrates how private sector involvement improves efficiency in construction, maintenance, and revenue collection. Empirical studies reveal that performance-based contracts ensure accountability, yet delays in government approvals occasionally hinder optimal outcomes (Marques & Berg, 2011). These experiences highlight the necessity of strong governance structures alongside private sector engagement to realize efficiency gains fully.

In Zambia, the introduction of the Public-Private Partnership Act No. 14 of 2009 has created a legal framework for infrastructure development projects, including toll roads such as the Lusaka–Ndola dual carriageway where Katuba Tollgate is located. Research shows that PPP implementation has improved operational efficiency by introducing structured management, reliable maintenance schedules, and systematic toll revenue collection (Muleya, Chitundu & Nkulukusa, 2019). These mechanisms help reduce delays common in traditional public projects, suggesting that PPPs can enhance service delivery when combined with appropriate oversight.

The Katuba Tollgate demonstrates that efficiency gains in Zambian PPP projects are tangible, particularly in the areas of road maintenance and revenue management. Audit reports indicate that toll collection supports ongoing maintenance, minimizing the deterioration of road infrastructure (NRFA, 2023). Empirical studies reveal that the involvement of private operators introduces discipline in project execution, resulting in more predictable outcomes compared to solely public management.

Nevertheless, the operational efficiency of PPPs in Zambia is affected by challenges such as bureaucratic delays, limited technical capacity of regulatory institutions, and occasional lapses in contract enforcement (Banda & Jeke, 2022). These factors can slow project implementation and reduce the expected gains from private sector participation. Despite these issues, evidence suggests that PPPs introduce a level of structure and accountability that significantly improves efficiency relative to fully public infrastructure projects.

Comparisons with other African countries reveal that efficiency in Zambian PPPs mirrors regional patterns. While projects in South Africa, Kenya, and Nigeria demonstrate higher compliance with project timelines and maintenance standards, Zambia experiences moderate efficiency improvements, constrained by institutional capacity and governance mechanisms (World Bank,

2018; Osei-Kyei & Chan, 2015). These comparisons reinforce the view that PPP efficiency is context-dependent and influenced by both public and private sector performance.

Further research in Zambia indicates that efficiency extends beyond financial metrics to include service quality, safety, and user satisfaction. Studies of the Katuba Tollgate show improvements in road quality and reduced travel disruptions, yet some operational activities lag behind planned schedules due to coordination challenges between stakeholders (Muleya et al., 2019). This highlights the importance of holistic efficiency assessments that encompass technical, financial, and social dimensions.

Lessons from global and regional PPP projects suggest that efficiency is maximized when clear performance indicators, risk-sharing mechanisms, and active stakeholder engagement are integrated into project design. The experiences of the UK, Canada, South Africa, and Kenya emphasize that these factors are critical in ensuring that private sector participation translates into tangible infrastructure improvements (Yescombe, 2017; Osei-Kyei & Chan, 2015). For Zambia, adopting these practices can strengthen the operational performance of projects like Katuba Tollgate.

Empirical evidence confirms that efficiency in PPPs is a function of well-structured contracts, competent project management, and continuous oversight. In Zambia, projects like the Katuba Tollgate reveal both the potential and the constraints of the PPP model, demonstrating that while private sector involvement enhances operational performance, challenges in governance and monitoring can limit the full realization of efficiency gains (Muleya et al., 2019; NRFA, 2023). These insights underscore the need for context-specific strategies to optimize PPP performance.

Overall, the literature illustrates that PPPs can significantly improve efficiency in infrastructure delivery when public and private sectors collaborate effectively. The Katuba Tollgate reflects a microcosm of this dynamic, showing measurable improvements in maintenance, toll revenue collection, and road quality, while also highlighting areas for refinement in institutional oversight, performance monitoring, and stakeholder coordination. This body of evidence establishes a foundation for examining the efficiency of PPP projects in Zambia in a more detailed and context-sensitive manner.

2.1.2 Challenges in the Implementation of PPP Projects

Public-Private Partnerships, while offering potential efficiency and financial benefits, frequently encounter implementation challenges globally. In developed countries, studies highlight that even with advanced institutional frameworks, PPP projects are susceptible to delays caused by overly complex contractual agreements and bureaucratic processes. For example, in the United Kingdom, several PFI projects have experienced cost escalations and delayed completion due to disagreements between public authorities and private contractors regarding scope changes and risk-sharing arrangements (Grimsey & Lewis, 2004). These challenges suggest that the efficiency and effectiveness of PPPs depend not only on private sector involvement but also on the clarity and flexibility of contractual frameworks.

In Europe, countries such as Spain and Italy have reported that stakeholder coordination and regulatory approvals often hinder timely project delivery. Spanish toll highway projects, while generally successful in terms of revenue and quality, have faced legal disputes over land acquisition and environmental compliance, which significantly delayed operationalization (Roumboutsos & Anagnostopoulos, 2009). Similarly, Italy's transport PPP projects highlight the challenge of aligning multiple government agencies with private operators, demonstrating that even strong economies must carefully manage administrative complexity to prevent implementation bottlenecks.

Across Asia, India's urban and transport PPP projects illustrate another dimension of implementation challenges. While private partners bring technical expertise and financial resources, inadequate public sector capacity to oversee contracts often leads to operational inefficiencies and disputes over performance indicators. The Mumbai-Pune Expressway, for instance, faced several delays due to approval hold-ups and disagreements regarding toll rate adjustments, underscoring the importance of effective coordination and governance in achieving project goals (Yescombe, 2017). Research demonstrates that challenges in institutional capacity and legal frameworks are among the most significant barriers to successful PPP implementation globally.

In Africa, the experience of Kenya's Thika Superhighway demonstrates how logistical and institutional constraints can impact PPP project performance. Although the project achieved timely

construction, studies indicate that regulatory hurdles, political interference, and community opposition required continuous management interventions (World Bank, 2018). Similarly, Nigeria's Lekki-Epe Expressway faced challenges related to land acquisition, financing delays, and limited local expertise in contract management, which temporarily slowed progress and increased project costs (Marques & Berg, 2011). These examples highlight that while PPPs have potential, contextual challenges frequently influence outcomes, emphasizing the need for robust planning and risk mitigation strategies.

South Africa offers further evidence of challenges in PPP implementation despite a relatively mature institutional framework. Toll road projects such as the N3 highway faced delays in construction and operational disputes over traffic volume projections and revenue sharing. Research indicates that insufficient stakeholder alignment and gaps in contract monitoring were primary contributors to these delays, illustrating that even experienced governments encounter hurdles when managing complex PPP arrangements (Osei-Kyei & Chan, 2015). Lessons from South Africa show that rigorous oversight and adaptive management are essential to mitigate risks inherent in PPP projects.

In Zambia, PPP implementation in road infrastructure encounters both technical and institutional obstacles. The Katuba Tollgate project, while improving road quality and revenue collection, has faced challenges such as delayed approval processes, limited public sector capacity to monitor contracts effectively, and occasional disagreements between the private operator and regulatory authorities (Banda & Jeke, 2022). Empirical studies reveal that these challenges can compromise operational efficiency, illustrating that even with a legal framework like the PPP Act No. 14 of 2009, practical implementation is influenced by governance quality, stakeholder coordination, and administrative capacity.

Experience from regional and local contexts emphasizes that community engagement and social acceptance are critical for the successful implementation of PPPs. In Zambia, road users and local communities sometimes resist toll collection initiatives, perceiving them as inequitable or poorly communicated. Studies indicate that insufficient consultation and public sensitization can lead to delays, reduced usage, or operational disruptions (Muleya et al., 2019). This evidence underscores

that technical and financial efficiency in PPPs is intertwined with social and institutional factors, highlighting the multidimensional nature of implementation challenges.

A further challenge observed in global PPP projects involves financial risk management, particularly in large-scale infrastructure developments. In Australia, several road PPP projects faced cost overruns due to inaccurate traffic projections and unexpected operational expenses, demonstrating that private investment alone does not eliminate financial risks (Hodge & Greve, 2007). Research highlights that misaligned risk allocation between public and private partners can lead to disputes, additional costs, and delayed service delivery, emphasizing the importance of carefully negotiated contracts and proactive financial oversight.

In Europe, environmental and regulatory compliance presents another implementation obstacle. Projects in Germany and France, including urban toll roads, experienced delays due to stringent environmental impact assessments and public consultations, which occasionally extended beyond planned timelines (Roumboutsos & Anagnostopoulos, 2009). These cases show that while PPPs introduce private efficiency, external regulatory requirements and social considerations must be integrated into project planning to prevent inefficiencies.

Political factors also influence PPP implementation globally. In countries such as Brazil and Mexico, changes in government leadership and policy priorities have caused interruptions in PPP projects, including renegotiation of contracts and delays in approvals (Yescombe, 2017). Such experiences indicate that political stability and policy consistency are crucial to maintain efficiency and ensure that private sector commitments are realized as intended.

In Africa, governance weaknesses and limited institutional capacity remain prominent challenges. Ghana's Accra-Tema motorway PPP, for instance, encountered implementation delays due to fragmented regulatory oversight and insufficient technical expertise in managing complex contracts (Osei-Kyei & Chan, 2015). Similarly, in Nigeria, community opposition to toll collection combined with bureaucratic hurdles led to delayed operationalization of key highway PPP projects. These challenges highlight that, in many African countries, the effectiveness of PPPs is heavily influenced by the capacity of public institutions to oversee and manage partnerships effectively.

In Kenya, studies indicate that social and environmental concerns have periodically slowed PPP project implementation. Resistance from local communities regarding land acquisition and compensation delayed parts of the Thika Superhighway project, requiring additional negotiations and adjustments (World Bank, 2018). Such challenges demonstrate that technical efficiency cannot be separated from social acceptance, as public resistance can compromise project timelines and operational outcomes.

Zambian PPP projects similarly face financial and operational constraints. The Katuba Tollgate project, despite improvements in road quality and revenue collection, has experienced delayed maintenance schedules and periodic disputes between the private operator and the regulatory authorities regarding toll adjustments and operational responsibilities (Banda & Jeke, 2022). Research highlights that these issues are compounded by limited institutional capacity for contract monitoring and enforcement, showing that efficiency and operational performance are highly dependent on governance quality.

Finally, evidence from Zambia indicates that stakeholder coordination, including communication between government agencies, private operators, and the public, is a critical determinant of successful PPP implementation. Misalignment of expectations or inadequate engagement strategies can create operational disruptions and undermine project objectives. The Katuba Tollgate experience shows that while the project achieves certain efficiency and revenue targets, gaps in oversight, stakeholder communication, and social acceptance continue to present challenges that must be addressed to optimize the full potential of PPPs (Muleya et al., 2019).

2.2.3 Strategies for Enhancing PPP Performance

Global experience demonstrates that clearly defined contractual frameworks are fundamental to improving the performance of PPP projects. Evidence from the United Kingdom's Private Finance Initiative indicates that contracts with explicit performance indicators, risk-sharing arrangements, and detailed maintenance obligations significantly reduce operational inefficiencies (Grimsey & Lewis, 2004). By linking private sector compensation to measurable outcomes, these contracts incentivize timely delivery and high-quality service, illustrating the importance of legally robust and enforceable agreements in ensuring project success.

Financial structuring is another critical strategy widely adopted to enhance PPP performance. In Canada, toll road projects such as the Highway 407 extension benefit from innovative financing models that combine government guarantees with private investment, thereby aligning financial incentives with operational efficiency (Yescombe, 2017). Empirical studies show that when financial risks are allocated appropriately between public and private partners, the projects achieve better cost control, minimize delays, and maintain long-term sustainability. This approach underscores that performance is closely tied to the design of financial mechanisms and risk allocation strategies.

Technological integration has emerged as a key performance enhancer in global PPP projects. Japanese urban transport PPPs, for instance, implement advanced traffic monitoring systems, automated toll collection, and real-time maintenance reporting to improve operational efficiency and service quality (Yescombe, 2017). Research highlights that leveraging technology not only optimizes day-to-day operations but also strengthens accountability and transparency, enabling stakeholders to respond promptly to challenges. Such innovations demonstrate that modern PPPs require the integration of technical tools alongside managerial frameworks to maximize efficiency and performance outcomes.

Institutional capacity building is another widely recognized strategy for enhancing PPP effectiveness. In Australia, government agencies overseeing toll roads and transport PPPs invest in training, process optimization, and technical expertise to ensure that public officials can monitor private operators effectively (Hodge & Greve, 2007). Studies reveal that projects with strong institutional capacity experience fewer delays, more consistent maintenance, and higher user satisfaction. These findings emphasize that the public sector's ability to manage complex PPP arrangements is as crucial as the private partner's operational performance.

Stakeholder engagement and social inclusion are increasingly recognized as essential for sustaining PPP performance. European toll road projects in Spain and France have shown that proactive consultation with communities, clear communication regarding benefits and costs, and participatory decision-making processes reduce public resistance and operational interruptions (Roumboutsos & Anagnostopoulos, 2009). Evidence suggests that integrating community

feedback into project design enhances the legitimacy of PPP initiatives and ensures smoother implementation, highlighting that social acceptance is a critical dimension of project success.

Political stability and policy consistency are also key drivers of PPP performance globally. In Latin American countries like Brazil and Mexico, PPP projects often face delays and renegotiations due to changes in government leadership or policy priorities (Yescombe, 2017). Empirical studies confirm that predictable policy environments, transparent regulations, and consistent political support provide a stable framework for private partners to operate efficiently. These lessons indicate that aligning PPP performance strategies with broader governance and policy structures is crucial for ensuring sustained project success.

