
# AN ANALYSIS OF RISK SHARING MECHANISMS IN PPP PROJECTS IN ZAMBIA: A CASE STUDY OF LUSAKA WATER SUPPLY, SANITATION AND DRAINAGE (LWSSD) PROJECT

BY

**MARTHA CHILUFYA MULENGA**

**BPA22114519**

ON

**SUPERVISOR**

**MR. MUSADABWE CHULU**

**Submitted to the School of Technology and Social Science of the University of Lusaka as a requirement to attain a Bachelor's Degree in Public Administration**

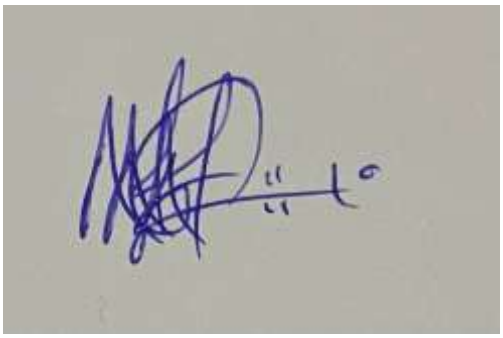
DECLARATION STATEMENT

I Martha Mulenga hereby declare that all the work and research done in this document was done through my own academic and intellectual capabilities. All the works lifted from external sources have been cited for accordingly.

**Students Name: Martha Mulenga**

**Student ID: BPA22114519**

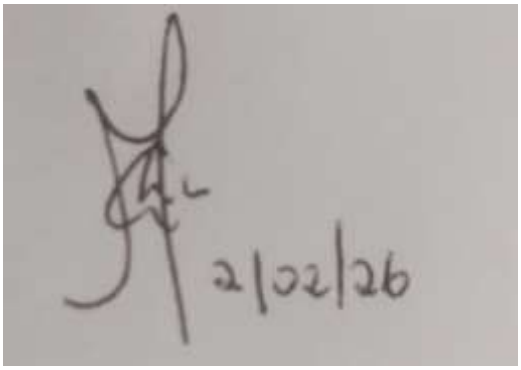
**Signature:**



**Date: 3rd March 2026**

**Supervisor Name: Mr. Musadabwe Chulu**

**Signature:**



DEDICATION

I dedicate this dissertation to my beloved parents and siblings, whose unwavering love, encouragement, and support have been my greatest source of strength. Your belief in me, your sacrifices, and your constant guidance have made this journey possible. This work is as much yours as it is mine.

ACKNOWLEDGEMENTS

I wish to express my gratitude to all individuals that helped me during this study and the process of writing this dissertation. Above all, I would like to say a big thanks to my supervisor Mr. Musadabwe, whose guidance, constructive criticism, and support have proven to be invaluable. This work was influenced by his professionalism and his patience. I also value my lecturers, colleagues and classmates due to their assistance, cooperation and support in my academic life.

I want to say thank you to my parents and siblings, who gave me their undying love, sacrifices, and support. I have been motivated and strengthened by your faith in me.

I owe it all to my friends and anyone who, in one form or another, helped in the success of this dissertation.

Most importantly, I am grateful to God for enabling me to have the strength, resilience, and grace to get to this stage. This I did not achieve by myself, but by you all who supported me.

## LIST OF TABLES

## LIST OF FIGURES

Table of Contents

## ABSTRACT

Public–Private Partnerships (PPPs) are widely used to finance and deliver large infrastructure projects, particularly in developing countries facing resource constraints. However, the success of such projects depends largely on how risks are allocated and managed among stakeholders. In Zambia, limited empirical evidence exists on how risk-sharing mechanisms influence the performance and sustainability of major urban infrastructure initiatives. This study examined risk-sharing mechanisms in the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project to determine their effects on service delivery efficiency in water supply, operational performance and sustainability in sanitation, and the mitigation of construction and environmental risks in drainage infrastructure.

The study adopted a quantitative research approach using a survey design. Data were collected from government officials, private sector partners, and community representatives through structured questionnaires containing closed-ended questions. Stratified random sampling was employed to ensure representation of the major stakeholder groups involved in or affected by the project.

The findings revealed that risk-sharing mechanisms significantly influenced project performance across the three components. In the water supply sector, balanced allocation of operational responsibilities was associated with improved service delivery efficiency, although challenges such as maintenance constraints and limited institutional capacity persisted. In the sanitation component, unclear allocation of operation and maintenance responsibilities was associated with reduced system utilisation and threats to long-term sustainability. In the drainage component, infrastructure investments contributed to reduced flooding risks, but insufficient coordination and undefined maintenance responsibilities posed risks to the durability of these benefits.

The study concludes that effective risk-sharing arrangements are critical for enhancing the efficiency, effectiveness, and sustainability of PPP infrastructure projects. The findings suggest that policymakers and project implementers should emphasise clarity in contractual obligations, alignment of risk allocation with stakeholder capacity, and strong institutional frameworks for monitoring and maintenance. The study recommends strengthening regulatory oversight, building technical capacity within implementing agencies, and improving stakeholder coordination to sustain project outcomes. Further research is recommended to

examine long-term performance of PPP projects in Zambia and to conduct comparative quantitative analyses across infrastructure sectors.

**Keywords:** Public–Private Partnerships (PPPs); risk-sharing mechanisms; infrastructure performance; water supply; sanitation; drainage; service delivery efficiency; sustainability; Zambia

# CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

## 1.1 Overview

Lots of low-income countries, such as Zambia, are now favouring Public-Private Partnerships (PPP) when it comes to developing infrastructure. They bring together governmental and corporate advantages to provide more efficient and sustainable critical services. One of the issues is to identify, allocate, and manage the risks among the partners. Failure to share risk badly may result in delays, cost overruns or even failure (Grimsey and Lewis, 2002). PPPs are viewed to be a way of correcting the historical shortages of service delivery in terms of water, sanitation and drainage in the urban areas such as Lusaka in Zambia (World Bank, 2017).

The LWSSD Project is a significant example of the PPP model of sustainable urban infrastructure in Zambia. The project was co-financed with the Government of Zambia, the Millennium Challenge Corporation (MCC) and the private organisations, to increase the availability of clean water supply, widen sanitation services and establish modern drainage systems, to mitigate the threat of urban flooding (Millennium Challenge Account Zambia, 2020). Its multi-component character meant that the project had financial, technical, environmental and social risks, which needed strong risk-sharing tools in order to be implemented successfully. The contractual and institutional frameworks created in the LWSSD project give a great chance to learn about the way risk-sharing affects the outcomes in the three spheres.

The efficient risk-sharing will see to it that every participant is able to take the risks that they are most able to handle, coupled with better performance and safeguarding the interests of the people (Yescombe, 2011). In Zambia, the inability of institutions to deliver on the aforementioned challenges, regulatory inefficiency, and unforeseen political and economic conditions are some of the factors that make PPP implementation difficult (UN‑Habitat, 2018). The LWSSD project provides empirical information on the field of the practical application of the principles of PPP, particularly the way the risks were shared by the parties (public and private) and how it influenced the delivery and sustainability.

This paper evaluates the efficiency of risk-sharing instruments in the LWSSD project which is directed towards water supply, sanitation and drainage. It analyses the type of risks, the allocation model used and the results that were obtained in every industry. The ultimate goal of the findings will include a contribution to policy and scholarly debates on PPPs in Zambia

by outlining best practices, space of improvement, and suggestions to improve the progress of future PPP. Finally, the paper justifies the development of more resilient and fair infrastructure development frameworks in Zambia and other similar settings.

### 1.2 Background to the Study

The use of PPPs has currently emerged as a key tool in providing massive scale infrastructure in developing nations whereby government resources are no longer able to cater to increased demands (Yescombe, 2011). A PPP is the contractual relationship whereby the private sector funds, develops, runs or sustains the state infrastructure. It is aimed at the integration of the social mandate of the public sector and efficiency, technical knowledge, and access to capital of the private sector (Grimsey and Lewis, 2002). In Zambia, urban service delivery, such as water, sanitation and drainage which are vital in health, environmental sustainability and economic growth, is enhanced by PPPs (World Bank, 2020).

LWSSD Project is among the most important PPP projects in Zambia which is aimed at addressing major gaps in infrastructures in Lusaka. Lusaka is the largest and fastest-growing urban centre in the country: its water supply and sanitation is permanently challenged by the lack of drainage, uneven water supply, and wastewater disposal (Zambian Ministry of Local Government, 2020). These issues are enhanced by a rapid increase in population and scarcity of municipal resources. The LWSSD Project was also meant to enhance service coverage, efficiency in operations and the provision of sustainable provision of water and sanitation services by a government and a business partnership.

A fundamental feature of the PPP projects is risk management. Risk in this case is the risk of variations in the outcomes that are expected to occur thus influencing cost, schedule, quality or sustainability (Grimsey and Lewis, 2002). Risk-sharing is a successful method of distributing the risks to the party and that is in the best position to handle the risks and this lowers the chances of failures and generates value to the money (Yescombe, 2011). The distribution of risks in PPPs, unfortunately, is not regular and well-defined in most developing countries, which causes disagreements, cost increases, and delays (Khan, Bhatti & Malik, 2016). The presence of vague contractual tasks in water and sanitation projects in Zambia leads to inefficiencies in operations that pose a detriment to the PPP benefits (Mwale, 2020).

Financial risk: LWSSD Project is prone to the risks characteristic of an urban water and sanitation infrastructure: lack of revenue, due to low tariffs; system failure and maintenance; environmental and social risks, floods, pollution, or community discontent (UN‑Habitat,

2018). Institutional and regulatory frameworks continue to change, and they leave loops in monitoring, enforcement, and accountability (Osei-, Chan, 2017). These deficits highlight the importance of having systematic mechanisms to ensure that neither of the two sectors is left with a disproportionately high share of risk since unbalanced risk-sharing will undermine sustainability and deter trust in society.

Evidence at the international level is emphasizing the significance of good risk-sharing. In Pakistan, urban infrastructure PPPs had poorly identified risk allocations that postponed the completion and escalated the costs incurred particularly in water and sanitation (Khan, Bhatti and Malik, 2016). In Ghana, risk-sharing and excellent institutional supervision enhanced the efficiency and sustainability of the project (Osei-Kyei and Chan, 2017). These experiences imply that the LWSSD Project in Zambia can be reinforced by the realistic allocation of risks, good governance and involvement of stakeholders in order to attain its goals and long-term service provision.

The policy implications of the study of risk sharing in LWSSD Project are important. The establishment of the risk allocation that is unclear or non-effective will help in the establishment of more solid contractual arrangements, regulation provisions, and project management practices under the PPPs in Zambia. The knowledge of the risk management of water, sanitation, and drainage can also inform future urban infrastructure development in other fast-growing cities in Sub-Saharan Africa (World Bank, 2020; UN-Habitat, 2018). Finally, the study also adds to the larger debate of enhancing the efficiency, sustainability, and accountability of PPPs in facilitating the provision of critical public services.

### 1.3 Statement of the Problem

The infrastructure sector in Zambia faces numerous problems with the poor implementation of PPP due to poorly organised risk-sharing models, particularly in sanitation (World Bank, 2017). The LWSSD Project exemplifies the following problems: the access to sanitation has been already improved, but the lack of clarity in the spread of operational and maintenance risks and unevenness have slowed down the development (Millennium Challenge Account Zambia, 2020). Lack of clarity with regard to the liability in case of system failures, cost-effectiveness and long-term maintenance cause inefficiencies, delays, and increasing costs that undermine stakeholder trust.

The regulatory frameworks in Zambia do not have a strong framework to measure the performance of the PPPs in the sanitation sector, and this leads to poor accountability, absence

of enforcement of the risk-sharing agreements and poor sustainability (UN-Habitat, 2018). Lack of effective community involvement, inadequate institutional bases in risk assessment, as well as lack of contingency plans subject both partners to financial and reputational risks (Yescombe, 2011). As a result, the sanitation aspect of the LWSSD Project is a valuable case to evaluate the impact of risk-sharing in the project effectiveness and the overall long-term effects. These structural weaknesses are critical in addition to addressing the needs of future PPPs in the Zambia sanitation sector to provide equitable, efficient and sustainable urban services (Grimsey and Lewis, 2002).

## 1.4 Research Objectives

### 1.4.1 General Objective

To analyse the effectiveness of risk-sharing mechanisms in Public-Private Partnership (PPP) projects in Zambia, with a specific focus on the Lusaka Water Supply, Sanitation and Drainage (LWSSD) Project.

### 1.4.2 Specific Objectives

1. To analyse the nature and structure of risk-sharing agreements in the LWSSD water supply component and their influence on service delivery efficiency.
2. To assess the allocation of risks among stakeholders in the LWSSD sanitation component and its implications for operational performance and long-term sustainability.
3. To examine the risk management mechanisms applied in the LWSSD drainage component and their effectiveness in addressing construction and environmental risks.

## 1.5 Research Questions

1. What types of risk-sharing agreements were implemented in the LWSSD water supply component, and how have they influenced service delivery efficiency?
2. How were risks allocated among stakeholders in the LWSSD sanitation component, and what impact has this allocation had on operational performance and sustainability?
3. What risk management mechanisms were applied in the LWSSD drainage component, and how effective have they been in mitigating construction and environmental risks**?**

### 1.5.1 Significance of the Study

The study of risk-sharing mechanisms of the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project has significance in various ways. It educates policy makers by highlighting inadequacies and difficulties in existing risk-sharing packages and assists in formulating better

policies that reasonably redistribute risks between the social and corporate partners. It has practical teachings to practitioners like project managers and investors on how to identify, allocate and mitigate risks which can result into improved project performance, reduced operational disturbances and increased sustainability. On the academic front, the research contributes to existing empirical data regarding the role of risk-sharing in the water and sanitation industry in Zambia, thus contributing to the discussions on the topic of the governance of infrastructure and public-private partnership (PPP) in developing nations. In general, this study can inform future design of the PPP, enhance institutional capacity and increase more sustainable urban development in Zambia.

### 1.6 Scope of the Study

The study area is the limitation of this research as it defines the period of time, themes and geographic area of this study. The temporal frame of the study is between 2013 and 2023. This timeframe incorporates the key stages of the LWSSD Project namely planning, implementation, and initial evaluation and can be used to analyze how the risk-sharing processes transformed during the design and construction stages into the operation and maintenance phases. Thematic-wise, the study was on the risk-sharing mechanisms in the water supply, sanitation, and drainage components of the LWSSD Project. It examined the distribution of risks between the partners and the entities that were publicly and privately owned and how effective the mitigation strategies were as well as the challenges encountered during the implementation of these arrangements. Other project components like the stakeholder engagement or finance were considered only when they were as far as risk management was concerned. The study had a geographical constraint in the Lusaka region, Zambia where the LWSSD Project was implemented. Focusing on Lusaka, the study was able to capture local conditions like institutional structures, regulatory environment and environmental conditions that affect the dynamics of risk-sharing in PPP projects..

### 1.7 Definition of Key Operations Terms

Public-Private Partnership (PPP).

PPP is an investment model that is characterized by the involvement of the private sector in infrastructural or social services where they take up major financial, technical and operational risks as part of the contracts with the authorities in Zambia (Cabinet Office, 2024).

Risk Sharing

Risk sharing In PPPs, risk sharing involves distributing project risks such as financial, operational, environmental and political risks, between the public and the private partners in proportion to their respective capacity to cope with them (Grimsey and Lewis, 2002).

Sanitation Infrastructure

Sanitation infrastructure refers to the systems, facilities, and services that are aimed at the safe management of human waste, wastewater, and hygiene (Mwale, 2020).

Drainage Systems

Drainage systems are designed mechanisms and natural functions, which can transport water either on the surface or underground to stop surface or underground flooding, erosion and waterlogging (Mwale, 2020).

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

This chapter reviews relevant literature on risk-sharing mechanisms in Public–Private Partnerships (PPPs), with specific focus on water supply, sanitation, and drainage infrastructure within the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project. It begins with a conceptual overview of risk-sharing in PPP infrastructure, outlining key risk categories and principles of allocation between public and private partners. The chapter then examines literature according to the study objectives, drawing from global, regional (Sub-Saharan Africa), and local (Zambia) perspectives to analyse how risk-sharing influences service delivery efficiency, operational performance, sustainability, and risk mitigation. It further presents the theoretical framework underpinning the study, grounded in Principal–Agent Theory and Transaction Cost Economics, and concludes with a conceptual framework and identification of knowledge gaps that justify the research.

## 2.2 Conceptual overview: risk-sharing in PPP infrastructure projects

Risk-sharing refers to the identification, allocation, and ongoing management of project risks between the public and private partners in a PPP. A common principle is that each risk should be assigned to the party best able to control, mitigate, and bear the consequences of that risk at least cost. In practice, risk allocation is operationalised through contractual provisions, performance standards, payment mechanisms, tariff and revenue arrangements, guarantees, and dispute-resolution clauses. In infrastructure sectors such as water, sanitation, and drainage, risks typically span construction and completion risks, demand and revenue risks, operational and maintenance risks, financial and macroeconomic risks, regulatory and political risks, and environmental and social risks (World Bank, 2017; Global Infrastructure Hub, 2019).

In water and sanitation utilities, risk-sharing is closely linked to service delivery outcomes because the party responsible for operations, revenue collection, and maintenance directly affects non-revenue water, continuity of service, water quality compliance, network expansion, and asset sustainability. In drainage, risk-sharing interacts with construction quality, routine maintenance of drains, solid waste management, and the system's resilience to extreme rainfall. Poorly structured risk allocation can produce either excessive risk transfer (reducing bankability and increasing costs) or insufficient transfer (weakening incentives for performance and undermining value for money).

## 2.3 Empirical literature review

### 2.3.1 Objective 1: To determine risk-sharing agreements in the LWSSD water supply component and their impact on service delivery efficiency.

#### *2.3.1.1 Global literature*

Global studies on PPPs in urban water utilities emphasise that risk-sharing agreements shape performance by defining incentives and responsibilities for operations, maintenance, investment, and customer service. Reviews of water PPP experience in developing countries show mixed outcomes, with improvements often observed in operational efficiency indicators such as continuity, billing and collection, and reductions in non-revenue water, but with frequent challenges related to affordability, political acceptance, and contract renegotiation (Marin, 2009; OECD, 2025).

The global PPP literature identifies several water-sector risks that are especially sensitive to allocation decisions. First is demand and revenue risk, driven by customer connections, consumption patterns, and tariff policies. Where the private operator bears significant revenue risk without credible tariff adjustment rules and enforcement, incentives may shift toward cost-cutting at the expense of service quality, or the contract may face early termination. A second set involves operational and maintenance (O&M) risks, including asset deterioration, staffing, and system losses. Performance-based contracts can mitigate O&M risks when they include measurable service standards (for example, hours of supply, water quality compliance, response times, and leakage targets) linked to payments or penalties. Third is regulatory and political risk, particularly in utilities where tariff setting is politically sensitive and enforcement is weak. Global guidance recommends structuring contracts with clear adjustment mechanisms, transparent performance monitoring, and dispute-resolution procedures to manage these risks (World Bank, 2017; Global Infrastructure Hub, 2019).

A recurring conclusion is that water PPPs perform better where risk allocation is realistic and matched to institutional capacity. Where regulators and contracting authorities have limited monitoring capability, assigning complex performance risks to private operators without robust verification systems can lead to disputes and weak accountability. Conversely, where government retains too many controllable risks (for example, billing enforcement or timely investment delivery), private incentives weaken and efficiency gains are limited. The global evidence therefore supports a balanced risk-sharing approach that prioritises operational

efficiency while protecting service affordability and social objectives (Marin, 2009; OECD, 2025).

#### 2.3.1.2 Regional literature

In Sub-Saharan Africa, PPPs in water utilities frequently take the form of management contracts, afterimage/lease arrangements, and hybrid service contracts rather than full concessions. A regional review of water PPPs in Africa notes that many arrangements seek to allocate operational and revenue-collection risks to local private operators while leaving capital investment largely with the public sector or donors, partly to maintain affordability and manage political risk (IFC, 2014).

Empirical studies from the region stress that risk-sharing is constrained by governance and institutional realities. Studies in Ghana's water sector, for instance, identify political interference, weak tariff enforcement, payment defaults, and inadequate data systems as significant constraints to effective PPP risk allocation. These constraints can undermine service delivery efficiency when responsibilities are unclear or when the private party lacks practical levers to manage risks assigned to it (Ameyaw and Chan, 2015a; Ameyaw and Chan, 2015b).

Regional literature also highlights that non-revenue water reduction is a central efficiency objective but depends on both technical and governance conditions. Leakage control requires investment, accurate metering, and enforcement against illegal connections. Where investment decisions and network rehabilitation remain largely public responsibilities, private operators may face limits in delivering NRW reductions even if contracts contain performance targets. This reinforces the argument that African water PPPs need risk-sharing agreements that align performance targets with control over critical inputs such as capital works, staffing, and customer management systems (IFC, 2014; Auriol and Blanc, 2006).

#### 2.3.1.3 Local literature

Zambia's legal and policy environment recognises PPPs as instruments for infrastructure delivery and service improvement. The Public Private Partnership Act of 2009 provides for the development and implementation of PPP agreements, including arrangements for construction, operation, rehabilitation, and expansion of public infrastructure. The framework implies that risk-sharing should be embedded in PPP agreements, with due consideration to transparency and long-term sustainability (Government of Zambia, 2009).

Within Lusaka, the LWSSD Project has been implemented as part of the Millennium Challenge Corporation (MCC) Zambia Compact, with infrastructure investment and technical assistance aimed at expanding and improving water supply and sanitation services and improving drainage in selected areas. Project scope documented by the Lusaka Water Supply and Sanitation Company (LWSC) includes rehabilitation of treatment facilities, NRW reduction, network expansion, and institutional strengthening, which are all directly linked to efficiency outcomes in water supply (LWSC, n.d.; MCC, 2023).

Local evidence from the final evaluation brief of the MCC-funded project indicates that infrastructure investments produced measurable household benefits for connected customers, including increased consumption and reduced time spent collecting water. The evaluation also notes persistent service challenges in some areas, including outages and water quality management gaps, and highlights weaknesses in utility maintenance practices. These findings imply that accountability arrangements for O&M and asset sustainability are pivotal to service delivery efficiency in Lusaka (Mathematica, 2023).

Taken together, Zambia's PPP framework, LWSC's operational mandate, and the MCC evaluation findings suggest that effective risk-sharing agreements in the water supply component must do more than specify responsibilities. They must create enforceable incentives for maintenance, NRW reduction, and water quality assurance, and they must be supported by credible monitoring and institutional capacity to sustain performance after construction.

#### 2.3.1.4 Synthesis and knowledge gaps

The reviewed literature demonstrates that risk-sharing agreements influence water service delivery efficiency through incentive structures, clarity of responsibilities, and enforceable performance monitoring. However, gaps remain regarding how risk-sharing is operationalised within specific multi-component projects such as LWSSD, where responsibilities are distributed across government agencies, utilities, contractors, and communities. There is limited project-specific empirical evidence on which risks were actually borne by which stakeholders, how those allocations affected maintenance and operational decisions, and how stakeholder perceptions of fairness and capability shaped the effectiveness of risk-sharing in practice. These gaps justify an in-depth inquiry into risk-sharing agreements and their efficiency implications in the Lusaka context.

### 2.3.2 Objective 2: To evaluate risk allocation in the LWSSD sanitation component and its effects on operational performance and sustainability.