In Africa, regional experience underscores the importance of regulatory oversight and contractual enforcement to enhance PPP performance. South African highway PPPs, such as the N3 and N4 toll roads, achieve operational efficiency and high service standards through detailed contracts, routine audits, and performance-linked payment systems (Osei-Kyei & Chan, 2015). Empirical evidence from these projects demonstrates that consistent monitoring, risk-sharing arrangements, and accountability mechanisms reduce delays and ensure that both public and private objectives are met. For Zambia, these strategies offer valuable lessons for optimizing the Katuba Tollgate and similar PPP projects, particularly in strengthening institutional capacity and contract enforcement.

In Kenya, lessons from the Thika Superhighway project demonstrate that performance is enhanced when regulatory agencies establish clear monitoring frameworks. Empirical studies reveal that continuous evaluation of construction quality, toll collection efficiency, and maintenance schedules ensures accountability and reduces the likelihood of operational disruptions (World Bank, 2018). These practices indicate that structured oversight, combined with private sector expertise, is crucial for sustaining high performance in PPP projects.

Financial sustainability and innovative funding mechanisms also play a pivotal role in optimizing PPP performance in Africa. Nigerian toll road projects, such as the Lekki-Epe Expressway, show that aligning revenue streams with operational costs and incorporating flexible tolling models allow for continuous maintenance and reinvestment (Marques & Berg, 2011). Evidence indicates that financially self-sustaining PPPs are better positioned to meet performance targets, avoid

service interruptions, and deliver consistent benefits to users, emphasizing the interdependence of financial management and operational efficiency.

Capacity building within local institutions is essential for addressing contextual challenges in African PPPs. Studies from Ghana's Accra-Tema motorway highlight that insufficient technical expertise and weak contract monitoring can undermine performance outcomes (Osei-Kyei & Chan, 2015). Strengthening the capabilities of public agencies through targeted training, resource allocation, and institutional reforms enhances oversight and ensures that private partners adhere to contractual obligations. For Zambia, this approach is particularly relevant in projects like the Katuba Tollgate, where sustained monitoring and evaluation are critical to maintaining efficiency.

Stakeholder engagement remains a central strategy for improving PPP performance in Zambia and across the region. Research shows that when communities, road users, and local authorities are involved in planning and decision-making processes, there is greater compliance, reduced resistance to toll collection, and improved operational outcomes (Muleya et al., 2019). The Katuba Tollgate project demonstrates that public awareness campaigns, transparent communication regarding revenue allocation, and participatory consultation strengthen legitimacy and enhance the effectiveness of PPP arrangements.

Technological integration also enhances the operational performance of Zambian PPPs. Automated toll collection systems, traffic monitoring technologies, and data-driven maintenance scheduling allow for more accurate revenue management and timely intervention in infrastructure upkeep (NRFA, 2023). Empirical evidence confirms that such innovations improve service quality, reduce operational bottlenecks, and facilitate evidence-based decision-making, demonstrating that technology is a critical enabler of performance.

In addition, adaptive governance and risk management frameworks are vital for sustaining high performance in PPPs. Lessons from South African and Kenyan toll road projects indicate that anticipating potential operational, financial, and environmental risks and establishing clear mitigation strategies reduces delays and maintains service standards (Osei-Kyei & Chan, 2015; World Bank, 2018). For Zambia, proactive risk management ensures that challenges such as traffic fluctuations, maintenance backlogs, or community disputes do not compromise the intended outcomes of projects like the Katuba Tollgate.

Finally, empirical evidence from Zambia illustrates that integrated strategies encompassing contractual clarity, financial sustainability, institutional capacity, technological innovation, and stakeholder engagement collectively enhance PPP performance. The Katuba Tollgate demonstrates that when these elements are aligned, operational efficiency, service delivery, and revenue generation improve significantly, providing a replicable model for future infrastructure projects (Banda & Jeke, 2022; Muleya et al., 2019). These insights underscore that effective PPP performance is multifaceted, requiring coordinated interventions across governance, finance, technology, and community relations.

2.2 Conceptual Framework

2.2.1 The Concept of Public-Private Partnership

Public-Private Partnerships (PPPs) are collaborative arrangements in which government institutions and private sector entities jointly design, finance, construct, or manage public infrastructure and services. PPPs have become increasingly relevant as governments across the world confront fiscal constraints, rising infrastructure needs, and the demand for more efficient service delivery. According to Yescombe (2018), PPPs offer a structured mechanism for mobilising private capital and technical expertise in ways that complement public oversight, ultimately enhancing project performance and ensuring long-term infrastructure sustainability. In their basic form, PPPs redistribute responsibilities and risks between partners, ensuring that the private sector assumes operational responsibilities while the public sector safeguards accountability and equity. This makes PPPs not only an economic mechanism but also a governance model aimed at improving the quality of life for citizens through better infrastructure and service provision.

The rise of PPPs is also driven by practical concerns around efficiency, innovation, and cost-effectiveness in public project implementation. Traditional public procurement models often face delays, cost overruns, and administrative bottlenecks, which undermine timely infrastructure delivery. PPPs, however, introduce performance-based systems that incentivize private partners to meet agreed-upon targets, ensuring improved quality control and adherence to timelines. Ameyaw et al. (2018) argue that PPPs encourage innovation because private partners have the flexibility and technical capability to introduce modern technologies and management practices, ultimately improving user satisfaction. By fostering such innovation, PPPs contribute directly to human

development outcomes, particularly in underserved areas where public institutions may lack the capacity to deliver large-scale infrastructure projects independently.

PPPs encompass a diverse range of arrangements, including Build-Operate-Transfer (BOT), Design-Build-Finance-Operate (DBFO), and concession-based models, each reflecting different levels of private sector involvement and risk-sharing. These flexible frameworks allow governments to structure partnerships based on national development priorities and projectspecific requirements (Carbonara & Pellegrino, 2018). A successful PPP arrangement depends on clear legal frameworks, transparent contracting, equitable risk allocation, and effective dispute resolution mechanisms. Research by Osei-Kyei and Chan (2021) indicates that strong institutional capacity and stakeholder engagement are critical to ensuring PPP success, especially in developing countries where governance systems may still be evolving. Importantly, modern PPPs are increasingly aligned with global development goals, particularly the Sustainable Development Goals (SDGs), which emphasize equitable, resilient, and sustainable infrastructure expansion.

In Zambia, the PPP model gained legal foundation through the Public-Private Partnership Act No. 14 of 2009, which provided guidelines for engaging private partners in infrastructure development. PPPs have since played a significant role in roads, energy, and public services, helping to address fiscal limitations while expanding infrastructure coverage. Muleya, Banda and Jeke (2022) highlight that projects such as the Katuba Tollgate illustrate how PPPs enhance road maintenance, improve revenue collection, and promote more predictable infrastructure financing. These partnerships also align closely with Sustainable Development Goal (SDG) 9, which focuses on building resilient infrastructure and fostering innovation, and SDG 17, which calls for partnerships to support sustainable development. By integrating public accountability with private sector efficiency, PPPs in Zambia not only stimulate infrastructure growth but also contribute to long-term national development goals centred on inclusivity, economic empowerment, and improved social welfare.

2.2.2 The Concept of Infrastructure Development

Infrastructure development refers to the planning, construction, and maintenance of physical and organizational structures that support economic growth and enhance the well-being of communities. These include transportation networks, energy systems, water supply, digital

connectivity, social infrastructure such as schools and healthcare facilities, and other public utilities essential for societal functioning. Recent scholarly work recognizes infrastructure as a catalyst for inclusive economic transformation, particularly in developing regions where inadequate facilities hinder productivity and human development (World Bank, 2019). Modern infrastructure development frameworks emphasize not only physical expansion but also resilience, sustainability, and the capacity to support long-term national development. This shift reflects the growing recognition that well-developed infrastructure improves mobility, reduces business costs, enhances access to essential services, and improves overall quality of life for citizens.

Infrastructure development is increasingly understood through the lens of sustainability and resilience, given the global challenges of climate change, rapid urbanization, and technological disruption. Carbonara and Pellegrino (2018) argue that today's infrastructure systems must go beyond traditional engineering priorities and incorporate environmental safeguards, resource efficiency, and adaptive capacity. The integration of renewable energy systems, digital technologies, and climate-resilient materials exemplifies this evolution in infrastructure thinking. Humanised approaches to infrastructure development acknowledge the lived realities of local communities, emphasizing accessibility, affordability, and social inclusion. For instance, ensuring that rural communities have access to safe roads, electricity, and clean water significantly enhances livelihood opportunities and reduces inequalities. This aligns directly with the principles of sustainable and people-centred development advocated in contemporary public administration and planning studies.

Infrastructure development is also central to the achievement of several Sustainable Development Goals. In particular, SDG 9 (Industry, Innovation and Infrastructure) emphasizes the need for resilient, sustainable, and inclusive infrastructure to drive industrialization and foster innovation. Additionally, infrastructure improvements contribute to SDG 1 (No Poverty) by enabling economic opportunities, SDG 7 (Affordable and Clean Energy) through enhanced energy access, SDG 6 (Clean Water and Sanitation) by expanding water systems, and SDG 11 (Sustainable Cities and Communities) through better urban planning and public service provision. Scholars such as Ameyaw et al. (2020) highlight that the SDG agenda has reshaped how governments and development stakeholders conceptualize infrastructure—not merely as physical assets but as long-term socio-economic investments that promote equity, environmental protection, and national

competitiveness. This multidimensional perspective reinforces the importance of infrastructure as a strategic pillar for sustainable development in countries like Zambia.

In the Zambian context, infrastructure development plays a critical role in economic modernization and regional connectivity. Road infrastructure, in particular, is vital for linking agricultural areas to markets, facilitating domestic and cross-border trade, and enhancing mobility for local communities. Studies by Muleya, Banda and Jeke (2022) reveal that improved road networks in Zambia contribute significantly to job creation, investment attraction, and poverty reduction. However, despite progress, the country continues to face challenges such as limited financing, maintenance backlogs, and institutional capacity constraints. Consequently, the government has increasingly turned to innovative models such as Public-Private Partnerships (PPPs) to bridge infrastructure gaps and accelerate development. As noted by the African Development Bank (AfDB, 2021), PPP-supported infrastructure enhances sustainability when paired with strong governance, community engagement, and transparent oversight. This demonstrates that effective infrastructure development in Zambia is not only a technical undertaking but also a social and governance imperative, requiring cooperation between public institutions, private investors, and local communities.

2.3 Research Gaps

Despite extensive research on Public-Private Partnerships globally, there remains a noticeable gap in studies that link PPP efficiency directly to localized social and economic outcomes. Evidence from the United Kingdom and Canada shows that while PFI and toll road projects are analyzed extensively for cost-effectiveness and operational efficiency, there is limited empirical investigation into how these projects influence the welfare of surrounding communities or equity in service delivery (Grimsey & Lewis, 2004; Yescombe, 2017). This gap highlights the need for context-specific studies that consider not only financial and operational metrics but also socioeconomic impacts.

In Europe, although numerous studies evaluate contract management, risk allocation, and performance monitoring in PPPs, there is a scarcity of longitudinal studies that track project outcomes over multiple decades. Spanish and Italian toll road projects, for example, are often assessed only within the construction or early operational phases, leaving long-term impacts on

maintenance sustainability, traffic safety, and public satisfaction largely unexplored (Roumboutsos & Anagnostopoulos, 2009). This absence of longitudinal evidence presents an important gap that could inform strategies for enhancing the resilience and sustainability of PPP initiatives.

Asian contexts, such as India and Japan, indicate that research often focuses heavily on technical and financial performance of PPPs, with limited attention to governance challenges and institutional capacity building. Studies on urban toll roads in Mumbai and Tokyo demonstrate efficiency gains, yet fail to critically examine how public oversight, regulatory frameworks, and stakeholder interactions influence the outcomes of these projects (Yescombe, 2017). This underscores the importance of integrating institutional and governance dimensions into PPP research to provide a more holistic understanding of performance.

Within Africa, research on PPP infrastructure projects largely concentrates on economic feasibility and investment attraction, with insufficient attention to operational challenges and social acceptability. Nigerian and Kenyan highway projects illustrate that while private investment and toll revenues are frequently analyzed, the implications of community resistance, public awareness, and equity in service provision are under-researched (Marques & Berg, 2011; World Bank, 2018). This gap emphasizes the need for studies that combine financial, technical, and social perspectives to assess the true effectiveness of PPPs in achieving sustainable development outcomes.

In Zambia, empirical research on PPPs remains particularly limited. Most studies, such as those analyzing the Katuba Tollgate and Lusaka–Ndola dual carriageway, focus primarily on financial performance and maintenance efficiency (Banda & Jeke, 2022; Muleya et al., 2019). There is a lack of comprehensive studies evaluating the broader socio-economic effects, including accessibility, traffic safety, revenue equity, and local community satisfaction. This gap suggests that the existing literature does not fully capture the multidimensional impacts of PPPs, leaving policymakers with incomplete information to optimize project design and governance.

Furthermore, existing Zambian studies often neglect comparative analysis with regional counterparts, such as South Africa, Kenya, and Nigeria. While these countries provide valuable lessons on contract management, stakeholder engagement, and technological integration, Zambian research rarely contextualizes its findings against regional benchmarks (Osei-Kyei & Chan, 2015;

World Bank, 2018). The absence of cross-country comparative studies limits the ability to adopt best practices and identify strategies suitable for local contexts.

Finally, there is a notable research gap in integrating policy, financial, operational, and social dimensions into a unified framework for evaluating PPP performance. While global and regional studies examine individual aspects in isolation, Zambia lacks empirical studies that combine these dimensions to assess the overall effectiveness of PPPs. Addressing this gap is critical for projects like Katuba Tollgate, as it would provide a holistic understanding of project outcomes, highlight areas for improvement, and offer evidence-based recommendations for future infrastructure development (Muleya et al., 2019; Banda & Jeke, 2022).

2.4 Theoretical Framework

The theoretical framework guides this study by providing a lens through which the effects of Public-Private Partnerships (PPPs) on infrastructure development are analyzed. It explains how PPP arrangements influence project efficiency, operational performance, and socio-economic outcomes, while linking these dynamics to the study's objectives. Specifically, the framework draws on Transaction Cost Theory to understand efficiency and resource optimization in PPP projects, and Public Choice Theory to examine governance challenges, risk allocation, and institutional behavior. Together, these theories provide a structured approach for analyzing the implementation of the Katuba Tollgate project, identifying challenges, and proposing strategies to enhance performance.

2.4.1 Transaction Cost Theory

Transaction Cost Theory (TCT) was first developed by Ronald Coase in 1937 and later expanded by Oliver Williamson in the 1970s to explain how economic actors organize transactions to minimize costs and maximize efficiency (Coase, 1937; Williamson, 1979). The theory posits that every economic exchange incurs transaction costs, which include search and information costs, bargaining and decision-making costs, and enforcement and monitoring costs. Organizations, including public and private entities, structure their operations to reduce these costs and improve overall efficiency. In the context of infrastructure development, TCT provides a framework to analyze why governments engage private partners in PPP arrangements, as the collaboration can

potentially lower operational, financial, and managerial costs associated with delivering largescale infrastructure projects.

Applying TCT to Public-Private Partnerships, the theory explains that governments enter into contractual arrangements with private firms to outsource certain infrastructure functions, thereby minimizing the internal costs of project management, maintenance, and service delivery (Williamson, 1985). PPPs allow for risk-sharing, technical expertise, and resource mobilization while theoretically reducing inefficiencies linked to public sector bureaucracy and limited capacity. For the Katuba Tollgate project, Transaction Cost Theory can be used to evaluate whether the partnership arrangement effectively reduces costs related to road construction, maintenance, and toll collection, and whether the contractual mechanisms facilitate efficient coordination between the government and private operator.

Empirical studies suggest that applying TCT in PPP infrastructure projects can enhance understanding of both successes and challenges. For instance, inefficiencies or delays often occur when contracts are poorly designed, monitoring is weak, or incentives are misaligned, resulting in higher transaction costs (Ngoma, Mundia, & Kaliba, 2014; Muleya, Zulu, & Nanchengwa, 2019). By using TCT, researchers and policymakers can identify areas where transaction costs are unnecessarily high and implement strategies to improve efficiency, such as strengthening contractual clarity, enhancing oversight, and optimizing risk allocation. In the case of Katuba Tollgate, TCT provides a lens to assess whether the PPP arrangement has achieved its objective of efficient infrastructure delivery while minimizing administrative and operational burdens.

2.4.2 Public Choice Theory

Public Choice Theory was developed in the 1950s and 1960s, with foundational contributions from James Buchanan and Gordon Tullock (1962). The theory applies economic principles to political decision-making, positing that public officials, bureaucrats, and politicians act in their self-interest, just as individuals do in markets, which can influence policy outcomes and public resource allocation. In the context of infrastructure development, Public Choice Theory provides a lens to examine how governmental decisions regarding PPP projects may be shaped by political incentives, bureaucratic interests, or institutional constraints rather than purely efficiency or public welfare considerations (Buchanan & Tullock, 1962).

In PPP arrangements, Public Choice Theory explains the challenges associated with governance, risk allocation, and accountability. Government officials may prioritize short-term political gains, while private partners focus on profitability, potentially leading to misalignment of objectives and operational inefficiencies (Osei-Kyei & Chan, 2015). In Zambia, the Katuba Tollgate project exemplifies this dynamic, as decision-making regarding toll rates, project monitoring, and maintenance schedules may reflect both political and financial considerations. Applying this theory allows for an understanding of how institutional behavior, incentives, and stakeholder interactions influence the effectiveness of PPP projects in delivering infrastructure outcomes.

Moreover, the theory provides insights into strategies for enhancing PPP performance by addressing governance and incentive challenges. Studies indicate that ensuring transparency, stakeholder accountability, and performance-linked contracts can mitigate risks arising from selfinterested behavior of public officials or private actors (Ngoma, Mundia, & Kaliba, 2014). For the Katuba Tollgate, Public Choice Theory helps evaluate whether governance structures and oversight mechanisms are sufficient to align the interests of all parties with the public good, reduce potential inefficiencies, and optimize infrastructure service delivery. By incorporating this theoretical perspective, the study gains a robust analytical lens for assessing operational challenges and informing practical strategies for PPP improvement.

2.5 Conceptual framework

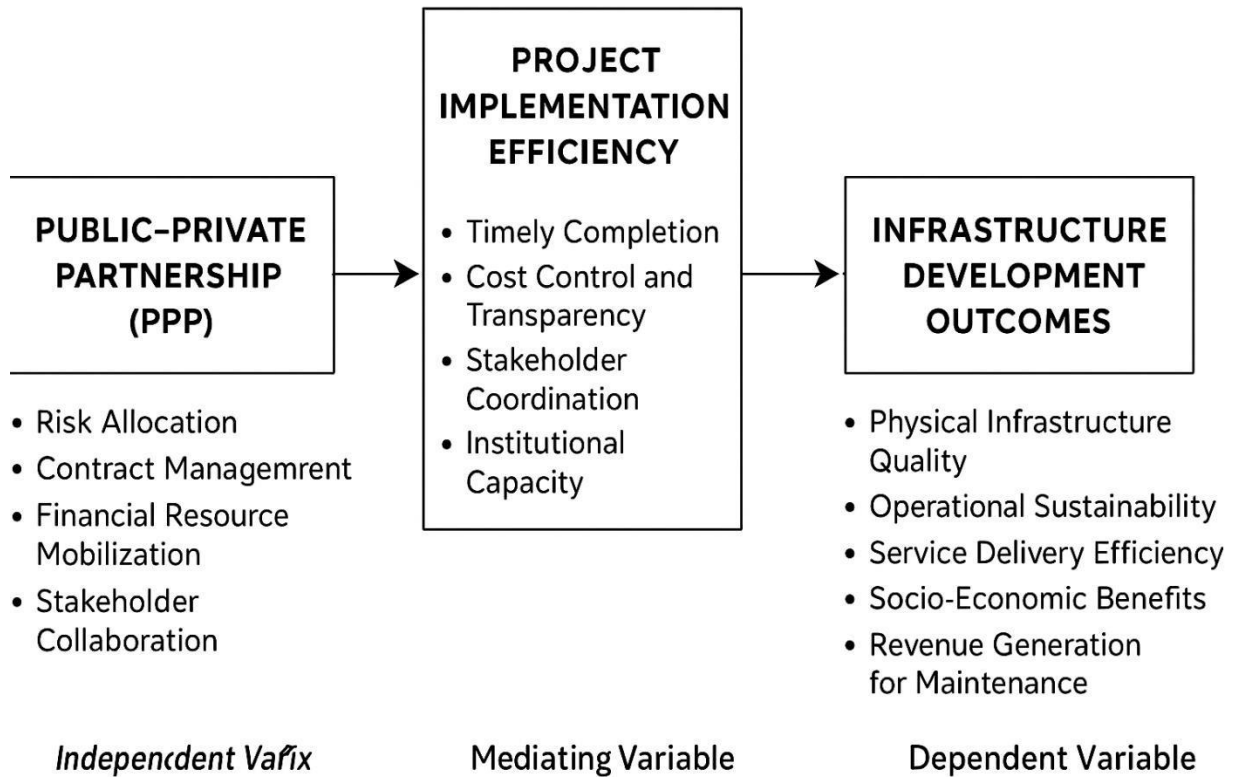


Figure 2.3 Conceptual framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the methodology that guided the study on assessing the effects of Public–Private Partnerships on infrastructure development at the Katuba Tollgate. It outlines the research design, study population, sample size, sampling procedure, data collection methods, research instruments, data analysis techniques, validity and reliability considerations, and the ethical principles adhered to during the study. The choices made in this chapter aim to ensure that the research process was systematic, credible, and appropriate for addressing the study’s objectives.

3.1 Study Area

The study was carried out at the Katuba Tollgate, which is located along the Lusaka–Ndola dual carriageway in Central Province, Zambia. Katuba is situated approximately 45 kilometres north of Lusaka and serves as a major transit point connecting the capital city to the Copperbelt Province. This strategic location makes Katuba an important transportation and economic hub, as it handles high volumes of domestic and commercial traffic moving between southern and northern regions of the country. The tollgate was selected as the study area because it is one of Zambia’s most significant Public–Private Partnership (PPP) projects in the road sector, implemented under the Public-Private Partnership Act No. 14 of 2009.

The Katuba Tollgate is highly relevant to this study because it reflects the practical interaction between government institutions and private actors in managing road infrastructure. Its operations generate substantial revenue for national road maintenance, while also influencing local socio-economic activities such as business opportunities, employment, and transport efficiency. Examining this tollgate therefore provided an opportunity to understand how PPP arrangements operate in practice, how they affect road infrastructure development, and what challenges arise during implementation.

The study area was also appropriate because of its direct impact on surrounding communities. Residents, transporters, and businesses along the Katuba stretch experience the everyday realities of the tollgate’s operations, making them key contributors to understanding the outcomes of the

PPP project. As such, the Katuba Tollgate offered a rich and contextually grounded environment for assessing the effectiveness, efficiency, and challenges of PPP-driven infrastructure development in Zambia.

3.2 Research Design

A research design is the overall plan that guides how a study is conducted, outlining the procedures for collecting, analysing, and interpreting data (Kothari, 2019). It serves as the blueprint that ensures the study is systematic and logically organised. For this research, a qualitative research approach was adopted because the study sought to gain deep insights into the experiences, perceptions, and interpretations of stakeholders involved in the Katuba Tollgate PPP project. Unlike quantitative designs that focus on numerical measurement, the qualitative approach allows the researcher to explore complex social realities in detail.

Within the qualitative approach, the study employed a case study research design. A case study design enables an in-depth examination of a single case within its real-life context, making it suitable for understanding practical situations that may not be captured through broad generalisations (Yin, 2018). The Katuba Tollgate PPP was selected as the single case because it represents a significant infrastructure project whose implementation, challenges, and outcomes could be examined comprehensively. This design made it possible to collect rich and contextual data directly from those involved in or affected by the project.

The case study design was justified because it allowed the researcher to explore the PPP arrangement holistically, capturing operational issues, stakeholder experiences, and institutional dynamics. It also permitted the use of multiple data sources such as interviews and focus group discussions, which enhanced the depth and credibility of the findings. Overall, the case study research design was the most appropriate choice for understanding the complex and multifaceted nature of PPP performance at Katuba Tollgate.

3.3 Study Population

A study population refers to the entire group of individuals or units that possess the characteristics relevant to a particular study and from which the sample is drawn (Saunders et al., 2019). For this

research, the study population consisted of approximately 600 stakeholders who were directly or indirectly involved in, or affected by, the Katuba Tollgate Public–Private Partnership project. This included government officials from institutions such as the Road Development Agency (RDA), the National Road Fund Agency (NRFA), and the Ministry of Infrastructure; representatives from the private concessionaire and contractors; members of the Chibombo District Council; and residents living within the catchment area of the tollgate.

This population was appropriate because these groups hold valuable knowledge and experience regarding the planning, implementation, and outcomes of the PPP project. Government and private-sector officials understand the operational, contractual, and administrative components of the tollgate, while community members experience the day-to-day socio-economic effects of the project. Including such diverse but relevant participants ensured that the research captured multiple perspectives, thereby providing a more holistic and balanced assessment of the PPP's impact. The selection of this population therefore strengthened the study by ensuring that the findings were grounded in rich, comprehensive, and context-specific insights.

3.4 Sampling Method

The study employed a purposive sampling method, which is a non-probability sampling technique used to deliberately select participants who possess specific knowledge, experience, or characteristics relevant to the research problem (Etikan, Musa & Alkassim, 2016). This approach was suitable for the study because the aim was to gather detailed insights from individuals who were directly involved in, or affected by, the Katuba Tollgate PPP project. By intentionally selecting participants from government agencies, private concessionaires, and the surrounding community, the researcher ensured that the data collected would be rich, credible, and aligned with the study objectives.

Purposive sampling was particularly effective in this context because PPP projects involve technical, administrative, and socio-economic dimensions that can only be fully understood by stakeholders with firsthand experience. The method therefore allowed the study to include key informants such as RDA and NRFA officials, local council representatives, technical experts, and community members who interact with the tollgate on a regular basis. Their perspectives were essential for assessing project implementation, operational challenges, and the developmental outcomes associated with the PPP arrangement.

In addition, snowball sampling was used to complement purposive sampling. This technique involved asking initial participants to refer other knowledgeable individuals who could contribute valuable insights. Snowball sampling was particularly useful for reaching senior officials and technical experts who were not easily accessible due to their busy schedules or organisational protocols. Together, purposive and snowball sampling enhanced the depth and diversity of the data collected, strengthening the overall validity of the research.

3.5 Sample Size

A sample size of 60 participants was selected for this study, representing approximately 10 percent of the total estimated population of 600 individuals involved in or affected by the Katuba Tollgate PPP project. This proportion was deemed sufficient for qualitative inquiry because it allowed the researcher to gather rich and meaningful data while ensuring that the sample remained manageable for in-depth interviews and focus group discussions. According to Guest, Namey and Chen (2020), qualitative studies often reach saturation with smaller, well-focused samples, especially when participants are knowledgeable about the topic under investigation.