#### *2.3.2.1 Global literature*

Global sanitation PPPs often focus on wastewater collection, conveyance, and treatment, including sewage treatment plants and sludge management. The literature indicates that sanitation projects have distinct risk profiles compared to water supply, particularly due to regulatory compliance risks (effluent standards), technology and process risks, and long-term O&M risks linked to treatment performance and sludge disposal. Studies on urban sewage treatment PPPs argue that PPP models can improve management and operational performance when contracts allocate operational risks to private operators while maintaining strong regulatory oversight and performance verification (Yang et al., 2017).

Risk allocation in wastewater PPPs is frequently framed around construction completion risk, process performance risk, and demand or throughput risk. Where treatment plants are paid based on verified outputs (for example, treated volume and compliance with effluent standards), private partners have incentives to optimise operations and maintain assets. However, where payment depends on inflows that are uncertain because sewer connections are incomplete or tariffs are politically constrained, financial risks can trigger renegotiation or underperformance. Research on efficient risk transfer in wastewater PPPs underscores that allocating risks to the party best able to manage them is associated with stronger project outcomes, but only when the allocation is supported by credible monitoring and enforceable contracts (Shrestha et al., 2017; Global Infrastructure Hub, 2019).

Sustainability in sanitation PPPs is also shaped by institutional capacity, including the ability to manage contracts, regulate environmental compliance, and finance lifecycle maintenance. Global guidance therefore stresses the importance of setting realistic service standards, ensuring funding for O&M, and integrating social considerations such as affordability and willingness to connect to sewer networks (World Bank, 2017; OECD, 2025).

#### 2.3.2.2 Regional literature

In Sub-Saharan Africa, sanitation PPPs are less common than water PPPs, but there is growing interest in leveraging private participation for fecal sludge management, treatment services, and maintenance of infrastructure. Regional evidence suggests that key constraints include limited sewer coverage, weak cost recovery, and fragmented institutional mandates across

utilities and local authorities. These constraints increase the importance of carefully allocating revenue, demand, and O&M risks. Where public agencies cannot guarantee sufficient inflows or predictable tariffs, sanitation PPPs may require blended financing or availability-based payments to remain viable (Auriol and Blanc, 2006; IFC, 2014).

African case study literature highlights that sanitation outcomes depend on coordinated investments across the sanitation chain. For example, treatment facilities alone cannot deliver performance improvements without adequate network connections, pump station reliability, and household uptake. This has implications for risk allocation, because the private operator's ability to meet performance requirements depends on upstream public investments and social programmes that drive connections. Regional policy debates therefore stress aligning risk allocation with a realistic division of responsibilities between utilities, municipalities, and private providers, accompanied by transparent monitoring and stakeholder engagement (IFC, 2014; OECD, 2025).

#### 2.3.2.3 Local literature

Local sanitation initiatives in Lusaka include the Lusaka Sanitation Project supported by the World Bank, which aims to increase access to sustainable sanitation services and strengthen the capacity of the Lusaka utility to manage services effectively. Such programmes underscore that sanitation performance is closely linked to institutional capacity, financing, and maintenance arrangements, all of which are influenced by how risks are allocated between government, utilities, contractors, and service providers (World Bank, 2015).

The LWSSD Project scope includes expansion of sewer networks, pump station upgrades, and improvements to sewage treatment facilities. These activities introduce sanitation risks that span construction quality, mechanical reliability, power and energy costs, sludge handling, and environmental compliance. Evidence from the MCC evaluation brief notes that relatively few households were connected to the sewer network several years after compact completion, indicating potential mismatches between infrastructure delivery and connection uptake. Such outcomes raise questions about demand and connection risks and about who bears responsibility for ensuring that sanitation infrastructure achieves intended operational performance and sustainability (Mathematica, 2023; LWSC, n.d.).

Local sanitation practice also reflects the interaction between citywide planning and project-level interventions. Public statements and programme documentation indicate that Lusaka's

sanitation expansion is guided by master planning initiatives and multi-partner financing, suggesting that risk allocation cannot be evaluated only within a single project contract. Instead, it requires examining the broader governance setting that shapes maintenance, cost recovery, and service delivery responsibilities (AfDB, 2019).

#### 2.3.2.4 Synthesis and knowledge gaps

The sanitation literature indicates that operational performance and sustainability depend on allocating O&M, performance, and environmental compliance risks to parties with the capacity to manage them, supported by credible monitoring. In Lusaka, the observed challenges of limited sewer connections and maintenance constraints suggest a need to examine how sanitation risks were anticipated, allocated, and managed in LWSSD, and how stakeholders perceived those arrangements. Empirical evidence remains limited on the effectiveness of risk allocation across the sanitation value chain within Lusaka's PPP-oriented and donor-supported infrastructure environment, creating a clear justification for the current study.

### 2.3.3 Objective 3: To assess risk management practices in the LWSSD drainage component, with emphasis on construction and environmental risks.

#### *2.3.3.1 Global literature*

Globally, drainage and stormwater infrastructure is increasingly framed as a resilience investment due to rising urban flood risks associated with climate variability, land-use change, and rapid urbanisation. Drainage PPPs and partnership models are less standardised than water utility PPPs, but the literature identifies comparable risk categories: construction and completion risks, design risks (including hydraulic adequacy), environmental and social risks, and long-term maintenance risks. Reviews of stormwater partnership arrangements suggest that success depends on clear institutional roles, sustained maintenance funding, and coordination between drainage, solid waste management, and land-use enforcement (Biddle, 2012).

Construction risk in drainage projects is closely linked to quality assurance and lifecycle performance. Drainage systems often fail not because they were not built, but because they were built to inadequate standards, blocked by waste, or not maintained. Environmental risks include pollution transport, erosion, impacts on downstream ecosystems, and public health risks associated with standing water. The global literature therefore stresses integrating

environmental management plans, community engagement, and maintenance responsibilities into the core risk-sharing framework, rather than treating these as secondary concerns (Biddle, 2012; World Bank, 2017).

#### 2.3.3.2 Regional literature

In Sub-Saharan African cities, drainage risk management is shaped by informal settlement growth, limited municipal budgets, and weak enforcement of land-use regulations. These conditions amplify environmental risks such as blocked drainage channels, erosion, and contamination, and they also complicate the assignment of responsibilities for maintenance and waste management. Regional climate and urban governance studies emphasise that drainage improvements must be paired with solid waste management, community participation, and institutional coordination to deliver sustained flood reduction benefits (FRACTAL, 2019).

The regional evidence suggests that risk-sharing for drainage is frequently fragmented across multiple actors, including municipal councils, utilities, road agencies, disaster management institutions, and communities. This fragmentation increases coordination risk, where project outcomes depend on actors performing complementary tasks. It also increases the importance of monitoring and enforcement because drainage benefits can be undermined by illegal dumping, unplanned construction in flood-prone areas, and inadequate routine maintenance. These realities imply that risk-sharing frameworks for drainage in African cities should explicitly address coordination and behavioural risks, not only engineering risks.

#### 2.3.3.3 Local literature

Local literature consistently identifies Lusaka's flooding as a recurrent urban risk driven by heavy rains, topography and geology, and compounded by poor drainage design, blocked drains, and uncoordinated development. Policy-oriented work on Lusaka flooding emphasises that flooding contributes to public health risks and damages infrastructure, and that climate projections indicate a risk of more intense rainfall events (FRACTAL, 2019).

Recent institutional initiatives in Lusaka include drainage-related disaster risk reduction interventions in flood-prone areas such as Kanyama, implemented with support from partners including UN-Habitat and the Lusaka City Council. Such initiatives highlight that drainage risk management depends on both infrastructure and governance, particularly the ongoing maintenance of drains and the management of solid waste that can obstruct flow (UN-Habitat, n.d.).

Evidence from the MCC evaluation brief indicates that households located near new drainage infrastructure were substantially less likely to experience flooding, demonstrating that drainage investments can yield measurable benefits. However, sustaining these benefits depends on continued maintenance and effective coordination among responsible institutions. The LWSSD drainage component therefore provides a practical case for examining how construction quality risks, environmental risks, and maintenance responsibilities were managed and shared among project stakeholders (Mathematica, 2023).

#### 2.3.3.4 Synthesis and knowledge gaps

While the global and regional literature provides useful principles for managing construction, environmental, and maintenance risks in drainage infrastructure, there is limited empirical evidence on how these risks are structured and managed within multi-component projects in Zambia. In particular, few studies systematically document the practical mechanisms used to enforce construction quality, manage environmental risks, and ensure routine maintenance after project completion. These knowledge gaps justify a focused assessment of drainage risk management practices in the LWSSD Project and the institutional arrangements that influence long-term effectiveness.

## 2.4 Theoretical Framework

A theoretical framework gives us the conceptual basis of the relationship of the variables and interpretation of the results. To conduct the study of the LWSSD Project, the analysis will be conducted based on two theories: Principal-Agent Theory and the Transaction Cost Economics (TCE). Both interpret how the interaction of both the public and the private works, how they distribute risk and how they handle uncertainty in complex infrastructures and demonstrate how the design of contracts and their incentive structure impact efficiency, cost-effectiveness, and sustainability.

### 2.4.1 Principal–Agent Theory

The principal-Agency Theory was first developed by Jensen and Meckling (1976) and polished by Eisenhardt (1989), explaining the interaction between a principal, the government or the general authority and an agent, which is a company providing services to the government. The theory also makes the assumption that both the parties are acting in self-interest and that there is information asymmetry and that the agent tends to have more information than the principal.

This imbalance has the potential to cause moral hazard and adverse selection which is detrimental to the projects results (Eisenhardt, 1989).

Moral hazard is encountered in PPPs when the private partner is interested in profit or risk avoidance, whereas adverse selection is experienced when the public partner is not able to precisely evaluate the ability of the private partner before signing the contract (Osei-Kyei and Chan, 2017). Principal-agent theory thus provides a method of reaching an alignment of incentives. Opportunistic behavior is minimized by provision of clear contractual obligations, performance-based payments and monitoring systems to enhance efficiency in delivery (Mwale, 2020). In the LWSSD Project, the theory explains the way, in which the balanced distribution of risks between Lusaka Water and Sewerage Company and its partners in the private sector could improve the accountability, transparency, and quality of services. Finally, Principal-Agency Theory also connects the risk-sharing process (independent variable) with service-delivery efficiency (dependent variable) by behavioral interactions and incentive systems (Zulu & Banda,Touch, 2020).

### 2.4.2 Transaction Cost Economics (TCE)

TCE, which is the brainchild of Coase (1937) and furthered by Williamson (1981), is interested in the costs of negotiating, monitoring, and enforcing agreements. These costs involve drafting contracts, compliance and dispute resolution in PPPs. According to the theory, organizations desire governance structures that have low-cost of transactions and safeguard against opportunism. Ineffective risk allocation increases transaction costs through high rate of renegotiations, lawsuits, and ineffective monitoring (Williamson, 1981). On the other hand, distributing the risk among those that can handle it best minimizes the transaction costs, which results in a more relaxed implementation and greater sustainability (Osei -Kyei and Chan, 2017).

The significance of well-developed contracts with a well-defined distribution of roles, responsibilities, and risk-management strategies is also emphasized in the LWSSD Project. To illustrate, one can transfer technical risks to the expertise of privately operating companies, but the government can take the regulatory or political risks as an example, which helps to minimize uncertainty and administrative load (Mwale, 2020). The reduction of transaction costs caused by the use of clear contracts leads to increased efficiency of operations, cooperation development and the use of resources. In this way, TCE lays stress on the fact that

effective risk-sharing structures are key governance tools that affect cost-effectiveness and sustainability.

### 2.4.1 Integration of Theories

A combination of Principal- Agency Theory and TCE provides a complete perspective of analyzing PPP performance. Principal- Agency Theory deals with the problem of behavioural and incentive congruency; TCE deals with institutional and contractual efficiency. They combine their explanations on how the risk-sharing systems eliminate governance costs and information asymmetries (Eisenhardt, 1989; Williamson, 1981). In such projects as the LWSSD, effective risk sharing harmonises the interests of both the government and the business organisation, reduces opportunism and minimizes monitoring and enforcement expenses. Agency problems, increased transaction costs and poor outcomes are aggravated by poor arrangements.