The sample was purposively distributed across the key stakeholder groups to ensure that perspectives from all major actors in the PPP project were captured. Out of the 60 participants, 20 were government officials drawn from the Road Development Agency (RDA), the National Road Fund Agency (NRFA), and the Ministry of Infrastructure; these individuals provided insights into the planning, contractual frameworks, and operational oversight of the tollgate. The sample also included 15 participants from the private concessionaire and associated contractors, who offered detailed technical and managerial viewpoints regarding PPP implementation. Furthermore, 10 officials from the Chibombo District Council were selected to reflect the local administrative perspective, particularly in relation to community engagement and local development outcomes. Lastly, 15 residents from communities surrounding the Katuba area were included to capture the socio-economic and daily lived experiences of those directly affected by the tollgate's operations.

Purposive sampling was used to select participants who possessed direct experience with, or substantial knowledge of, the PPP project. This was complemented by snowball sampling to reach additional technical experts and community members who may not have been easily accessible through formal channels. This distribution strategy ensured that the sample reflected a broad yet

relevant spectrum of experiences and views, thereby strengthening the depth, reliability, and contextual richness of the study's findings.

3.6 Types of Data

This study utilised both primary and secondary data to obtain a comprehensive and well-rounded understanding of the effects of Public–Private Partnerships on infrastructure development at the Katuba Tollgate. Using multiple data types strengthened the credibility of the research through triangulation, where information from different sources is compared and validated (Creswell & Plano Clark, 2017). Primary data provided firsthand insights from individuals with direct experience of the PPP project, while secondary data offered additional context and supported interpretation of the findings.

3.6.1 Primary Data

Primary data were collected directly from participants who were involved in or affected by the Katuba Tollgate PPP. These included government officials, private contractors, council representatives, and community members. The data were gathered through semi-structured interviews and focus group discussions, which allowed participants to freely express their perspectives, experiences, and concerns. This type of data was crucial because it reflected real-life experiences and offered detailed insights that could not be obtained from documents alone.

3.6.2 Secondary Data

Secondary data were obtained from existing sources such as government reports, institutional publications from RDA, NRFA, and the Ministry of Infrastructure, PPP policy documents, academic articles, and relevant literature on PPPs. These sources provided background information, historical trends, and theoretical perspectives that helped contextualize the findings from the primary data. Secondary data also supported the verification and interpretation of emerging themes related to PPP implementation, effectiveness, and challenges within Zambia's infrastructure sector.

3.7 Data Collection Method

Data for this study were collected using semi-structured interviews and focus group discussions, both of which are well-suited to qualitative research because they allow participants to express their experiences and viewpoints in detail. These methods enabled the researcher to explore the

perspectives of different stakeholder groups involved in the Katuba Tollgate PPP project, while also offering flexibility to probe deeper into issues that emerged during the discussions. Collecting data directly from individuals with firsthand knowledge of the PPP provided rich, context-specific information essential for addressing the research objectives.

3.7.1 Interview Guide

A semi-structured interview guide was developed to ensure consistency across interviews while allowing space for participants to elaborate on their responses. The guide included open-ended questions focusing on the planning, implementation, operational performance, and perceived outcomes of the Katuba Tollgate PPP project. Questions were aligned with the study objectives to ensure the data collected directly addressed the research problem. Interviews were conducted face-to-face with government officials, private concessionaire representatives, and council officers to facilitate rapport and enable the researcher to capture nuanced insights.

In addition to interviews, focus group discussions were conducted with community members living around Katuba. These discussions provided collective perspectives on how the PPP project affected livelihoods, mobility, and local economic activities. Focus groups also allowed participants to build on one another's ideas, thereby enriching the data. The use of both interviews and focus group discussions strengthened the study through triangulation, enhancing the credibility and depth of the findings.

3.8 Data Analysis

The study employed thematic analysis to analyse the qualitative data collected from interviews and focus group discussions. Thematic analysis is a systematic method used to identify, organise, and interpret patterns of meaning (themes) within qualitative data (Braun & Clarke, 2019). This approach was appropriate because it enabled the researcher to examine the complex perceptions, experiences, and insights shared by stakeholders involved in the Katuba Tollgate PPP project. The method also allowed for flexibility in analysing both explicit statements and underlying meanings within participants' narratives.

The analysis process began with the transcription of audio-recorded interviews and focus group discussions, followed by repeated reading of the transcripts to familiarise the researcher with the data. Initial codes were then generated to capture significant ideas, after which the codes were

grouped into broader themes that reflected recurring issues related to PPP implementation, operational challenges, and developmental outcomes. Themes were refined, reviewed, and interpreted in relation to the study objectives and existing literature. This systematic process ensured that the findings were grounded in the data while also allowing for meaningful comparison with established knowledge on PPPs in infrastructure development.

3.9 Validity and Reliability

Validity and reliability are essential components of qualitative research because they ensure that the study's findings are credible, trustworthy, and accurately reflect the realities being investigated. Validity refers to the extent to which a research instrument measures what it is intended to measure and whether the findings truthfully represent participants' experiences (Cohen, Manion & Morrison, 2018). In this study, validity was enhanced through several strategies. First, the interview guide was reviewed by academic supervisors and experts familiar with Public-Private Partnerships to ensure that the questions were aligned with the research objectives. Second, data triangulation was achieved by collecting information from multiple stakeholder groups government officials, private concessionaire representatives, council officers, and community members which strengthened the accuracy and consistency of the findings. Additionally, the use of both interviews and focus group discussions allowed the researcher to cross-check emerging themes across different data sources.

Reliability, on the other hand, refers to the consistency and dependability of the research findings specifically, whether similar results would be obtained if the study were repeated under the same conditions (Kothari, 2019). To ensure reliability, the researcher used the same interview guide for all participants to maintain uniformity in the data collection process. Interviews and focus group discussions were audio-recorded, with detailed notes taken to capture non-verbal cues and contextual information. This documentation created an audit trail that made the analysis replicable and transparent. Furthermore, careful transcription of recordings helped preserve the accuracy of participants' responses, reducing the likelihood of researcher bias influencing the interpretation of data.

3.10 Ethical Considerations

This study was conducted in accordance with established research ethics principles to ensure the integrity of the research process and the protection of participants. Research ethics refer to the moral standards and professional guidelines that govern how research involving human participants is designed, conducted, and reported (Israel & Hay, 2020). Ethical compliance was critical for this study because it involved direct interaction with individuals and institutions who shared their experiences and opinions about the Katuba Tollgate PPP project.

Before commencing fieldwork, ethical clearance was obtained from the relevant institutional review board. Participants were fully informed about the purpose, procedures, and significance of the study before any data were collected. Informed consent was obtained from all participants, ensuring that their participation was voluntary and that they could withdraw at any stage without any consequence. Confidentiality and anonymity were strictly maintained by omitting names or any identifying details from transcripts and the final report. The researcher also ensured that all data collected were securely stored and used solely for academic purposes.

Furthermore, the study adhered to principles of respect, integrity, and transparency throughout the research process. Participants' views were accurately represented without distortion or bias, and their dignity was upheld during interviews and discussions. These ethical safeguards ensured that the research process was credible, responsible, and respectful of all individuals involved in the Katuba Tollgate PPP project.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents, analyses, and discusses the findings of the study conducted on the effects of Public–Private Partnerships (PPPs) on infrastructure development at the Katuba Tollgate. The purpose of the chapter is to report what was discovered during data collection and to interpret these findings in relation to the study’s objectives and existing literature. The study was guided by three specific objectives: (i) to assess the efficiency of the Katuba Tollgate PPP project, (ii) to identify the challenges encountered during its implementation, and (iii) to determine strategies for enhancing the performance of future PPP infrastructure projects in Zambia.

The chapter is organised into three major sections. The first section (4.1) presents the demographic characteristics of respondents, which helps provide context for understanding the perspectives shared during interviews and focus group discussions. The second section (4.2) presents and analyses the findings according to emerging themes aligned with the research objectives. The final section offers a discussion of the findings, linking the results to existing literature and the theoretical framework that guided the study.

4.1 Demographic Characteristics of Respondents

Understanding the demographic characteristics of respondents is essential because it provides context for interpreting the perspectives shared during interviews and focus group discussions. Factors such as age, gender, educational background, occupation, and work experience influence how individuals perceive and engage with Public–Private Partnership (PPP) projects such as the Katuba Tollgate. Presenting this information helps clarify the diversity of respondents and strengthens the credibility of the findings by showing that views were drawn from a broad and relevant range of stakeholders.

4.1.1 Age of Respondents

The study sought to establish the age distribution of the 60 respondents to understand how different age groups engage with and perceive the Katuba Tollgate PPP project. Age is an important demographic variable because it influences respondents' experiences with road usage, institutional processes, and economic activities linked to tollgate operations.

Table 1: Age of respondents

Age Category	Frequency	Percentage (%)
18–25 years	6	10.0
26–35 years	20	33.3
36–45 years	18	30.0
46–55 years	10	16.7
56 years and above	6	10.0
Total	60	100%

Source: Field Data (2025)

The age distribution shows that respondents were drawn from a wide range of age groups, indicating a diverse and representative sample. Younger adults (18–25 years) and older respondents (56+) each accounted for 10 percent of the sample, showing that both less experienced and more seasoned road users were included. The largest proportion of respondents (33.3 percent) fell between the ages of 26 and 45, representing individuals who are typically more active in employment, business activities, and daily travel. This diversity is important because it ensures that the findings reflect perspectives from both frequent road users and those with long-term experiences in infrastructure and transport systems.

4.1.2 Gender of Respondents

Gender distribution was analysed to understand whether both male and female perspectives were adequately represented in the study, as experiences with tollgate operations and infrastructure usage can differ across gender groups

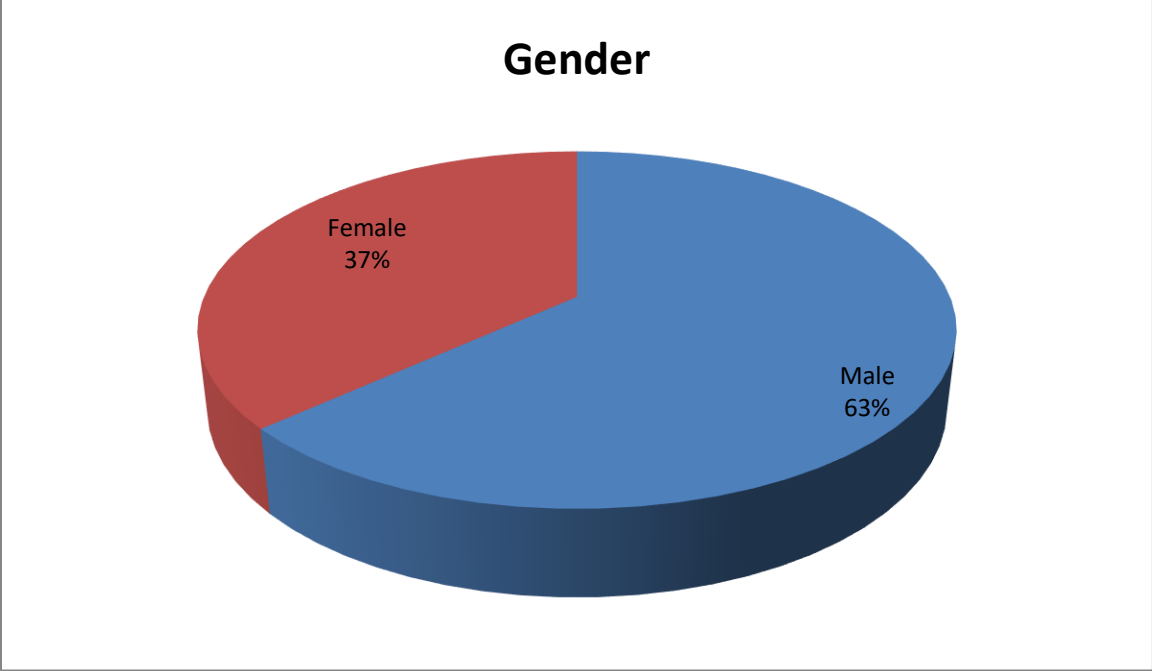


Figure 1: Gender of respondents

Source: Field Data (2025)

The findings show that males constituted a larger proportion of the respondents at 63.3 percent, while females accounted for 36.7 percent. This distribution is expected, as men tend to be more represented in transport-related occupations and road-based economic activities around tollgates. Nevertheless, the inclusion of both genders ensures that the study captures a range of user experiences, providing a balanced understanding of perceptions toward the Katuba Tollgate PPP project.

4.1.3 Educational Level of Respondents

Understanding the educational background of respondents helps to contextualise the quality and depth of the insights they provided, as individuals with different levels of education may interpret PPP operations, infrastructure development, and service delivery differently.