Thus, the combined theories show that the key independent variable is the efficient risk-sharing that affects the project performance. It builds trust to each other, better coordination and general success of PPP infrastructure projects. This conceptual framework establishes the LWSSD Project in a sound conceptual framework to bridge the contractual design, stakeholder behavior, and project efficiency in the changing PPP environment in Zambia.

## 2.5 Conceptual Framework

The conceptual framework provides a visual and analytical representation of the relationships between key variables in the study. It illustrates how risk-sharing mechanisms in Public-Private Partnerships (PPPs) influence the performance of water supply, sanitation, and drainage projects, specifically within the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project.

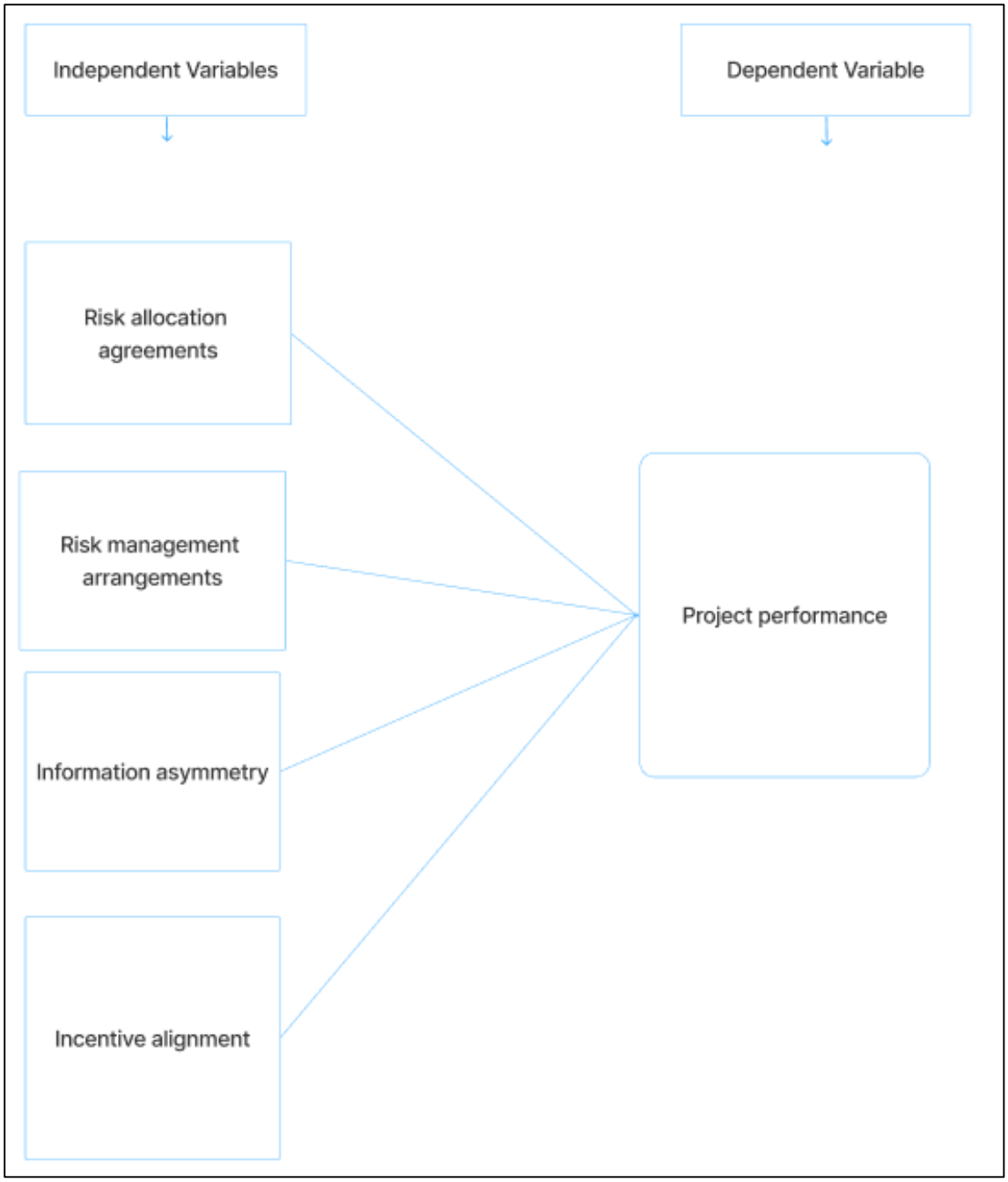



***Figure 1: Conceptual framework (Author, 2026)***

The framework includes moderating variables, such as regulatory frameworks, capacity of stakeholders, institutional support, which could reinforce or reduce the risk-sharing impact on the outcome of the project. Through the arrangement of the study that has been conducted based on these variables, the framework will provide a methodical structure to examine the sharing of risks, the operational effectiveness that occurs because of this sharing, and possible policy and managerial enhancements to the PPP projects of Lusaka. This will be used to make sure

that not only will the study explore whether there is or is not risk-sharing mechanisms, but also analyze whether they have any practical implications to the delivery of urban water and sanitation and drainage services.

The mechanism of risk-sharing in PPPs are defined as contractual assignments and strategies that distribute the risks in the public sector (government) and the private partners, regarding the ability of each party to handle the risks in the most efficient manner. These mechanisms are vital in that they form incentives, promote collaboration and determine the viability, sustainability and success of infrastructure development. An example is that risks like construction delays or cost increase are normally transferred to the private partner, who normally has control in execution. The public sector is still subject to regulatory changes or political uncertainty. The efficient risk-sharing will result in equal duties and economic responsibility and will encourage both parties to maximize performance and service delivery. Poor or inappropriate risk distribution is associated with higher transaction costs, moral hazard and adverse-selection issues which would negatively affect efficiency and money value.

As far as the objectives of the study are concerned, the risk aspect is in the middle. It also looks into the impact of various risk-sharing mechanisms (independent variables) on service-delivery efficiency, operational performance, sustainability and mitigation of risks (dependent variables) in the water-supply system, sanitation system and drainage system of Lusaka. The theories present the explanatory variables and cause and effect relationships of how risk allocation and risk management affect the success of a project. Therefore, the theoretical framework demonstrates the study objectives because it clearly forms a connection between risk-sharing mechanisms (based on the PPP contract structure and governance) and the effects on project and service outcomes through the intervention of the information asymmetry, incentive alignment, and transaction costs.

### 2.6 Gaps in Knowledge

Despite the growing implementation of Public-Private Partnerships (PPPs) in Zambia, particularly in sectors like water supply, sanitation, and drainage, there remains a significant gap in the understanding of effective risk-sharing mechanisms in these projects. While several studies have explored the general principles of risk allocation in PPPs, limited research has specifically addressed how these mechanisms function in the context of Zambian infrastructure projects, such as the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project. Existing literature on risk-sharing in PPPs often focuses on developed economies or general

PPP models, leaving a gap in empirical evidence and theoretical insights tailored to Zambia's unique economic, political, and institutional environment. Furthermore, much of the existing work fails to explore the long-term effects of these risk-sharing mechanisms on project performance, sustainability, and the equitable distribution of benefits. This research aims to bridge this gap by providing an in-depth analysis of the risk-sharing dynamics within the LWSSD Project, offering recommendations for improving the design and implementation of PPP agreements in Zambia's public infrastructure sector.

# CHAPTER THREE: METHODOLOGY

## 3.1 Introduction

This chapter presents the methodological procedures used to investigate risk-sharing mechanisms in the Lusaka Water Supply, Sanitation and Drainage (LWSSD) Public–Private Partnership (PPP) Project. It outlines the research approach and design adopted for the study, and explains how the study population was defined to capture the perspectives of key stakeholder groups, namely government officials, private-sector partners/contractors, and community representatives. The chapter further details the determination of sample size, the sampling techniques applied to select respondents and key informants, and the data collection instruments used, specifically open-ended questionnaires and semi-structured interview guides.

In addition, the chapter explains the procedures followed in analysing the data, including the use of SPSS for descriptive statistical summaries of questionnaire responses and Microsoft Excel for data cleaning, tabulation, and graphical presentation of patterns and trends. Finally, the chapter addresses the ethical considerations that guided the study, including informed consent, confidentiality and anonymity, and the avoidance of harm. Collectively, these methodological choices were intended to generate credible evidence on how risks were identified, allocated, and managed among stakeholders, and how such arrangements influenced outcomes across the project's three service areas: water supply, sanitation, and drainage

## 3.2 Research Approach

The study adopted a quantitative research design using a survey approach to examine risk-sharing mechanisms in the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project. A quantitative design was appropriate because the study sought to measure relationships between risk allocation practices and project performance indicators in a systematic and objective manner. The survey enabled the collection of structured data from a large number of stakeholders involved in or affected by the project. Closed-ended questionnaires were used to gather measurable data on stakeholders' perceptions, experiences, and assessments of risk-sharing practices. This design facilitated statistical analysis of patterns and trends across the water supply, sanitation, and drainage components of the project..

## 3.3 Research Design

To collect the information, we adopted a survey-based research design to provide insights of a large number of stakeholders who were involved or impacted by the LWSSD Project. A survey

is also the best option to gather the systematic data regarding the perceptions, experiences, and problems connected with risk-sharing concerning the PPPs (Kothari, 2004). Detailed responses were obtained in the open-ended questionnaires where the respondents were able to elaborate their experiences, opinions, and suggestions. This design not only allowed us to test operational and managerial issues of risk-sharing in the three project elements such as water supply, sanitation and drainage but also in determining where risk management measures affect performance.

### 3.4 Research Population

All major stakeholders that were directly involved or affected by the LWSSD Project were used as the research population. It comprised approximately 50 government officers of the Ministry of Water, Sanitation and Development and Lusaka City Council, approximately 80 partners and contractors in the private sector (project managers, staff, engineers), and approximately 300 community members and residents of the neighbourhoods serviced. Overall, approximately 430 stakeholders with pertinent knowledge and experience of risk-sharing mechanisms, operational issues, and performance consequences were enrolled in the study. The use of this population guaranteed the assortment of visions on the distribution of risks and management of water supply, sanitation, and drainage aspects in the project.

### 3.5 Sample Size

To ensure adequate representation of all key stakeholder categories, separate sample sizes were calculated for the two major groups in the study, government officials and community representatives using Yamane's (1967) formula. This approach addressed the need to generate reliable, representative data from both institutional and community levels of the Lusaka Water Supply, Sanitation, and Drainage (LWSSD) Project. The formula used was:

$$\boldsymbol{n} = \frac{N}{1+N(e)^2}$$

Where:

$n$ = sample size

$N$ = population size (430)

$e$ = margin of error (0.10)

Sample for Government Officials

The government officials constituted a population of 50 individuals drawn from the Ministry of Water Development and the Lusaka City Council. Applying the formula:

$$\boldsymbol{n} = \frac{50}{1+50(0.1)^2}$$

$$\boldsymbol{n} = \frac{50}{1 + 0.5}$$

$$\boldsymbol{n} = \frac{50}{1.5}$$

$$\boldsymbol{n = 33\ respondents}$$

Therefore, a total of 33 government officials were selected to participate in the study. This number was considered sufficient to obtain a broad representation of views from officials

Responsible for regulation, oversight, and policy implementation.

### 3.6 Sample for Community Representatives

Community representatives and residents formed the largest stakeholder group, with an estimated population of 300individuals from neighbourhoods served by the LWSSD Project. Applying the same formula:

$$\boldsymbol{n} = \frac{300}{1+300(0.1)^2}$$

$$\boldsymbol{n} = \frac{300}{1+3}$$

$$\boldsymbol{n} = \frac{300}{4}$$

$$\boldsymbol{n = 75\ respondents}$$

Hence, 75 community members were selected to provide insights into how risk-sharing mechanisms affected service delivery and project outcomes at the grassroots level.

### 3.7 Private Sector Participants

Another interview method we used was purposive interviewing of key partners and contractors in the private sector (approximately 80 individuals) in order to obtain expert opinion regarding contracts, risk distribution, and performance of operations.

A total of 108 participants were included in the study, comprising 33 officials, 75 community participants, and the key informants of the private-sector identified. This hierarchical methodology compromised institutional, technical, and community perspectives and enhanced the validity of the results about risk-sharing in the LWSSD Project.

### 3.8 Sampling Techniques

The sample size of 81 respondents was selected by means of a stratified random sampling approach among the 430 stakeholders. There were three groups comprising the population, including government officials, partners and contractors of the private-sector, and the representatives of the community. All the strata were proportionately represented: 9 officials, 15 partners of the private sector and 57 community members. The sampling was random in each of the strata so that every member received an equal opportunity to be selected to minimize biases and maximise representativeness. This approach ensured that a broad scope of views was taken and made sure that all the important stakeholders who were either directly involved in the LWSSD Project or impacted by it provided their views.

### 3.9 Data Collection

Data were collected using a structured questionnaire designed to obtain quantitative information on risk-sharing mechanisms and project performance. The questionnaire contained closed-ended questions measured on rating scales to capture respondents' perceptions of risk allocation, mitigation strategies, institutional capacity, and service delivery outcomes across the project components.

#### 3.9.1 Questionnaires

The structured questionnaire was administered to the selected respondents. It collected data on key variables such as identification of risks, allocation of responsibilities, effectiveness of mitigation measures, and perceived performance of water supply, sanitation, and drainage services. The use of standardised questions ensured consistency of responses and facilitated statistical analysis.

## 3.10 Data Analysis

We examined questionnaires and interviews to identify patterns, themes and relationships related to risk-sharing in the LWSSD Project. It was on the role of risk allocation in determining the performance of water supply, sanitation, and drainage aspects. .

### 3.10.1 SPSS Analysis

The data of the quantitative questionnaires was inputted into SPSS to be analyzed. The SPSS generated descriptive statistics including frequencies, percentages, cross-tabulations in order to summarise the response and indicate trends as well as evaluate the efficacy of risk-sharing among the parts of the project. It proved particularly helpful with numerical data on the risk perception, satisfaction of the stakeholders, and operation performance.

### 3.10.2 Microsoft Excel Analysis

Excel was used to tabulate, chart and graphically represent data. It was used to complete SPSS as it displayed vivid graphical patterns and trends. Excel simplified comparison across groups of stakeholders and project elements and offered a convenient format in which findings could be presented. It was also useful to clean and validate information prior to specific SPSS analysis.

## 3.11 Ethical Considerations

### 3.11.1 Informed Consent

The purpose and goals of the study were explained to the respondents before the data was collected. They were given the chance to ask questions and were requested to become voluntary participants. This was so that no one was left behind on what to do, but everyone was willing to give in without being forced.

### 3.11.2 Confidentiality and Anonymity

Every subject was maintained as confidential and anonymous. The responses were not associated with individual identities and personal information was safely stored. This established a secure environment of risk-sharing information on the LWSSD Project.

### 3.11.3 Avoidance of Harm

The experiment did not imply any physical, psychological, or social harm. Questions were created in a way that is non-invasive and respectful and participants were assured that their responses would not be used to their detriment. This safeguarded the well-being of the participants during the study

# CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION OF FINDINGS

## 4.1 Introduction

This chapter presents the analysis and discussion of quantitative data collected from 81 respondents using structured questionnaires. The analysis focuses on the influence of risk-sharing mechanisms on the performance of water supply, sanitation, and drainage services in the LWSSD Project. The collected data were coded and analysed using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel. Descriptive statistical techniques, including frequencies, percentages, and cross-tabulations, were used to summarise respondents' characteristics and examine patterns in perceptions of risk allocation, mitigation practices, and project performance. The findings are discussed in relation to the study objectives and existing literature in order to identify consistencies, divergences, and practical implications for PPP infrastructure management.

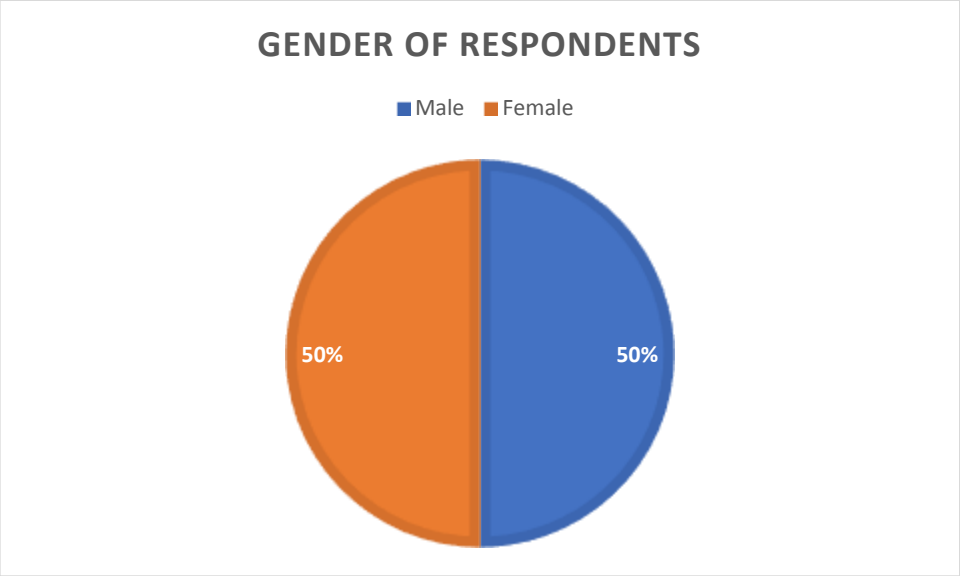
## 4.2 Demographic Characteristics of Respondents

The demographics of the respondents will be presented below: 4.2 Demographic Characteristics of Respondents. The research initially focused on the demographic character of the participants. Out of the 81 respondents 57 per cent were representatives of the community, 19 per cent were representatives of the private sector, 12 per cent were government representatives and 12 per cent not mentioned. The proportion of gender was 60:40 male feminine. The majority of the respondents (65 %) had over five years of experience in water, sanitation or drainage industries and this guaranteed the research of capturing well informed views on risk-sharing mechanisms. This population distribution gave equal representation to every group of stakeholders.

### 4.2.1 Gender of Respondents

This segment presents the gender distribution of the 81 respondents involved in the study.

***Figure 2:*** *Gender of the Respondents*




**Source: Author's computation (2026)**

These respondents established that 49 of the respondents (60.50) were male and 32 respondents (39.50) were female. This implies an increase in the number of males, which is in tandem with the usual gender representation of the water supply, sanitation, and drainage project in Zambia, since male gender is normally represented in technical and managerial positions. The level of female participation, although less meaningful, was still high and so was an indication of women's involvement in community representative and project management activities.

**Table 4.1: Gender Distribution Across Stakeholder Groups**

| **Stakeholder Group** | **Male** | **Female** | **Total** |
|---|---|---|---|
| Community Representatives | n=34 (59.6%) | n=23 (40.4%) | n=57 (100%) |
| Private Sector Partners | n=10 (66.7%) | n=5 (33.3%) | n=15 (100%) |
| Government Officials | n=5 (55.6%) | n=4 (44.4%) | n=9 (100%) |
| **Overall** | **n=49 (60.5%)** | **n=32 (39.5%)** | **n=81 (100%)** |

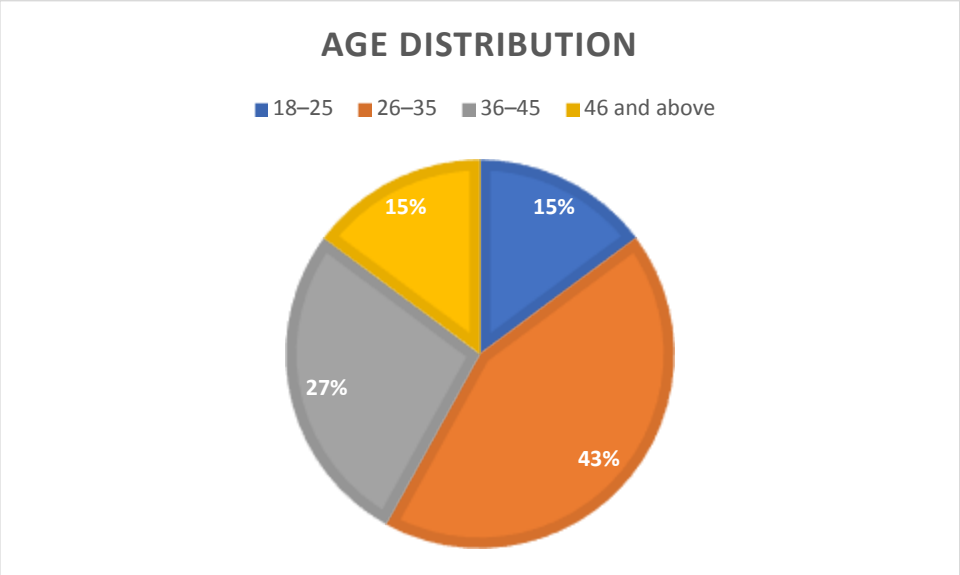
| | | | |
|---|---|---|---|
| | | | |

It was revealed that in the whole group of stakeholders, male respondents (60.5) prevailed over female respondents (39.5). The male representation was the greatest in the private sector partners.

### 4.2.2 Age of Respondents

This segment examines the age distribution of respondents, which provides context on the generational composition of stakeholders in the LWSSD Project.

***Figure 3:*** *Age of the Respondents*



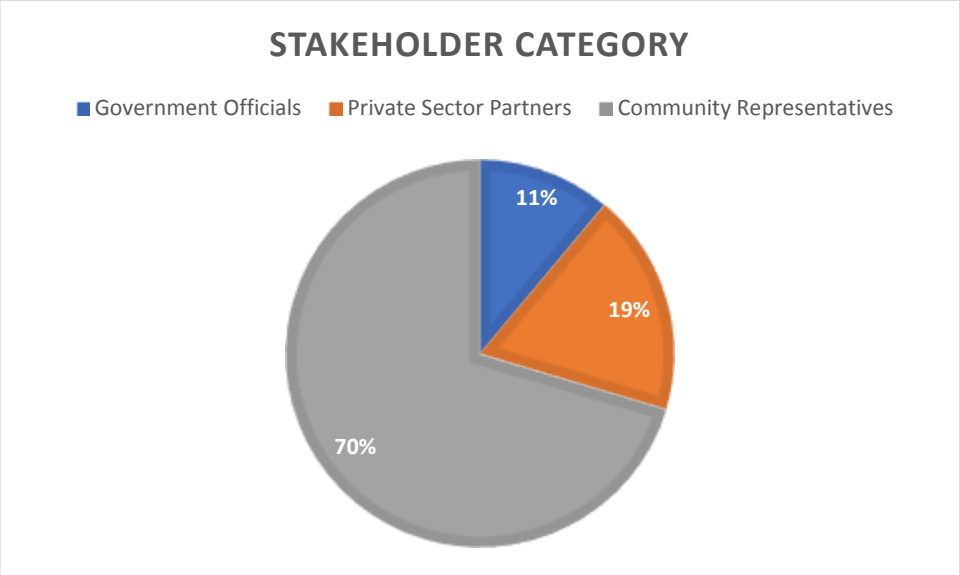

**Source: Author's computation (2026)**

The age distribution demonstrated that 12 respondents (14.8 -25) were between 18 and 25 years old, 35 respondents (43.2 -25) were between 26 and 35 years old, 22 respondents (27.2 -25) were between 36 and 45 years old and 12 respondents (14.8 -25) were over 46 years old. The most numerous, 26-35, included mid-career professionals, such as employees of the private sector, and community representatives on the move, which refers to a fairly young yet experienced working generation.

### 4.2.3 Stakeholder Category

This section presents the distribution of respondents across different stakeholder categories involved in the LWSSD Project.