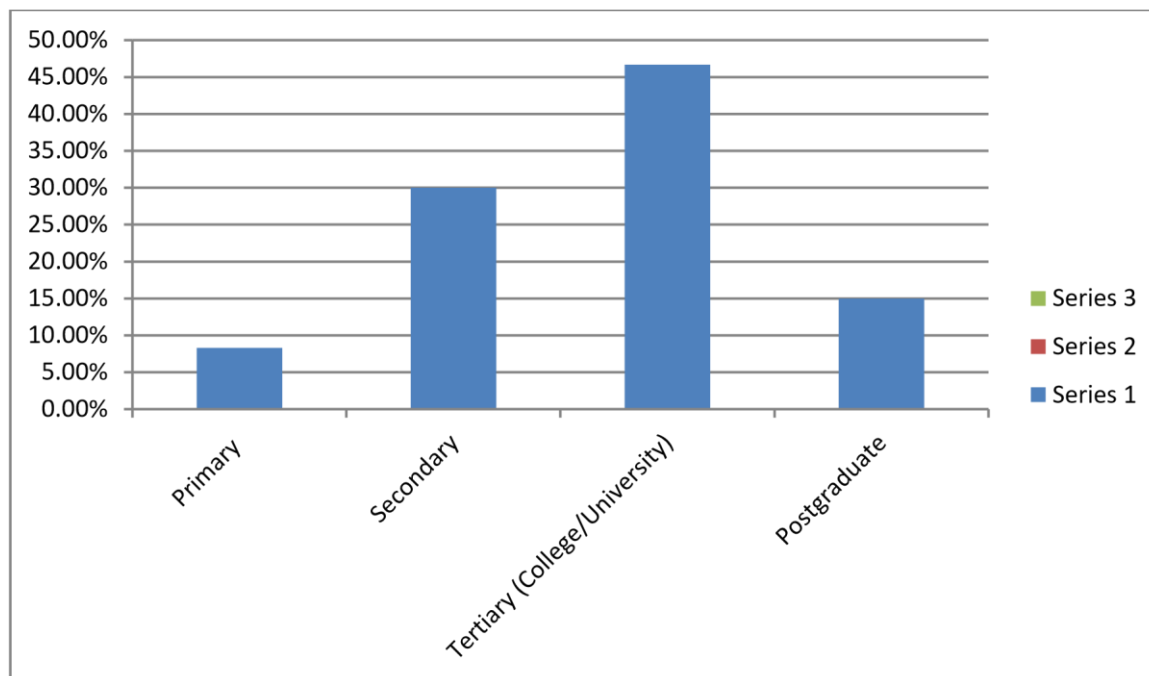


Figure 2: Educational level of respondents

Source: Field Data (2025)

The results show that respondents possessed a wide range of educational backgrounds, with the majority (61.7%) having tertiary or postgraduate qualifications. This suggests that most participants had a relatively strong understanding of governance structures, economic activities, and service delivery processes associated with PPP projects. Secondary-educated respondents (30%) and those with primary education (8.3%) also contributed valuable experiences, particularly as road users and community members who interact with the tollgate on a practical, day-to-day basis. The diverse educational spread strengthens the reliability of the findings by incorporating perspectives from individuals with varying levels of technical and civic knowledge.

4.1.4 Occupation of Respondents

Occupation was included as a demographic variable because the nature of one’s work often determines the frequency of road usage, level of engagement with tollgate services, and the respondent’s exposure to infrastructure performance under PPP arrangements.

Table 2: Occupational level of respondents

Occupation Category	Frequency	Percentage (%)
Civil Servants	12	20.0
Private Sector Employees	15	25.0
Business Owners/Entrepreneurs	14	23.3
Transport Operators (e.g., drivers)	10	16.7
Community Members/Unemployed	9	15.0
Total	60	100

Source: Field Data (2025)

The findings reveal a diverse occupational composition, with respondents drawn from both formal and informal sectors. Private sector employees (25%) and business owners (23.3%) formed the largest groups, reflecting individuals who rely heavily on road infrastructure for daily economic activities. Civil servants (20%) and transport operators (16.7%) also contributed significantly, offering insights related to administrative, regulatory, and operational dimensions of the tollgate’s functioning. The presence of community members and unemployed respondents (15%) ensures that everyday road users with non-economic motivations are also represented. This diversity enhances the richness of the findings by capturing varied experiences with the Katuba Tollgate PPP project.

4.2. Assessing the Efficiency of the Katuba Tollgate PPP Project

The first objective of the study aimed to assess the operational efficiency of the Katuba Tollgate under the Public–Private Partnership arrangement. Respondents were asked to evaluate service quality, speed of toll collection, and satisfaction with operational performance. Their responses were categorised into three major sub-themes which reflect the primary indicators of efficiency. Each sub-theme is presented with its own rating table, analysis, and direct quotations from participants.

4.2.1 Quality and Reliability of Tollgate Services

Table 3: Quality and reliability of tollgates

Rating	Frequency	Percentage (%)
Very Good	14	23.3
Good	21	35.0
Rating	Frequency	Percentage (%)
Fair	17	28.3
Poor	8	13.3
Total	60	100

Source: Field Data (2025)

The findings indicate that most respondents rated the quality and reliability of services at the Katuba Tollgate as either **Very Good** or **Good**, suggesting a generally positive perception of the operational standards under the PPP arrangement. Participants highlighted well-maintained infrastructure, orderly lanes, and the visible presence of staff as key indicators of reliability. Several respondents mentioned that the tollgate “runs better than before” and that private sector involvement appears to have introduced greater discipline in maintenance schedules. Respondent One noted, *“You can see the difference; the place is clean, the lights work, and they don’t allow the booths to look abandoned like before.”* Despite this, a number of respondents still felt that the reliability of service fluctuates depending on time of day or traffic volume. These respondents argued that while the infrastructure is maintained, the human resource capacity does not always match the workload, especially during peak hours.

Other participants described the quality as only **Fair**, emphasising that although improvements are visible, some inconsistencies persist. For example, they reported occasional delays when staff rotate shifts or when payment booths are temporarily closed without explanation. Respondent Four stated, *“Sometimes it’s smooth, but there are days when you find only two booths working and the queue becomes long.”* This illustrates that while the PPP arrangement has contributed positive changes, the experience is not uniform for all road users. Interestingly, a small proportion rated the service quality as **Poor**, pointing to issues such as inadequate communication, limited signage, and inconsistent customer engagement. Respondent Eight remarked, *“The service is okay on good days*

but poor on others. They need to work on communication so people know what to expect.” This varied feedback demonstrates that although the tollgate’s infrastructure and services generally reflect improved standards, there remain operational gaps that hinder complete satisfaction.

Overall, Sub-theme One shows that the Katuba Tollgate is perceived as offering moderately high-quality services, with most respondents acknowledging improvements under the PPP model. However, inconsistencies in staffing and booth management remain a challenge that affects the reliability of user experiences.

4.2.2.Speed, Cost-Effectiveness, and Flow of Traffic

Table 4: Speed,Cost-effectiveness,and flow of traffic

Rating	Frequency	Percentage (%)
Very Good	12	20.0
Good	22	36.7
Fair	18	30.0
Poor	8	13.3
Total	60	100

Source: Field Data (2025)

The results show that respondents had mixed experiences regarding the speed and flow of traffic at the Katuba Tollgate. A combined 56.7 percent rated the speed as Very Good or Good, indicating that more than half of respondents believe the toll collection system generally operates efficiently. Many participants mentioned that payment processing is typically quick, with staff demonstrating competence and the electronic systems functioning reliably. Respondent Nine explained, “*Most of the time you just stop, pay, and go within a minute. It’s faster now than it used to be.*” This suggests that improvements in operational procedures have positively impacted traffic movement, preventing prolonged queues during normal traffic hours. Additionally, some respondents highlighted that dedicated lanes for different vehicle categories helped reduce confusion and maintain a smoother flow of vehicles.

Despite the positive feedback, 43.3 percent of respondents rated traffic speed as Fair or Poor, indicating significant concerns among almost half of the sample. These respondents argued that the efficiency experienced during off-peak hours does not extend to busier periods, such as weekends, holidays, and early mornings. Respondent Twelve stated, *“When it’s busy or during holidays, the traffic becomes frustrating. Sometimes only two booths are open, and that slows everything down.”* Others pointed out that the cost-effectiveness of the PPP arrangement becomes questionable during such delays, especially for transport operators who pass through the tollgate daily. Respondent Fourteen added, *“If we pay every day, then the flow should always be fast. Otherwise, the cost doesn’t match the service.”* These perspectives highlight the perception that PPP-driven efficiency must be consistent, not situational, if it is to be considered truly effective by the public.

Sub-theme Two demonstrates that while the Katuba Tollgate generally maintains a reasonable flow of traffic under the PPP arrangement, inconsistencies during high-traffic periods undermine perceptions of efficiency. Respondents value quick transactions but are dissatisfied when lane management and staffing fail to meet demand, especially when toll fees remain constant.

4.2.3 Stakeholder Satisfaction and Perceived Value of the PPP Arrangement

Table 5: Stakeholder Satisfaction and perceived value of PPP

Rating	Frequency	Percentage (%)
Very Satisfied	10	16.7
Satisfied	22	36.7
Neutral	15	25.0
Dissatisfied	13	21.6
Total	60	100

Source: Field Data (2025)

The results indicate that slightly more than half of the respondents (53.4 percent) were either **Very Satisfied** or **Satisfied** with the PPP arrangement at the Katuba Tollgate. Participants in these categories generally appreciated improvements in security, infrastructure upkeep, and the overall

organisation of tollgate operations. Many respondents expressed that the tollgate environment is cleaner, safer, and more predictable under the PPP system compared to previous years. Respondent Sixteen noted, *“At least I feel like the money is going to something. The place looks maintained, and the service is organised.”* These participants often viewed the PPP model as bringing professionalism, accountability, and modern operational practices that were previously lacking. Additionally, several respondents pointed out that the private partner appears more responsive in addressing breakdowns and keeping technology functional, which enhances their sense of value and satisfaction.

However, a combined 46.6 percent of respondents positioned themselves as **Neutral** or **Dissatisfied**, revealing that many still question the true value of the PPP arrangement. Those who were neutral expressed uncertainty over whether the toll fees they pay justify the level of service received. Respondent Twenty mentioned, *“I can't say I'm fully satisfied. Some days it's okay, other days you wonder why you are paying.”* Dissatisfied respondents raised concerns about transparency, pointing out that the public is rarely informed about how collected toll revenues are used or whether the PPP partner meets its performance obligations. Others felt that efficiency drops too frequently during busy periods for the PPP model to be considered successful. Respondent Twenty-Three remarked, *“They say PPP is better, but we still face delays, and no one explains anything. We want to see the benefits clearly.”* These sentiments highlight the significant role that communication, consistency, and public trust play in shaping perceptions of PPP value.

Overall, Sub-theme Three shows that while many stakeholders acknowledge improvements introduced by the PPP arrangement, nearly half of the respondents remain unconvinced of its full value. Satisfaction is strongly tied to transparency, communication, and operational consistency, suggesting the need for clearer public engagement and sustained service delivery improvements.

4.3 Challenges Encountered in the Implementation of the Katuba Tollgate PPP Project

This section presents the findings related to the second objective, which sought to identify the key challenges experienced during the implementation of the Katuba Tollgate under the PPP model. Respondents shared various operational, financial, and institutional difficulties that affect the overall performance of the tollgate system. The challenges were grouped into three major sub-themes based on the patterns that emerged from the responses. Each sub-theme is presented with

a detailed rating table, followed by an in-depth analysis supported by direct quotations from participants. The aim is to capture a comprehensive understanding of the constraints that undermine the effectiveness of the PPP arrangement.

4.3.1 Operational Challenges on the Ground

Table 6: Occupational challenges on the ground

Operational Challenge Identified	Frequency	Percentage (%)
Long queues during peak hours	42	70.0
Limited number of active toll booths	38	63.3
System downtime causing delays	35	58.3
Staffing shortages during busy periods	33	55.0
Slow booth changeover / shift delays	30	50.0
Poor lane coordination (mixing trucks and small cars)	28	46.7
Delayed response to equipment malfunction	25	41.7
Total Respondents = 60		

Source: Field Data (2025)

The findings indicate that operational challenges at the Katuba Tollgate are widespread and significantly affect user experience. The most frequently reported issue was long queues during peak hours, cited by 70 percent of respondents. Participants explained that queues often extend several hundred metres during mornings and weekends, largely because only a limited number of booths are opened, even when the tollgate infrastructure has the capacity for more simultaneous processing. This aligns with the second most reported challenge (63.3 percent), where respondents highlighted that booth utilisation does not match traffic demand. Respondent One stated, *“During busy times, we find only two or three booths working. That’s why the lines are so long.”* Another prominent challenge was system downtime, affecting 58.3 percent of users. When the system freezes or goes offline, all vehicles are forced to wait until transactions can resume. Respondent Three explained, *“When the network goes down, everything just stops. You can be stuck for 15 minutes.”* These findings reveal that service reliability is frequently compromised by technical and administrative shortcomings.

Staffing challenges and procedural delays also featured prominently among respondents. Over half (55 percent) reported that staffing shortages contributed to inefficiencies, particularly during morning peak periods when traffic is highest. Respondents also cited slow shift changes, with 50 percent indicating that booth closures during staff rotations caused unnecessary backlog. Respondent Seven remarked, *“Traffic builds up fast because they close the booth when changing shifts. It takes too long.”* Additionally, poor lane coordination was reported by 46.7 percent of participants, especially when heavy trucks are forced into smaller-vehicle lanes, slowing overall flow. Finally, delayed response to equipment breakdowns was mentioned by 41.7 percent, highlighting maintenance issues under the PPP arrangement. Respondent Nine shared, *“When a scanner or barrier fails, it takes too long before someone fixes it.”* These operational realities demonstrate that although the PPP model has brought some improvements, significant inefficiencies remain on the ground.

Overall, the operational challenges at the Katuba Tollgate are practical, frequent, and highly visible, including long queues, inadequate booth utilisation, system breakdowns, staffing gaps, slow shift procedures, lane mismanagement, and slow maintenance response. These issues significantly reduce the intended efficiency of the PPP arrangement.

4.3.2 Financial and Cost-Related Challenges

Table 7: Finance and Cost Related Challenges

Financial Challenge Identified	Frequency	Percentage (%)
High toll fees for frequent users (e.g., transport operators)	40	66.7
Perception that toll fees do not match quality of service	37	61.7
Limited transparency on revenue utilization	35	58.3
High operational costs under PPP arrangement	32	53.3
Delays in allocation of funds for maintenance	30	50.0
Disputes over PPP revenue-sharing between stakeholders	22	36.7
Lack of financial incentives or discounts for frequent users	20	33.3
Total Respondents = 60		

Source: Field Data (2025)

The findings reveal that financial challenges are among the most sensitive issues surrounding the PPP arrangement at the Katuba Tollgate. A significant proportion of respondents (66.7 percent)

indicated that toll fees are too high, especially for frequent road users such as bus and truck drivers, delivery companies, and traders who pass through the tollgate daily. Many reported that the accumulated daily or weekly toll payments significantly reduce their profits. Respondent Twelve shared, *“For us who pass here every day, the charges are too high. You end up spending a lot just on tolls.”* Closely related to this, 61.7 percent of participants expressed the belief that the fees do not match the quality or consistency of the services provided, particularly when delays and system downtimes still occur. Respondent Fourteen commented, *“If we are paying these fees, we expect the service to be smooth all the time, not only sometimes.”* These findings highlight a strong public concern about value for money under the PPP model.

Another major challenge was the lack of transparency in revenue utilisation, reported by 58.3 percent of respondents. Many participants stated that they are unsure how toll revenues collected at Katuba are used, and whether they contribute directly to improving local infrastructure. Respondent Eighteen noted, *“We don’t see clear reports showing how the money is used. They just collect, and we guess the rest.”* This lack of clarity undermines public trust and creates suspicion about the accountability of PPP stakeholders. Additionally, 53.3 percent of respondents cited high operational costs under the PPP arrangement as a challenge, noting that more money seems to go into running the tollgate than into visible improvements. Delays in funding for equipment repair or lane expansion, reported by 50 percent of respondents, further indicate that financial management systems may not be aligned with efficient service delivery. Finally, 36.7 percent pointed out revenue-sharing disputes between the PPP operator and government agencies, as well as the absence of financial incentives or discounts for frequent users. Respondent Twenty-Two remarked, *“They should consider monthly passes or discounts for people who pass often. Other countries do that.”* These financial issues weaken public confidence and undermine the perceived fairness of the PPP system.

Financial challenges at the Katuba Tollgate are driven by concerns about high fees, unclear revenue utilisation, lack of financial incentives, and perceived mismatch between toll charges and the quality of service provided. These concerns highlight gaps in PPP financial management, transparency, and public engagement.

4.3.3 Institutional, Legal, and Coordination Challenges

Table 8: Institutional, legal and coordination challenges

Institutional Challenge Identified	Frequency	Percentage (%)
Weak monitoring and oversight by government agencies	39	65.0
Poor communication between PPP stakeholders (NRFA, RDA, operator)	36	60.0
Lack of clarity on roles and responsibilities within PPP arrangement	33	55.0
Institutional Challenge Identified	Frequency	Percentage (%)
Slow enforcement of Service-Level Agreements (SLAs)	30	50.0
Limited public awareness about PPP operations and benefits	29	48.3
Bureaucratic delays in decision-making and approvals	27	45.0
Inadequate legal framework to guide long-term PPP management	24	40.0
Total Respondents = 60		

Source: Field Data (2025)

The findings show that **institutional weaknesses are among the most serious challenges affecting the efficiency and sustainability of the Katuba Tollgate PPP project**. A total of 65 percent of respondents indicated that **weak monitoring and oversight by government agencies** such as the National Road Fund Agency (NRFA) and Road Development Agency (RDA) prevents the tollgate from operating at its full potential. Several participants stated that government inspectors rarely conduct routine monitoring, allowing performance gaps to persist. Respondent One remarked, *“You only see inspectors once in a while. If they monitored closely, some problems would be solved faster.”* Another major challenge identified (60 percent) was **poor communication and coordination between PPP partners**. Respondents explained that when operational issues arise, responsibility shifts between the private operator and government bodies, resulting in delays. Respondent Seven explained, *“When there is a problem, the private people blame government, and government blames them. Meanwhile we are the ones suffering in the queues.”* These structural disconnects weaken the PPP’s ability to function as a unified system.

Furthermore, more than half of respondents (55 percent) indicated that there is **a lack of clarity on roles and responsibilities**, which complicates accountability when performance issues occur. This is closely related to the 50 percent who reported **slow enforcement of Service-Level**

Agreements (SLAs). Many respondents felt that even when the PPP contract outlines specific obligations, they are not enforced quickly enough. Respondent Twelve stated, *“If the contract says they must open more booths or act fast when the system goes down, it should be enforced. But it’s not.”* Another major challenge is **limited public awareness about PPP operations**, reported by 48.3 percent of respondents. Participants said they do not understand how PPPs work, how toll revenues are distributed, or what improvements are planned. Respondent Fifteen shared, *“People don’t know what PPP really means here. They just see a toll and pay.”* Finally, 45 percent cited **bureaucratic delays**, especially when approvals for maintenance, hiring, or system upgrades require multiple layers of clearance. These delays undermine the expected flexibility of PPPs and slow down improvements that could enhance service delivery.

Institutional and coordination challenges at the Katuba Tollgate arise from weak government oversight, poor communication between stakeholders, unclear responsibilities, and slow enforcement of contractual obligations. These structural issues reduce accountability and hinder the PPP’s ability to provide efficient and reliable services.

4.4 Strategies for Enhancing the Performance of PPP Projects at the Katuba Tollgate

This section presents findings related to the third research objective, which sought to identify practical strategies that can improve the efficiency, accountability, and overall performance of the Katuba Tollgate PPP arrangement. Respondents proposed several measures grounded in their day-to-day experiences with the tollgate, highlighting the improvements they believe would enhance service delivery. Their responses were grouped into three major sub-themes: operational efficiency strategies, financial transparency and user-support measures, and institutional coordination and contract enforcement strategies. Each sub-theme includes a table outlining the specific strategies suggested by respondents, followed by an in-depth analysis supported by direct quotations.

4.4.1 Strategies to Improve Operational Efficiency and Human Resource Management

Table 9: Strategies to improve operational efficiency and human resource management

Suggested Operational Strategy	Frequency	Percentage (%)
Increase number of active toll booths during peak hours	45	75.0
Improve staffing levels and shift coordination	40	66.7
Introduce faster response to system downtime	38	63.3

Provide regular technical maintenance and upgrades	35	58.3
Create separate lanes for trucks and small vehicles	33	55.0
Deploy supervisors to manage peak-hour operations	28	46.7
Total Respondents = 60		

Source: Field Data (2025)

Respondents recommended several strategies aimed at enhancing operational efficiency at the Katuba Tollgate. The most frequently cited suggestion (75 percent) was the need to **increase the number of active toll booths during peak hours**. Participants argued that long queues could be significantly reduced if all available booths were utilised consistently, especially in the mornings and during weekends. Respondent One stated, *“They have enough booths, but most of the time only two or three operate. If they opened more, queues would be shorter.”* Additionally, 66.7 percent of respondents emphasised improving **staffing levels and shift coordination**, noting that delays often occur during staff rotations. Many believed that having shift supervisors on-site would help ensure seamless booth transitions and reduce downtime. Respondent Five explained, *“Shift changes are a big problem; we need better planning so the booths don’t stay closed.”*

Another strategy, cited by 63.3 percent of respondents, focused on **faster response to system downtime**. Participants highlighted the need for dedicated technical personnel onsite to address breakdowns quickly and prevent long waiting times. Respondent Nine noted, *“When the system goes down, we wait too long. They need technicians ready to fix issues immediately.”* This was closely linked to the 58.3 percent who recommended **regular technical maintenance and system upgrades**, arguing that both hardware and software should be updated frequently to prevent recurrent failures. Furthermore, 55 percent of respondents suggested better **lane separation between trucks and small vehicles**, which they believed would ease congestion and improve the flow of traffic. Respondent Twelve remarked, *“Big trucks should not be mixed with small cars. Separate lanes would speed things up for everyone.”* Together, these strategies highlight the practical steps road users believe would greatly improve tollgate operations under the PPP arrangement.

Respondents proposed actionable operational strategies centered on booth utilisation, staffing, maintenance, and traffic lane management. Implementing these measures would likely reduce congestion, minimise downtime, and enhance overall service efficiency at the Katuba Tollgate.

4.4.2 Strategies to Strengthen Financial Transparency and User Support

Table 10: Suggested financial management and user management skills

Suggested Financial Strategy	Frequency	Percentage (%)
Increase transparency on how toll revenues are used	42	70.0
Introduce discounts or monthly passes for frequent users	38	63.3
Provide periodic public reports on PPP fund allocation	35	58.3
Ensure quicker allocation of funds for maintenance	32	53.3
Improve accountability between PPP partners	30	50.0
Total Respondents = 60		

Source: Field Data (2025)

Financial transparency emerged as one of the strongest recommendations from respondents, with 70 percent calling for more clarity in how **toll revenues are used**. Many participants expressed concern that the public is left in the dark regarding revenue distribution and how toll collections translate into road improvements. Respondent Eighteen remarked, *“We pay every day, but we don’t know where the money goes. They should show us how it is used.”* Similarly, 58.3 percent of respondents advocated for **public reports on PPP fund allocation**, suggesting that periodic updates would build trust and demonstrate the value of toll payments. Respondent Twenty-Two added, *“If they showed us reports, people would appreciate the system more.”* These perspectives reveal a strong desire for openness and accountability within the PPP framework.

Another major strategy, suggested by 63.3 percent of respondents, was the introduction of **discounts or monthly passes for frequent users**. Participants explained that transport operators and traders bear high toll expenses because they use the road daily. Respondent Twelve said, *“There should be a monthly pass for people who pass through often. It is done in other countries; it can be done here too.”* Furthermore, more than half of the respondents (53.3 percent) believed that **faster allocation of maintenance funds** would improve the tollgate’s performance, as delayed repair work often contributes to congestion and system failures. A final recommendation was enhancing **accountability between PPP partners**, with 50 percent arguing that both government and the private operator should be held to their contractual obligations. Respondent Twenty-Seven explained, *“If both sides were accountable, we wouldn’t have delays in fixing things or opening*

more booths.” These findings highlight that financial reforms could greatly improve public trust and efficiency.

Respondents identified increased transparency, user-friendly financial policies, timely maintenance funding, and stronger accountability as key strategies to strengthen financial management and public confidence in the PPP system.

4.4.3 Strategies to Enhance Institutional Coordination and Contract Enforcement

Table 11: Strategies to enhance institutional coordination and contract enforcement

Suggested Institutional Strategy	Frequency	Percentage (%)
Strengthen monitoring by NRFA and RDA	44	73.3
Improve communication among PPP partners	39	65.0
Clarify roles and responsibilities under PPP agreements	36	60.0
Enforce Service-Level Agreements more consistently	34	56.7
Increase public awareness about PPP operations and benefits	30	50.0
Simplify bureaucratic processes for maintenance approvals	28	46.7
Total Respondents = 60		

Source: Field Data (2025)

Institutional reforms were widely recommended, with 73.3 percent of respondents emphasizing the need for **stronger monitoring by NRFA and RDA**. Participants explained that frequent and active oversight would help ensure that the private operator meets performance standards. Respondent Ten stated, *“Government needs to monitor the operator more. If they are serious, things will work better.”* Similarly, 65 percent of respondents called for **improved communication between PPP partners**. Many felt that delays in addressing operational challenges arise because stakeholders do not coordinate effectively. Respondent Fifteen shared, *“The communication is poor. When something goes wrong, no one knows who should fix it.”* This lack of coordination undermines the smooth functioning of the tollgate.

Additionally, 60 percent of respondents stressed the need for **clearer roles and responsibilities** within the PPP arrangement. Many said that accountability is blurred when duties overlap. Respondent Twenty-One noted, *“We don’t know who is responsible for what. Even the staff seem*

unsure sometimes.” Further, 56.7 percent of respondents recommended stricter enforcement of **Service-Level Agreements (SLAs)** to ensure that the private operator maintains a consistent standard of service. Respondents also pointed out the importance of increasing **public awareness about PPP operations**, with 50 percent stating that a poorly informed public is less likely to support PPP initiatives. Respondent Twenty-Five explained, *“People don’t understand PPPs. They just pay. Awareness would help.”* Finally, respondents highlighted that **bureaucratic delays** should be minimized to speed up decision-making, particularly around maintenance approvals. These observations underscore the need for stronger institutional structures to support the PPP model.

Respondents believe institutional improvements such as enhanced monitoring, clearer roles, stronger communication, and reduced bureaucracy are essential to improving the long-term sustainability of the PPP arrangement at the Katuba Tollgate.

4.3 Discussion of Findings

The purpose of this section is to interpret the study’s findings in relation to existing literature and the theoretical frameworks that guided the research. By comparing the empirical results with global, regional, and local studies on Public–Private Partnerships (PPPs), the discussion provides deeper insight into how the Katuba Tollgate PPP arrangement aligns with or diverges from established knowledge. The section also draws on Transaction Cost Theory and Public Choice Theory to explain why certain patterns emerged and how they relate to the behaviour, incentives, and performance of PPP stakeholders. Each research objective is discussed separately to provide a structured, logical, and critical analysis that situates the study within the broader academic and practical context of PPP-led infrastructure development.