***Figure 4:*** *Stakeholder Category*




**Source: Author's computation (2026)**

It was analyzed that 9 respondents (11.1) were government representatives, 15 respondents (18.5) were partners in the private sector, and 57 respondents (70.4) were representatives of the community. The leadership of the representatives of the communities will not be surprising as the residents in Lusaka are the main beneficiaries of the project. Government executives also presented their take on policy, monitoring and regulatory policies, whereas the partners in the private sector offered technical and operational approach. The distribution will make the study capture the different stakeholder perspectives, as well as, to have a comprehensive analysis of risk sharing mechanisms in water supply, sanitation and drainage projects.

### 4.2.4 Years of Experience

This section examines the years of experience of the respondents, and this assists in assessing their professionalism and knowledge of risk-sharing mechanisms in the LWSSD Project.

**Table 2: Professional Experience Distribution for Private Sector and Government Officials**

| Experience Range | Private Sector Partners | Government Officials | Total |
|---|---|---|---|
| 0-5 years | n=3 (20.0%) | n=3 (33.3%) | n=6 (25.0%) |
| 6-10 years | n=7 (46.7%) | n=3 (33.3%) | n=10 (41.7%) |
| 11-15 years | n=3 (20.0%) | n=2 (22.2%) | n=5 (20.8%) |
| 16+ years | n=2 (13.3%) | n=1 (11.2%) | n=3 (12.5%) |
| Total | n=15 (100%) | n=9 (100%) | n=24 (100%) |

**Source: Field data (2026)**

The experience profile reveals that 80 percent of respondents in the private sector had six years or more years of professional experience in water infrastructure projects, with almost half (46.7 percent) of them having 610 years of experience. This high level of experience is an indicator of the technical specific professional experience that needs to be applied in the water supply, sanitation, and drainage PPPs. The fact that 13.3 per cent are above 16 years' experience means that it has retained old professional engineering and management who offer institutional memory and technical richness. The respondents in the private sector had only 20% experience of 0 5 years and this might imply that the private partner had a relatively stable and experienced workforce during the project implementation. There was a more balanced experience distribution in government officials, where 66.6 percent had six or more years of experience in policy, regulation or project oversight in the water sector. Nevertheless, 33.3% experienced 0-5 years' experience, which is more powerful staff turnover in the positions of the public sector than the private sector.

## 4.3 Risk-Sharing Mechanisms in Water Supply

**Table 4.2: Stakeholder Responses on Risk-Sharing Mechanisms in Water Supply**

| Statement | Stakeholder Group | SD (%) | D (%) | N (%) | A (%) | SA (%) | Mean | Interpretation |
|---|---|---|---|---|---|---|---|---|
| Risk-sharing has improved water supply reliability | Community (n=57) | 7.0 | 12.3 | 19.3 | 42.1 | 19.3 | 3.54 | Moderate agreement |
| | Private Sector (n=15) | 0.0 | 6.7 | 6.7 | 53.3 | 33.3 | 4.13 | Strong agreement |
| | Government (n=9) | 0.0 | 0.0 | 11.1 | 44.4 | 44.5 | 4.33 | Strong agreement |
| Private sector brings technical expertise to water supply | Community (n=57) | 3.5 | 8.8 | 14.0 | 49.1 | 24.6 | 3.82 | Moderate-strong agreement |
| | Private Sector (n=15) | 0.0 | 0.0 | 6.7 | 40.0 | 53.3 | 4.47 | Very strong agreement |
| | Government (n=9) | 0.0 | 0.0 | 0.0 | 55.6 | 44.4 | 4.44 | Very strong agreement |
| Water supply risks are fairly allocated | Community (n=57) | 10.5 | 19.3 | 26.3 | 31.6 | 12.3 | 3.16 | Neutral-moderate agreement |
| | Private Sector (n=15) | 6.7 | 13.3 | 13.3 | 46.7 | 20.0 | 3.60 | Moderate agreement |
| | Government (n=9) | 0.0 | 11.1 | 11.1 | 55.6 | 22.2 | 3.89 | Moderate-strong agreement |
| Water supply infrastructure maintenance is adequate | Community (n=57) | 12.3 | 24.6 | 22.8 | 28.1 | 12.2 | 3.03 | Neutral |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Private Sector (n=15) | 6.7 | 20.0 | 20.0 | 40.0 | 13.3 | 3.33 | Neutral-moderate |
| | Government (n=9) | 11.1 | 11.1 | 22.2 | 44.5 | 11.1 | 3.33 | Neutral-moderate |
| Service interruptions have reduced since PPP implementation | Community (n=57) | 8.8 | 15.8 | 24.6 | 38.6 | 12.2 | 3.30 | Neutral-moderate agreement |
| | Private Sector (n=15) | 0.0 | 6.7 | 13.3 | 60.0 | 20.0 | 3.93 | Moderate-strong agreement |
| | Government (n=9) | 0.0 | 11.1 | 11.1 | 55.6 | 22.2 | 3.89 | Moderate-strong agreement |

**Source: Field data (2026)**

**Key:** SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

he mixed evaluation of the performance of water supply was given by the community representatives (70.4 per cent. of the respondents). Although 61.4% thought that risk-sharing enhanced reliability of water supply, they rated it with a mean of (3.54) which is relatively low compared to other stakeholders. This creates optimism but with cautions to those that are the end users who are the persons that receive service delivery. The community members identified the private sector technical expertise (73.7 0 -100 exact agreement) and were very concerned about fair distribution of risks, with only 43.9 0 100 agreeing that there is fair allocation of risks. This perception gap means that communities are over-burdened with one of the risks especially financial risks like tariff increases and service affordability.

In addition, community respondents noted infrastructure maintenance adequacy (mean= 3.03) as the most critical, and 40.3% of the respondents agreed that there is adequate maintenance. This is in line with their real-life experience of deteriorating infrastructure and intermittent shortage in peri-urban locations. According to the interviews, one of the community representatives said: Water comes in three days, and in a week it stops. We settle the bills yet

the pipes are worn and are continually breaking. This qualitative observation supports quantitative results that maintenance is one of the critical unresolved risks even with the implementation of PPP.

The strongest agreement was shown by the partners of the private sector (18.5% of respondents) that scored 3.33 to 4.47 as a mean score on all indicators of water supply. Their greatest consensus was on the contribution of technical expertise (mean=4.47, 93.3% agreement) which indicated that they are confident about their ability to operate. Nevertheless, private partners also admitted shortage in infrastructure maintenance (mean 3.33), indicating that it is a structural issue that needs more investment and not operational inefficiency.

The private sector respondents agreed moderately to strongly (66.7) that there has been a decrease in service interruptions meaning that there have been quantifiable changes in the operation of the respondents. An example given by a manager of a private sector: We have cut the water loss by 45 per cent to 32 per cent during the past three years due to a superior leak detection and network management. This reflects real benefits of efficiency that can be attributed to risk-sharing structures that distributed risks of operations to the party which was well placed to handle risks.

Government officials (11.1% of the respondents) made the highest positive ratings, with mean scores of 3.33-4.44. Their high perceptions of technical skills (mean = 4.44) and service reliability enhancements (mean = 4.33) imply that they are satisfied with the results of PPP concerning policy and oversight issues. The confidence of government respondents on fair risk allocation (mean = 3.89) was greater than that of community representatives, which means that there is a disconnect between the policy development and the experience of ground-level implementation.

Nevertheless, the government representatives admitted to the maintenance issues as well (mean= 3.33 with 22.2 fail to agree), as the renewal of infrastructure is still lacking funding. One of the government officials in interviews clarified this by saying: The contract assigns the responsibility of maintenance, but no one has the budget to fund a major capital rehabilitation. The greatest challenge, this is to us. This confession creates an important missing element in the risk-sharing model in which the financial risks of rejuvenating infrastructure are between the public and the private mandates.

Partially, these findings support the theory of Public-Private Partnership by Grimsey and Lewis (2004) that suggests that it is through the allocation of risks to parties that are best positioned

to handle a particular risk that the performance of the project is improved. This principle is confirmed by the data in the aspects of operations: the administration of the private sector was more reliable (mean scores of 4.13 and 4.33 of the private and governmental sector respectively). The assumption of the theory of optimal risk-allocation is however criticised by community perceptions of inequitable allocation of risks (mean=3.16), whereby, risk-sharing schemes may be dominated by an emphasis on operational efficiency, rather than equity issues.

Its results also agree with those of Yescombe (2017) who states that the risks of long-term sustainability, especially infrastructure erosion, cannot be entirely offloaded onto the shoulder of the private partners. Maintenance was a concern to all stakeholder groups (means of 3.03 to 3.33), which took the form of systemic failure in assigning the financial responsibility of capital-intensive renewal works. This is inconsistent with the principle of optimal risk allocation and indicates that the LWSSD contract can be afflicted with what Hodge and Greve (2017) call incomplete risk specification, whereby some risks are not allocated or they are not allocated ambiguously between the parties.

The biggest result is the discrepancy between the community perceptions (mean= 3.16 on fair allocation) and government perceptions (mean= 3.89), which is a 23 percent difference in the perceptions. This gap is a pointer that risk-sharing arrangements might seem fair in terms of contractual/policy but result in unbalanced allocation of burden at the community level, especially in terms of affordability and access to services. These extremes were bracketed by the scores of the private sector, which implies that the latter appreciate the issue of contractual fairness and the difficulties in contract implementation.

### 4.4 Risk Allocation and Operational Performance in Sanitation

**Table 4.3: Stakeholder Responses on Risk Allocation in Sanitation Services**

| Statement | Stakeholder Group | SD (%) | D (%) | N (%) | A (%) | SA (%) | Mean | Interpretation |
|---|---|---|---|---|---|---|---|---|
| Risk-sharing improved sanitation service delivery | Community (n=57) | 5.3 | 14.0 | 24.6 | 38.6 | 17.5 | 3.49 | Moderate agreement |
| | Private Sector (n=15) | 0.0 | 6.7 | 13.3 | 53.3 | 26.7 | 4.00 | Strong agreement |
| | Government (n=9) | 0.0 | 0.0 | 11.1 | 44.4 | 44.5 | 4.33 | Strong agreement |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Private sector accountability has increased in waste management | Community (n=57) | 3.5 | 10.5 | 17.5 | 50.9 | 17.6 | 3.68 | Moderate-strong agreement |
| | Private Sector (n=15) | 0.0 | 0.0 | 13.3 | 53.3 | 33.4 | 4.20 | Strong agreement |
| | Government (n=9) | 0.0 | 0.0 | 11.1 | 55.6 | 33.3 | 4.22 | Strong agreement |
| Sanitation risks are appropriately allocated | Community (n=57) | 8.8 | 21.0 | 28.1 | 31.6 | 10.5 | 3.14 | Neutral |
| | Private Sector (n=15) | 6.7 | 6.7 | 20.0 | 53.3 | 13.3 | 3.60 | Moderate agreement |
| | Government (n=9) | 0.0 | 11.1 | 22.2 | 44.5 | 22.2 | 3.78 | Moderate-strong agreement |
| Community compliance with sanitation practices is adequate | Community (n=57) | 15.8 | 28.1 | 22.8 | 24.6 | 8.7 | 2.82 | Neutral-disagree |
| | Private Sector (n=15) | 20.0 | 33.3 | 20.0 | 20.0 | 6.7 | 2.60 | Disagree |
| | Government (n=9) | 11.1 | 33.3 | 22.2 | 22.2 | 11.2 | 2.89 | Neutral-disagree |
| Funding mechanisms for sanitation are sustainable | Community (n=57) | 17.5 | 26.3 | 26.3 | 22.8 | 7.1 | 2.75 | Neutral-disagree |
| | Private Sector (n=15) | 13.3 | 26.7 | 26.7 | 26.7 | 6.6 | 2.87 | Neutral-disagree |
| | Government (n=9) | 11.1 | 22.2 | 33.3 | 22.2 | 11.2 | 3.00 | Neutral |

**Source: Field data (2026)**

There was moderate agreement between the representatives of the community (56.1% that risk-sharing enhanced sanitation provision. They scored on average 3.49 which is lower than the 4.33 of the government officials, demonstrating a 24% gap in perceptions. Responsibility to

the waste management by the private-sector was also reported more in communities (68.5 per cent agreement, mean= 3.68) which showed visible improvements in service reliability and responsiveness. One of the leaders of the community remarked: When there is the private company, weeks would pass with no garbage being collected. Collection is now more frequent, and one has someone to call in case of any trouble.