4.3.1 Assessing the Efficiency of the Katuba Tollgate PPP Project

The findings revealed that the efficiency of the Katuba Tollgate PPP project is mixed, with respondents acknowledging improvements in service quality, but also pointing to persistent weaknesses such as long queues, limited booth utilisation, system downtime, and inconsistent traffic flow. Most users rated service quality as “Good” or “Very Good,” yet almost half still experienced delays during peak hours, shifting the overall perception of efficiency toward only moderate effectiveness. These findings demonstrate that while the PPP arrangement has introduced

notable improvements in infrastructure maintenance and general orderliness, it has not achieved the full efficiency expected from a PPP model that emphasises timely, cost-effective, and reliable service delivery.

These results are consistent with global literature on tollgate PPP performance, where efficiency often varies depending on operational consistency and technological reliability. Studies from India, South Africa, and Brazil have shown that PPP toll projects often improve physical infrastructure but struggle with traffic congestion and peak-hour delays due to incomplete lane optimisation or unpredictable system downtime (Mohan, 2019; Da Silva, 2020). Similar challenges were reported in PPP toll plazas in India, where electronic payment systems reduced delays but were undermined by intermittent system failures. This aligns with respondents' experiences at Katuba, where technological breakdowns were cited as a leading cause of inefficiency. Globally, PPPs tend to excel in infrastructure provision but face administrative obstacles that limit their full operational efficiency — a pattern that is visible in this study.

Regionally, studies across Africa show comparable efficiency challenges in tollgate PPPs. Research conducted in Nigeria, Kenya, and South Africa found that despite improvements in road quality and toll plaza infrastructure, operational efficiency was often compromised by inadequate staffing, slow payment processing, and insufficient technological support during peak periods (Ayo & Nkoro, 2022; Mutiso, 2018). The Katuba findings mirror these regional trends, particularly where respondents mentioned limited booth utilisation and slow system recovery when technological faults occur. In South Africa's Gauteng Freeway Improvement PPP, users complained that system failures and poorly coordinated lane management affected service flow — exactly the type of inefficiency observed at Katuba. Thus, the challenges identified in this study align closely with common African PPP operational constraints.

At the national level, Zambian literature also highlights similar limitations in tollgate efficiency. The National Road Fund Agency (NRFA) annual reviews and studies by local scholars have repeatedly noted challenges such as inadequate staffing, poor coordination between RDA and PPP operators, and variation in booth operation patterns (Mubanga, 2021; NRFA, 2022). Previous assessments of tollgates such as Shimabala, Kafulafuta, and Manyumbi show recurring issues with long queues and slow transactions during peak hours — the same issues raised by respondents at

Katuba. Local studies also observed that tollgate operational efficiency is often reduced by external factors such as seasonal traffic, limited capacity to address system breakdowns, and insufficient monitoring of PPP compliance. Therefore, the findings of this study are strongly consistent with national evidence.

Using **Transaction Cost Theory**, the efficiency challenges at the Katuba Tollgate can be interpreted as outcomes of high coordination and operational costs arising from poor monitoring and inconsistent booth utilisation. Transaction Cost Theory argues that PPP contracts perform efficiently only when monitoring structures are strong and coordination costs are low. In the case of Katuba, the frequent system breakdowns, delays in shift changes, and unclear roles between PPP partners reflect elevated transaction costs that prevent smooth operations. Respondents' concerns about long queues and poor lane coordination further confirm that operational uncertainty increases costs for both road users and the PPP operator. Thus, the theory helps explain why the expected efficiency gains of PPPs are only partially realised at Katuba.

Applying **Public Choice Theory** further clarifies why efficiency gaps persist. Public Choice Theory suggests that inefficiencies in public service delivery often arise from misaligned incentives, political interests, and limited accountability. Respondents in this study pointed to weak government oversight, delayed enforcement of service-level agreements, and poor communication between stakeholders — all indicative of incentive misalignment. If the PPP operator is insufficiently supervised or lacks pressure to maximise efficiency, operational shortcuts (such as opening fewer booths to reduce labour costs) may occur. Similarly, government agencies may have limited motivation to enforce strict performance standards, leading to a system where inefficiency becomes normalised. Public Choice Theory therefore provides insight into why efficiency remains inconsistent despite the presence of a private operator.

In conclusion, the discussion of Objective One shows that the Katuba Tollgate PPP project has delivered some operational improvements, especially in infrastructure quality and basic service reliability. However, full efficiency is constrained by predictable challenges such as congestion, staffing issues, system downtime, and weak institutional coordination. These findings align with global, regional, and national literature, and the theoretical frameworks illustrate that efficiency is dependent not only on physical infrastructure but also on effective coordination, incentive

alignment, and active monitoring. Enhancing efficiency at Katuba will therefore require targeted operational reforms supported by stronger institutional oversight and contractual enforcement.

4.3.2 Challenges Affecting the Performance of the Katuba Tollgate PPP Project

The findings of this study revealed several key challenges affecting the performance of the Katuba Tollgate PPP project. Respondents identified operational inefficiencies such as staffing shortages, inconsistent booth operation, slow service during peak hours, system breakdowns, poor lane management, and delayed technical response times. Additionally, institutional weaknesses such as insufficient government oversight, unclear role division among PPP partners, and slow enforcement of service-level agreements were highlighted. Financial challenges were also noted, including inadequate transparency, delayed allocation of maintenance funds, and limited accountability mechanisms between the public and private actors. These findings demonstrate that the challenges affecting performance are multidimensional, cutting across operational, institutional, and financial domains.

Comparable global studies similarly highlight that operational and institutional inefficiencies are common within PPP tollgate projects. Research from India, Chile, Canada, and Brazil shows that tollgate PPP performance is often hindered by technological failures, long queues during peak hours, poor staff-to-traffic ratios, and insufficient real-time monitoring (Kwak et al., 2020; Sharma, 2019). In India, the National Highways Authority documented that electronic tolling systems frequently fail to reduce waiting times due to slow system recovery, mirroring the challenges reported at Katuba. In Canada, PPP toll facilities such as the Highway 407 also face criticism over inconsistent booth operations and transparency issues, particularly related to pricing structures and the allocation of revenue. These parallels indicate that the challenges identified at Katuba are not unique to Zambia but are reflective of common worldwide PPP operational constraints.

Similar patterns have been observed across African PPP tollgate systems. Studies conducted in Nigeria, Kenya, Uganda, and South Africa reveal persistent performance challenges such as delayed maintenance, inadequate staff training, bureaucratic delays, weak monitoring mechanisms, and public dissatisfaction with transparency (Ameh & Ogunlana, 2021; Mutiso, 2018). For example, Nigeria's Lekki Toll Plaza faces regular public complaints about service delays and insufficient communication between government and private operators. Likewise, South Africa's

Gauteng Toll Project has been criticised for its lack of revenue transparency and weak institutional coordination. These cases reflect the same institutional and operational issues identified at Katuba, showing that African PPP toll projects often suffer from systemic weaknesses in oversight, technical management, and financial accountability.

Nationally, Zambian evidence strongly supports the challenges identified at the Katuba Tollgate. NRFA annual reports highlight recurring issues in tollgate operations, including high congestion periods, slow maintenance response, ICT system failures, and insufficient operational supervision. Local studies on tollgates such as Shimabala, Manyumbi, and Kafulafuta similarly found that performance is negatively affected by inadequate staffing, slow enforcement of PPP contracts, and limited transparency around revenue usage (Mubanga, 2021; Zulu, 2022). Additionally, previous evaluations by the Road Development Agency documented delays in system upgrades and maintenance activities due to financial bottlenecks. These national studies affirm that the challenges found at Katuba are consistent with broader patterns throughout Zambia's tolling system.

Using **Transaction Cost Theory**, the challenges at Katuba can be interpreted as outcomes of high coordination, monitoring, and enforcement costs within the PPP arrangement. The theory suggests that when roles are unclear, monitoring is weak, or contractual enforcement is inconsistent, transaction costs increase. This is evident at Katuba, where respondents noted poor coordination between NRFA, RDA, and the private operator, leading to delayed system repairs, inconsistent booth operations, and slow traffic management responses. The repeated system breakdowns and long queues reflect increased operational uncertainty, which is a core contributor to transaction costs. Therefore, the challenges observed can be seen as a result of structural inefficiencies that elevate the costs of running the PPP effectively.

Applying **Public Choice Theory** further deepens understanding of the challenges. Public Choice Theory argues that inefficiencies in public service delivery often stem from competing interests, limited accountability, and self-interested behavior among stakeholders. Respondents' concerns about weak government oversight, inadequate monitoring, and poor enforcement of PPP obligations directly reflect these dynamics. If government agencies lack strong incentives to enforce performance standards or are influenced by political or administrative considerations, PPP

operators may not prioritise optimal service delivery. Likewise, the absence of strong public reporting mechanisms reduces public pressure on both parties. Public Choice Theory therefore explains why performance issues persist despite the presence of formal contracts: the incentives within the system do not consistently reinforce accountability or efficiency.

In conclusion, the challenges affecting the performance of the Katuba Tollgate PPP project align closely with global, regional, and national patterns, as well as the predictions of Transaction Cost and Public Choice theories. The findings reflect a complex mix of operational constraints, institutional weaknesses, and financial accountability gaps that collectively undermine PPP performance. Addressing these challenges will require not only operational reforms but also deeper structural changes in monitoring, coordination, incentive alignment, and transparency within the PPP framework.

4.3.3 Strategies for Enhancing the Performance of the Katuba Tollgate PPP Project

The findings revealed several practical strategies that respondents believed would improve the performance of the Katuba Tollgate PPP project. These strategies centred on three main areas: operational efficiency, financial transparency, and institutional coordination. Respondents proposed measures such as increasing the number of active booths during peak hours, improving staff scheduling, enhancing technical support, and introducing separate lanes for trucks and light vehicles. They also recommended greater transparency in the use of toll revenues, more accountability between PPP partners, improved monitoring by NRFA and RDA, and stricter enforcement of service-level agreements. These findings show that road users possess clear, experience-based solutions that speak directly to the everyday operational realities at the tollgate.

Globally, similar strategies have been recommended in PPP tollgate literature. Studies in India, Canada, Chile, and Australia consistently highlight the importance of lane optimisation, real-time monitoring, adequate staffing, transparent revenue reporting, and routine technological upgrades (Kwak et al., 2020; Sharma, 2019). For instance, Indian toll plazas implementing continuous booth operation and improved staffing models drastically reduced queue times, while Canadian PPP toll roads emphasised the need for transparent financial reporting to build public trust. These global parallels validate the strategies proposed by respondents at Katuba, showing that the improvements they recommend are consistent with international best practices for toll road PPPs.

Regionally, African experiences further support the strategies suggested in this study. PPP tollgate literature from Kenya, Nigeria, and South Africa shows that operational efficiency is best improved through better staff deployment, system redundancy planning, and use of dedicated vehicle lanes (Ayo & Nkoro, 2022; Mutiso, 2018). For example, Nigeria’s Lekki Tollgate adopted enhanced ICT support systems and vehicle categorisation lanes to reduce congestion—strategies similar to those recommended by Katuba respondents. Likewise, South Africa’s tolling systems emphasise the importance of transparent revenue management and strong enforcement of performance contracts. These regional experiences echo respondent perspectives, showing that strengthening coordination and accountability is critical for improving PPP tollgate performance in Africa.

At the national level, evidence from NRFA and RDA reports, as well as local academic studies, strongly align with the strategies identified in this study. Previous evaluations of the Shimabala, Kafulafuta, and Manyumbi tollgates similarly recommended improved staffing schedules, better oversight of private operators, enhanced transparency in revenue utilisation, and increased investment in system maintenance (Mubanga, 2021; NRFA, 2022). Zambian researchers have also argued that PPP tollgates must strengthen institutional coordination to reduce bureaucratic delays and improve enforcement of service-level agreements. The close alignment between these national findings and the strategies suggested by Katuba road users demonstrates consistency in public perception and institutional analysis across the country.

The findings also align with **Transaction Cost Theory**, which emphasises the importance of reducing coordination and monitoring costs to improve PPP project outcomes. Many of the strategies suggested by respondents such as improving communication between PPP partners, increasing oversight, enforcing performance clauses, and enhancing maintenance responsiveness directly address transaction costs. When coordination mechanisms are strengthened, uncertainty is reduced, and efficiency improves. For example, faster technical support lowers operational downtime costs, while clearer roles between NRFA, RDA, and the operator reduce administrative delays. Thus, the respondent recommendations reflect a desire to reduce the transaction costs that currently limit tollgate efficiency.

Similarly, **Public Choice Theory** offers valuable insight into why the proposed strategies are necessary. The theory suggests that inefficiencies arise when stakeholders have misaligned

incentives or insufficient accountability mechanisms. Respondents' calls for increased transparency, stricter contract enforcement, better supervision, and clearer communication reflect these concerns. Without strong public reporting, frequent audits, and clear institutional responsibilities, PPP operators may not prioritise service efficiency, and government agencies may not enforce it. The strategies proposed by respondents therefore align with Public Choice Theory's emphasis on aligning incentives and reducing the influence of bureaucratic or political constraints on service delivery.

In conclusion, the strategies identified by respondents at Katuba Tollgate align closely with global, regional, and national literature on PPP performance improvement. They also fit logically within the theoretical frameworks guiding this study, particularly in their emphasis on improving coordination, reducing uncertainty, enhancing transparency, and strengthening accountability. If implemented, the strategies proposed could significantly improve the efficiency, responsiveness, and sustainability of the Katuba Tollgate PPP arrangement. The findings therefore highlight clear, actionable interventions that policymakers and PPP stakeholders should prioritise to enhance infrastructure performance and public satisfaction.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the final part of the study by summarising the key findings, drawing conclusions based on the research objectives, and outlining practical recommendations aimed at improving the performance of Public–Private Partnership (PPP) projects such as the Katuba Tollgate. The chapter revisits the major results obtained in Chapter Four, highlighting how they relate to the study’s aim and specific objectives. It also proposes actionable measures for policymakers, PPP stakeholders, and future researchers. The intention of this chapter is to consolidate the overall contribution of the study and provide clear direction for improving PPP operations within Zambia’s road infrastructure sector.