Nevertheless, the communities disapproved of the equitability of risk distributions in sanitation (42.1 only agreement, mean =3.14). Twenty-nine-point eight percent of the respondents disagreed and 28.1 percent were neutral. This implies that the performance in operation was enhanced but communities feel that they disproportionately face risks particularly as far as sanitation rates, connection charges and home infrastructure are concerned. The issues of affordability were expressed during the focus-group interviews: many families expressed that they cannot afford to be connected to sewer pipes. Who is this risk to us when we cannot pay?

Above all, the communities considered low adherence to sanitation practices as a significant challenge (mean = 2.82). It was only 33.3 per cent who said compliance is sufficient. This is also an indication of knowledge on behavioral risks which are likely to destroy the effectiveness of sanitation including unlawful connections, inappropriate disposal of waste and opposing the user fees. This was explained by a community health worker: people are aware of the rules, but they do not act following them, as they think that sanitation is the task of the government, not their own. It is what we need, not only education, but enforcement.

Funding sustainability (mean=2.75, agreement=29.9) was also not optimistic in the communities, which implies that present tariff system and subsidies cannot sustain long-term development especially in low income settlements where affordability issues are desperate.

There was high consensus among the private-sector partners (80 percent combined A/SA) that risk-sharing enhanced delivery of sanitation services (mean=4.00) which indicated that they believed that they made contributions in their operations. They concurred still further (86.7 0 ) on higher accountability (mean=4.20). Risk-allocation mechanisms (particularly performance-based incentives and penalties) that operate under contractual relationships have helped to strengthen their discipline and responsiveness of operation.

Nonetheless, the behavioral risks were mirrored by community concerns by the respondents of the private category. Only fifty-three-point-three percent agreed that compliance within the community is satisfactory (mean=2.60, the lowest of all sanitation indicators). One operator remarked: “We can construct the finest systems but when the communities tap unlawfully into

sewers or neglect the maintenance of the septic tanks the entire system collapses. This is the risk that we cannot do anything about but whenever problems arise, it is we who get put into the blame. This points to a significant risk-allocation gap: behavioral and social risks are not controlled in spite of being acknowledged by all stakeholders.

Funding sustainability was also problematic to the private partners (mean = 2.87, 40 percent disagree). The inability to collect revenue, delays in subsidies, and a lack of adjustment of tariffs jeopardize the long-term viability. According to a finance manager, it is due to thin margins. We are unable to sustain quality standards or invest in expansion when the establishment of tariff changes is delayed due to political decisions. This is a financial risk which was expected to be shared yet we take most of it.

The most positive evaluations were given by government officials, who strongly agreed that risk-sharing enhanced the delivery of sanitation (88.9 percent agreement, mean=4.33) and enhanced accountability (88.9 percent, mean=4.22). They perceive the role of the private-sector as improvement of service standards and their accessibility, which is not within the reach of the government.

Nonetheless, the same officials saw challenges, notably the compliance of the community (mean= 2.89, with 44.4 percent disagree) and sustainability in funding (mean= 3.00, with 33.3 percent disagree). Interviews disclosed that they are systemic weaknesses that need multi-stakeholder solutions. One of the officials stated: Risk-sharing is effective in operational issues, but we have not properly tackled social and financial risks. The contract presupposes rational economy; however, poverty and informal settlements provide the conditions in which risks cannot be allocated in a standard way.

Median: Governments disagreed on the fact that they allocate risks appropriately (mean = 3.78) as compared to that of communities (mean=3.14) which exhibited moderate-strong agreement (66.7). The 20 per cent perception difference implies that governments perceive risk allocation as a contractual/legal view but communities perceive risk allocation as service access, affordability burden and enforcement.

The results partly favor the Risk Management Theory of Akintoye and Beck (2009) whereby, operational efficiency and sustainable results should be promoted by efficient distribution of risks in sanitation PPPs. Accountability and reliability of services (means of 3.68 to 4.22) tend to prove the fact that sharing operational risks with the private partners led to the improvement

of performance, which is another key assumption of the theory according to which the risk-sharing leads to the establishment of performance incentives.

Nonetheless, the results reveal that the theory has immense weaknesses in the application in complex social and financial risks in the developing environment. Hodge and Greve (2017) also highlight that social behavior and financial risks are hard to allocate efficiently, which usually negatively affects the sustainability of projects, and the trend is observed in the context of LWSSD sanitation services. The community compliance (means 2.602.89) and funding sustainability (means 2.753.00) have been found to be problematic by all the stakeholder groups, which means that the identification and allocation or management of these risks within the PPP framework is not properly allocated.

This lack of fit indicates that Risk Management Theory, which has been designed primarily in developed country settings, might need significant redesign to apply to the realities of Zambia where poverty, informality, and an underdeveloped institutional capacity imply the existence of categories of risks that do not fit into traditional models of public-private allocation. The theory presupposes that risks are easily delegated to actors who have the attribution and incentive to address them, but behavioral risk in informal settlements and financial risk due to affordability limits cannot be efficiently distributed between the parties of the government and the business.

The sanitation core displays homogeneous cross-stakeholder consensus in the area of operational improvements but also uniform discord in the aspects of social and financial risk management. The difference between government (mean=4.33) and community (mean=3.49) views on overall improvement (a gap of 24%), indicates that top-down measures of the success of PPP are unlikely to capture bottom-up experiences, especially on equity, affordability and behavioral issues. This result has a significant implication on the PPP assessment systems that tend to focus on efficiency indicators at the expense of equity and sustainability measures that are important to the end-user.

### 4.5 Effectiveness of Risk Management in Drainage Infrastructure

**Table 4.4:Stakeholder Responses on Risk Management in Drainage Systems**

| Statement | Stakeholder Group | SD (%) | D (%) | N (%) | A (%) | SA (%) | Mean | Interpretation |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Risk-sharing strengthened drainage management | Community (n=57) | 8.8 | 12.3 | 26.3 | 36.8 | 15.8 | 3.38 | Neutral-moderate agreement |
| | Private Sector (n=15) | 0.0 | 6.7 | 20.0 | 46.7 | 26.6 | 3.93 | Moderate-strong agreement |
| | Government (n=9) | 0.0 | 0.0 | 11.1 | 55.6 | 33.3 | 4.22 | Strong agreement |
| Private sector improved drainage construction quality | Community (n=57) | 5.3 | 8.8 | 17.5 | 47.4 | 21.0 | 3.70 | Moderate-strong agreement |
| | Private Sector (n=15) | 0.0 | 0.0 | 6.7 | 53.3 | 40.0 | 4.33 | Strong agreement |
| | Government (n=9) | 0.0 | 0.0 | 0.0 | 55.6 | 44.4 | 4.44 | Very strong agreement |
| Drainage risks are fairly allocated between partners | Community (n=57) | 10.5 | 17.5 | 29.8 | 31.6 | 10.6 | 3.14 | Neutral |
| | Private Sector (n=15) | 6.7 | 13.3 | 26.7 | 40.0 | 13.3 | 3.40 | Neutral-moderate |
| | Government (n=9) | 0.0 | 11.1 | 22.2 | 44.5 | 22.2 | 3.78 | Moderate-strong agreement |
| Flooding incidents have reduced since PPP implementation | Community (n=57) | 14.0 | 21.1 | 28.1 | 26.3 | 10.5 | 2.98 | Neutral-disagree |
| | Private Sector (n=15) | 13.3 | 13.3 | 26.7 | 33.4 | 13.3 | 3.20 | Neutral |
| | Government (n=9) | 11.1 | 11.1 | 33.3 | 33.3 | 11.2 | 3.22 | Neutral |
| Maintenance funding for drainage is adequate | Community (n=57) | 19.3 | 28.1 | 24.6 | 21.0 | 7.0 | 2.68 | Disagree |
| | Private Sector (n=15) | 20.0 | 26.7 | 20.0 | 26.6 | 6.7 | 2.73 | Neutral-disagree |
| | Government (n=9) | 11.1 | 33.3 | 22.2 | 22.2 | 11.2 | 2.89 | Neutral-disagree |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Climate risks are adequately addressed in drainage planning | Community (n=57) | 21.0 | 29.8 | 26.3 | 17.5 | 5.4 | 2.56 | Disagree |
| | Private Sector (n=15) | 20.0 | 33.3 | 20.0 | 20.0 | 6.7 | 2.60 | Disagree |
| | Government (n=9) | 22.2 | 22.2 | 33.3 | 11.1 | 11.2 | 2.67 | Neutral-disagree |

**Source: Field data (2026)**

The lowest agreement on the performance of drainage was among community representatives amongst all the three project components. Though the percentage agreement on the risk-sharing enhancing drainage management was significant (52.6 percent), the average score (3.38) compared to water supply (3.54) and sanitation (3.49) was comparatively low and thus it was perceived that drainage was the least effective PPP activity in the communities. Nevertheless, they also acknowledged the technical contribution to the sector by the private sector, as 68.4 percent of them agreed that the quality of construction had been enhanced (mean = 3.70). This implies that the engineering standards and the execution of the project were well handled.

The key issue of concern to the communities was whether the drainage additions could translate into a reduction of the actual flood risks. When it came to the 36.8% responded that there was a reduction in flooding incidents (mean= 2.98 which leans towards disagree), 35.1% said no, and 28.1% was indifferent. This observation is especially important since the major aim of drainage infrastructure as an end-user issue lies in flood mitigation. People who live in the communities that are subject to flooding showed anger when they were interviewed: We put new drains, and still we flood during each rainy season. Probably the drains work somewhere, but not in ours compounds. And the other member of the community replied: The new drainage is nice, however, it gets blocked easily with trash and soil. It is not cleared regularly by anybody and thus during heavy rains, water does not have any outlet.

Maintenance funding adequacy was exposed to a lot of criticism by the communities (means= 2.68, squarely in the disagreement category), where 47.4% disagreed and 28% agreed. This implies that locals know that drainage systems need constant maintenance, that is, desilting, clearing of debris, repair of barriers, etc. but it is not being done at the required rates. Maintenance gap is a phenomenon that compromises the effectiveness of infrastructure and the continued flood vulnerability even after the capital investments.

Most importantly, there was a strong disagreement (50.8 0) that the risk of climate is being properly managed (mean 2.56) and only 22.9 0 agreed. This is a lived outcome of intensifying events of heavy rain, the pressure of urbanization, and insufficient drainage in the informal settlements. According to one leader in the community: Rains are heavier than ever. The drains that they constructed five years back are not able to take the current rain. Here, climate change is a reality and no one is planning on the same.

The partners in the private sector expressed more concurrence than communities regarding the general improvements in drainage management (73.3 percent agreement, mean= 3.93) and very strong in their confidence in their contributions in the construction quality (93.3 percent agreement, mean= 4.33). This indicates professional pride in technical performance and engineering performance, which were verified by the government officials with higher ratings (mean=4.44).

The respondents in the private sector however showed a much lower confidence in outcomes as compared to outputs. As they provided quality infrastructure, only 46.7 per cent told they reduced flooding events (mean=3.20, neutral) 26.6 per cent told they did not and 26.7 per cent told they were neutral. This candid review shows that the private sector recognizes that infrastructure performance is a factor that they cannot control in their contract, especially through maintenance, coordination of urban planning and adaptation to climatic conditions.