5.1 Summary of the Study

This study set out to explore the performance of the Katuba Tollgate PPP project through a qualitative lens, recognising that the lived experiences, perceptions, and narratives of road users and stakeholders provide deeper insight than quantitative indicators alone. The motivation for the study arose from persistent concerns expressed in public forums and policy discussions regarding congestion, inconsistent booth operations, and uncertainties surrounding how toll revenue is managed within PPP arrangements. Given the growing reliance on PPPs in Zambia’s road infrastructure development, there was a strong need to understand how the model is functioning on the ground. The study therefore focused on gathering detailed, experience-based accounts from individuals who interact with the tollgate regularly, with the aim of understanding the efficiency of the project, the challenges it faces, and the strategies that may enhance its performance.

The research was guided by three specific objectives: assessing the efficiency of the Katuba Tollgate PPP project, examining the challenges affecting its performance, and identifying strategies that could improve its operations. These objectives shaped the guiding questions used during data collection and analysis, ensuring that respondents’ narratives were captured in a structured yet flexible manner. The study approached efficiency not merely as a technical metric, but as a lived experience reflected in how long road users wait, how consistent the service is, and how effectively

different PPP partners coordinate their roles. Likewise, the exploration of challenges was grounded in the real frustrations, observations, and concerns expressed by respondents, offering an authentic view of the tollgate's operational realities.

Because the study was qualitative, a descriptive exploratory design was used to collect and interpret the data. This design allowed the researcher to capture rich, detailed accounts from participants rather than numerical patterns. A sample of sixty respondents was purposely engaged based on their knowledge of, and frequent interaction with, the tollgate. These included transport operators, daily commuters, local residents, and community members familiar with toll operations. Data were collected through interviews and structured open-ended questionnaires, allowing participants to express their experiences in their own words. Ethical considerations, including confidentiality and respect for respondents, were observed throughout the process.

Analysis followed a thematic approach, where emerging patterns from the responses were organised into meaningful themes. These themes reflected respondents' views about the efficiency of the tollgate, the challenges undermining its performance, and the improvements they believe are necessary. Narratives were coded, compared, and grouped into coherent categories, ensuring that the voices of participants formed the foundation of the study's findings. Direct quotations were used to preserve the authenticity of the respondents' experiences and provide a deeper understanding of the issues raised.

The findings showed that the Katuba Tollgate operates at a moderate level of efficiency. Respondents acknowledged that the tollgate has improved the quality of the road and provides a fairly organised system for toll collection. However, they also noted several recurring inefficiencies that undermine its performance. These included long queues, especially during peak hours, inconsistent booth utilisation, inadequate staffing, and frequent delays caused by system breakdowns. Many respondents described the tollgate as "better than nothing," but not fully efficient, reflecting a mixture of appreciation and dissatisfaction in how they perceive the PPP project.

The study also revealed several challenges that make the tollgate less effective than it could be. Respondents highlighted weak institutional coordination between the public and private partners, unclear role divisions, insufficient government oversight, and poor enforcement of service-level

agreements. Many were concerned about a perceived lack of transparency in toll revenue management, with several participants stating that the public has little visibility into how toll funds are used. These concerns illustrate that the challenges facing the tollgate extend beyond surface-level operational issues and are deeply rooted in governance, accountability, and communication gaps within the PPP structure.

Finally, the study identified practical strategies that respondents believe could enhance tollgate performance. These include increasing the number of active booths during busy periods, improving staff deployment and shift scheduling, strengthening technical support to reduce system downtime, and introducing dedicated lanes for different vehicle categories. Respondents also recommended greater financial transparency, regular public reporting, stronger monitoring by NRFA and RDA, and clearer communication among all PPP stakeholders. These suggestions demonstrate that road users are not only aware of the problems but also capable of offering realistic solutions grounded in their daily experiences.

5.2 Conclusions

The study concludes that the efficiency of the Katuba Tollgate PPP project is moderate, demonstrating a mixture of commendable progress and persistent operational gaps. Respondents acknowledged that the tollgate has contributed to improved road quality, a more organised tolling environment, and a generally functional system compared to earlier non-PPP arrangements. However, efficiency is significantly reduced during peak hours due to long queues, inconsistent booth utilisation, limited staffing, and slow responses to system breakdowns. These findings suggest that the PPP model has delivered partial benefits but has not yet achieved the level of operational consistency and responsiveness expected in a well-managed tolling system. The conclusion for Objective One is therefore that while the tollgate functions effectively under normal conditions, its overall efficiency is compromised by predictable operational pressures and inadequate day-to-day management.

The second conclusion relates to the challenges affecting the performance of the Katuba Tollgate. The study shows that these challenges are not isolated incidents but form part of deeper, structural weaknesses within the PPP framework. Respondents consistently pointed to poor coordination between the public and private partners, insufficient government oversight, and slow enforcement

of contractual obligations. These institutional shortcomings are further compounded by financial transparency concerns, delays in maintenance funding, and limited public communication regarding toll revenue utilisation. The study concludes that these challenges reflect broader systemic issues rather than temporary setbacks, and that addressing them will require strengthening governance structures, improving stakeholder collaboration, and enhancing accountability mechanisms within the PPP arrangement.

The study further concludes that respondents are strongly aligned on the strategies needed to improve the performance of the tollgate. Participants suggested operational measures such as increasing the number of active booths, improving staff scheduling, enhancing technological support systems, and establishing separate lanes for different vehicle categories. They also emphasised institutional reforms, including stronger monitoring by NRFA and RDA, clearer role definitions among PPP partners, and stricter enforcement of service-level agreements. Financial reforms, particularly increased transparency and regular public reporting, were equally emphasised. The conclusion for Objective Three is that road users and stakeholders possess a clear and practical understanding of the reforms needed to transform the tollgate into a more efficient, transparent, and reliable PPP facility. Their proposals collectively reflect a desire for a tolling system that is operationally effective, institutionally sound, and publicly accountable.

5.3 Recommendations

- 1. Enhance operational efficiency through improved staffing, booth utilisation, and lane management.**

The tollgate should ensure that all booths are opened during peak hours, introduce structured staff deployment schedules, and establish separate lanes for different vehicle categories to reduce congestion and improve the overall flow of traffic.

- 2. Strengthen technical capacity and ICT reliability at the tollgate.**

Dedicated onsite ICT personnel, regular system maintenance, and investment in modern tolling technologies are needed to minimise downtime and ensure uninterrupted service, particularly during busy periods.

- 3. Increase transparency and public communication on toll revenue utilisation.**

Regular public reports, community updates, and accessible information channels should

be introduced to build trust, enhance accountability, and demonstrate how toll revenues contribute to road development and maintenance.

- 4. Improve coordination and oversight among PPP stakeholders.**

NRFA, RDA, and the private operator should establish clearer communication structures, hold joint performance review meetings, and ensure consistent enforcement of servicelevel agreements to strengthen institutional collaboration and accountability.

5. **Implement continuous training and capacity-building programmes for tollgate staff.** Staff should undergo routine training in customer service, technical troubleshooting, and operational procedures to enhance professionalism, improve user experience, and reduce inefficiencies caused by human error.

5.4 Suggestions for Further Research

1. **Future research could explore the long-term impact of tollgate PPP projects on national road infrastructure sustainability.**
Such a study would provide deeper insight into whether PPP-operated tollgates contribute meaningfully to broader road maintenance and development goals in Zambia.
2. **Further qualitative studies could examine the experiences of tollgate employees and PPP administrators.**
Understanding their perspectives would offer valuable information on internal operational challenges that may not be visible to road users.
3. **Researchers could compare the performance of multiple tollgates across Zambia.** A comparative analysis would highlight differences in efficiency, management approaches, and institutional coordination among PPP and non-PPP tollgates.
4. **Future investigations could assess public perceptions of toll revenue transparency and accountability mechanisms.**
This would help determine how information gaps influence trust, compliance, and user satisfaction.
5. **Studies could also examine the influence of policy and regulatory frameworks on PPP performance in Zambia's road sector.**
Such research would help identify gaps in policy enforcement and provide guidance for strengthening PPP governance structures.

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Appendix one: Questionnaire

Questionnaire on the Effects of Public–Private Partnerships on Infrastructure Development: A Case Study of the Katuba Tollgate

Partnerships on Infrastructure Development: A Case Study of the Katuba Tollgate.” The purpose of this questionnaire is to collect information on your experiences, views, and perceptions regarding the implementation and performance of the Katuba Tollgate project under a Public Private Partnership (PPP) arrangement.

Your responses will contribute to an academic study aimed at assessing the efficiency of the PPP model, identifying challenges encountered during implementation, and proposing strategies for improving the performance of future PPP infrastructure projects in Zambia. The information you provide will be used strictly for academic purposes and will help generate evidence-based recommendations for policymakers, infrastructure managers, and other stakeholders.

Participation in this study is voluntary, and you are free to decline to answer any question or withdraw from the study at any time without any consequences. All responses will be treated with strict confidentiality and anonymity, and no identifying information will be disclosed in the final report. The questionnaire does not require you to provide your name or any personal identifiers.

There are no right or wrong answers. You are encouraged to respond honestly based on your personal experiences and knowledge of the Katuba Tollgate project. Your views are highly valued and will play an important role in improving understanding of how Public–Private Partnerships contribute to infrastructure development in Zambia.

Thank you for your time and willingness to participate in this study.

SECTION A: DEMOGRAPHIC INFORMATION

1. Age group: 18–25
 26–35
 36–45
 46–55 56
and above

2. Gender:
 - Male
 - Female
3. Highest level of education attained:
 - Primary
 - Secondary
 - Tertiary Postgraduate
4. Occupation:
 - Civil Servant
 - Private Sector Employee
 - Business Owner/Entrepreneur
 - Transport Operator
 - Community Member / Unemployed
5. Relationship to the Katuba Tollgate: Government official
 - Private concessionaire/contractor
 - Local authority official
 - Road user
 - Community resident

SECTION B: EFFICIENCY OF THE KATUBA TOLLGATE PPP PROJECT

6. How would you rate the overall efficiency of the Katuba Tollgate under the Public– Private Partnership arrangement?
 - Very efficient
 - Efficient
 - Fairly efficient
 - Inefficient
7. How would you describe the speed of toll collection during normal traffic conditions?
Very fast
 - Fast
 - Moderate
 - Slow
8. How would you describe the speed of toll collection during peak traffic hours?
 - Very fast
 - Fast
 - Moderate

- Slow
- 9. To what extent has the PPP arrangement improved road maintenance and infrastructure quality at Katuba Tollgate?
 - To a very great extent
 - To a great extent
 - To a moderate extent
 - To a small extent
- 10. In your view, has the PPP arrangement improved the organisation and management of tollgate operations?
 - Yes
 - No
 - Not sure
- 11. Please explain your response to Question 10.

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- 12. Compared to the period before the tollgate was introduced, how has service delivery changed?
 - Significantly improved
 - Slightly improved
 - No noticeable change
 - Worsened
- 13. What aspects of the Katuba Tollgate operations do you consider to be most effective under the PPP arrangement?

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SECTION C: CHALLENGES IN THE IMPLEMENTATION OF THE PPP PROJECT

- 14. What challenges have you observed in the implementation of the Katuba Tollgate PPP project?
 - Traffic congestion during peak hours
 - Inadequate toll lanes or staffing
 - Technical or system failures
 - Weak monitoring and supervision
 - Bureaucratic delays

- Poor communication with road users
 - Other (specify):
15. How effective is government monitoring and oversight of the PPP project?
- Very effective
 - Effective
 - Fairly effective
 - Ineffective
16. Have institutional or administrative processes affected the efficiency of tollgate operations?
- Yes
 - No
17. If yes, explain how these processes affect service delivery or operational performance.
-
-
-
-
18. How would you describe communication between tollgate management and road users or surrounding communities?
- Very good
 - Good
 - Fair
 - Poor
19. Do you consider the toll charges to be fair in relation to the quality of road infrastructure and services provided?
- Yes
 - No
 - Not sure
20. Please explain your answer to Question 19.
-
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-
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SECTION D: STRATEGIES FOR ENHANCING PPP PERFORMANCE

21. Which measures would most improve the performance of PPP tollgate projects in Zambia?
- Strengthened government monitoring
 - Adoption of advanced tolling technologies
 - Improved staffing and traffic management
 - Better stakeholder and community engagement

Clearer contractual enforcement

22. To what extent would automated or digital toll collection systems improve efficiency at Katuba Tollgate?

- To a very great extent
- To a great extent
- To a moderate extent
- To a small extent

23. How important is community sensitisation in improving acceptance of PPP tollgate projects?

- Very important
- Important
- Moderately important
- Not important

24. In your opinion, how can transparency and accountability in toll revenue utilisation be improved?

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25. What key lessons from the Katuba Tollgate PPP project should be applied to future infrastructure PPPs in Zambia?

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26. Do you believe Public–Private Partnerships are a sustainable solution for infrastructure development in Zambia?

- Yes
- No
- Depends on how they are implemented

27. Please justify your response to Question 26.

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SECTION E: GENERAL COMMENTS

28. Please provide any additional comments or recommendations regarding the Katuba Tollgate PPP project.

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