Maintenance funding was especially controversial to the private partners (mean = 2.73, 46.7 percent disagreement) which conforms closely to community views (mean = 2.68). One project manager in the private sector described it in the following way: We constructed to specification and delivered quality infrastructure. However, the maintenance contract is not fully funded and implemented. In certain places, the drains should be desilted quarterly, though at best, it is once every year. This is not our fault in the contract, but when water pours we are at fault. This quote shows a very serious risk allocation breakdown: the maintenance responsibility lies on the hands of the public authorities who have neither the budget nor the capacity to perform the task in an effective manner and thus there is a performance gap that neither the party handles adequately.

The respondents of the private sector also showed a strong disagreement (53.3≫) that climate risks are well taken care of (mean≫ 2.60), which meant that the people of the profession were aware that the design of drainage systems could be outdated in their hydrological data and

climate assumptions. According to one of the engineers: We design to Zambian standards, which assume historical rainfall patterns. And the weather is becoming extreme. The infrastructure that we are constructing today will be overwhelmed without new design standards that take into account climate forecasts.

The assessments of drainage management (88.9 percent agreement, mean of 4.22) and the quality of construction (100 percent agreement, mean 4.44) were the most positive according to the government officials, as they were satisfied with the infrastructure delivery in the policy and oversight perspective. Their ratings indicate that in contractual compliance perspective, the PPP was able to provide drainage infrastructure outputs.

There was however a much weaker consensus on outcomes among government respondents. Flooding reduced (mean = 3.22, neutral) was accepted by only 44.5% as infrastructure delivery has not been proportionately converted into flood-risk reduction. The fact that it was in this confession is important since it shows that government is aware of the existing disparity between infrastructure delivery and responsive risk reduction.

Maintenance funding was also critically regarded by the government officials (mean = 2.89, 44.4% disagreement) as it is a systemic fiscal constraint that does not fit in the PPP structure. One government official has admitted in an interview: We have not raised the budget of maintaining our drains even though we have added hundreds of kilometers of new drains to the system under the PPP. We cannot sustain what we have created. It is a national budget priority issue, and not a project management problem. This recognition indicates a fundamental shortcoming of the PPP models in situations where the budgetary constraints of the public sector can go beyond the supply of the initial capital expenditure to the operation costs that are recurrent.

There was also disagreement with government respondents (44.4˙) that climate risks are addressed properly (mean=2.67) signifying that policy level appreciates the fact that climate adaptation has not been systematically accommodated in the drainage planning. According to one official, this is because when the PPP was designed in the mid-2010s, climate change was not a primary factor. It is critical now, but amendments of the contract are hard and costly.

The drainage results reveal underlying constraints in the application of the Infrastructure Risk Theory in the context of developing scenarios where there is rapid urbanization and pressures

of climate change. According to Akintoye and Beck (2009), parties that are best positioned to handle the environmental and construction risks should be assigned such risks, and the construction risks should be assigned to the parties who can handle them, and environmental risks should be assigned to the ones who have the regulatory and planning roles.

The LWSSD data partially confirms this framework: the quality of construction ratings (means 3.70-4.44) of the process of assigning construction and design risks to a subcontractor provided quality infrastructure results. The theory, however, assumes that the risks posed by the environment can be properly controlled with the help of planning and regulation by the public sector being put in place, but the following performances on flood reduction (means 2.983.22), maintenance adequacy (means 2.682.89), and climate adaptation (means 2.562.67) are still very poor.

This inconsistency indicates that the Infrastructure risk theory, as traditionally understood, fails to recognize the complexity of environmental and climate risks in situations such as Lusaka, where: (1) informal urbanization is much faster than drainage infrastructure capacity; (2) climate change changes at a faster rate than it was in the past; (3) the maintenance budget is structurally inadequate in the public sector; and (4) inter-agency coordination (urban planning, environmental management, infrastructure operation) is weak.

Yescombe (2017) notes that one of the most important bottlenecks in infrastructure risk management is financial constraint and inadequate governance structures a trend that is clearly noticeable in the drainage aspect. The uniform cross-stakeholder recognition of the lack of maintenance funding (2.68 -2.89) signifies the systemic fiscal risk, which cannot be addressed within the framework of the PPP. This observation is consistent with the words of Hodge and Greve (2017) who argue that PPP contracts lack proper specification of long-term, capital-intensive renewal and maintenance that is necessary, which results in what they call orphan risks that neither party owns.

Most importantly, the almost unanimous stakeholder disagreement on climate risk integration (means 2.562.67) shows a very basic discrepancy in the identification and allocation of risks. The risk of floods, due to climate conditions, are what Grimsey and Lewis (2004) would describe as the unknown-unknown risks during the time of contract design-risks of which they were not entirely aware of the magnitude and urgency when the PPP was designed. According to the theory, the risks in question ought to lead to the renegotiation of the contract and the

adoption of adaptive management strategies, yet the experience with the LWSSD shows that the institution is too rigid and lacks the ability to employ adaptive management strategies.

The drainage component exhibits the highest extent of cross-stakeholder agreement on performance constraints, specifically with the issues of maintenance funding (means between only 2.68 and 2.89- a 7.8 percent range) and climate adjustment (means between 2.56 and 2.67- a 4.3 percent range). Such a strange overlap, unlike the divergent understanding concerning water supply and sanitation, implies that the problem of drainage is very systemic and visible that all stakeholders are aware of the problem despite their institutional role.

Nevertheless, there is still a considerable disparity on perceived overall effectiveness. The 25 per cent gap between government evaluation (mean 4.22) and community experience (mean 3.38) of a drainage management strength shows that the policy level of satisfaction with infrastructure delivery does not correlate with the community level satisfaction with flood-risk reduction. This discrepancy highlights the difference between output (infrastructure built) and outcome (risks mitigated) metrics of PPP performance evaluation - an important methodological difference in upcoming project assessments.

# CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS TO THE STUDY

## 5.1 Introduction

This chapter will conclude the study and provide recommendations on the findings and discussions made in the other chapters. It puts into prominence some of the findings of the study of risk-sharing in the Lusaka Water Supply, Sanitation and Drainage (LWSSD) Project, which covered water supply, sanitation, and drainage. The chapter also makes some practical recommendations that should enhance the design, implementation and sustainability of the risk-sharing schemes within the projects of public-privacy partnership (PPP).

## 5.2 Conclusion

The research considered risk-sharing processes in the LWSSD Project, which focused on water supply, sanitation, and drainage. The findings revealed that risk-sharing enhanced efficiency, accountability, and service delivery, particularly in terms of the involvement of the private sector. Within the water supply component, there was a tradeoff between financial and operational risks, which made the system more reliable, but gaps in the infrastructure and sustainability continued. Risk allocation enhanced operational performance in sanitation, whereas long-term outcomes were curtailed by the lack of compliance by the community and financial sustainability. Risk management in drainage enhanced the construction quality but it was not effective in managing the environmental and climate risks.

Generally, risks-sharing improved project performance in all LWSSD components but the unresolved social, financial, and environmental risks still do not allow full benefits. Such results are consistent with the available literature pointing to the advantages and disadvantages of risk allocation in PPPs (Akintoye and Beck, 2009; Hodge and Greve, 2017; Yescombe, 2017). The sustainability of the LWSSD Project in the long run should rely on the strengthening of the collaboration, an increase in the community involvement, and the introduction of the adaptive environmental strategies.

## 5.3 Recommendations to the Study.

### 5.3.1 Policy Recommendations

.

Based on the findings of the study, the following recommendations are prioritised according to their urgency, feasibility, and potential impact on improving the effectiveness and sustainability of risk-sharing mechanisms in the LWSSD Project and similar PPP infrastructure initiatives.

1. **Strengthen contractual clarity on roles and responsibilities**

Government agencies and implementing authorities should ensure that PPP agreements clearly specify the allocation of risks, operational responsibilities, performance standards, and maintenance obligations for each stakeholder. Particular attention should be given to defining post-construction responsibilities to prevent service deterioration. This recommendation is highly feasible as it primarily requires improvements in contract design and review processes rather than large financial resources.

2. **Establish robust monitoring and accountability mechanisms**

Regulatory bodies and project oversight institutions should develop structured monitoring frameworks with measurable performance indicators, regular reporting requirements, and enforcement provisions. Independent audits and periodic performance reviews should be incorporated to ensure compliance with contractual obligations. This will enhance transparency and accountability across stakeholders.

3. **Enhance institutional and technical capacity of implementing agencies**

Capacity gaps identified in operations and maintenance should be addressed through targeted training, technical support, and recruitment of specialised personnel. Strengthening institutional capacity will improve the ability of public agencies to supervise PPP arrangements, manage risks effectively, and sustain infrastructure performance over time.

4. **Improve coordination among stakeholders**

Effective coordination mechanisms should be established among government institutions, private partners, utilities, and local authorities to manage interdependent risks, particularly in sanitation and drainage components. Formal communication platforms, joint planning sessions, and clearly defined coordination protocols can reduce fragmentation and improve implementation efficiency.

5. **Secure sustainable financing for operation and maintenance**

Dedicated funding mechanisms should be developed to support the ongoing operation and maintenance of infrastructure assets. Without adequate financing, even well-designed risk-

sharing arrangements may fail to sustain service improvements. This may involve tariff reforms, government budget allocations, or blended financing approaches.

6. **Promote community engagement and public awareness**

Community participation should be strengthened to support infrastructure sustainability, particularly in drainage management and sanitation utilisation. Public awareness campaigns and community-based monitoring can reduce misuse of infrastructure, encourage compliance, and enhance ownership of project outcomes.

### 5.3.2 Future Research Recommendation.

Future studies should examine the long-term performance of PPP infrastructure projects in Zambia to assess whether risk-sharing mechanisms remain effective beyond the implementation phase. Mixed research is also recommended to measure the relationship between specific risk allocation models and service delivery outcomes across different sectors. Comparative studies across multiple PPP projects would provide broader evidence to inform policy and practice

**REFERENCES**

**REFERENCES**

AfDB (2019) 'Zambia: African Development Bank and partners improving sanitation for Lusaka's low-income suburbs', African Development Bank press release, 12 December.

Auriol, E. and Blanc, A. (2006) Public-Private Partnerships in Water and Electricity in Africa. Paris: Agence Francaise de Developpement (AFD) Working Paper.

Ameyaw, E.E. and Chan, A.P.C. (2015a) 'Evaluating key risk factors for PPP water projects in Ghana: a Delphi study', Journal of Facilities Management, 13(2), pp. 133-155. doi:10.1108/JFM-10-2013-0051.

Ameyaw, E.E. and Chan, A.P.C. (2015b) 'Risk allocation in public-private partnership water supply projects in Ghana', Construction Management and Economics, 33(3), pp. 187-208. doi:10.1080/01446193.2015.1031148.

Biddle, J. (2012) The Use of Public-Private Partnerships for Stormwater Management. Washington, DC: American University, Center for Environmental Policy.

Global Infrastructure Hub (2019) PPP Risk Allocation Tool 2019 Edition: Water and Waste. Sydney: Global Infrastructure Hub and Allen & Overy.

Government of Zambia (2009) Public Private Partnership Act, No. 14 of 2009. Lusaka: Government Printer.

IFC (2014) Water PPPs in Africa. Washington, DC: International Finance Corporation.

Marin, P. (2009) Public-Private Partnerships for Urban Water Utilities: A Review of Experiences in Developing Countries. Washington, DC: World Bank.

Mathematica (2023) Improving Water, Sanitation, and Drainage in Lusaka, Zambia: Final Evaluation Brief. Washington, DC: Millennium Challenge Corporation (MCC).

MCC (2023) Zambia Compact - Lusaka Water Supply, Sanitation, and Drainage Project: evaluation materials. Washington, DC: Millennium Challenge Corporation.

OECD (2025) Revisiting Public-Private Partnerships for Water and Sanitation: Background paper. Paris: Organisation for Economic Co-operation and Development.

Osei-Kyei, R. and Chan, A.P.C. (2017) 'Implementing public–private partnership (PPP) policy for public construction projects in Ghana: critical success factors and policy implications', International Journal of Construction Management, 17(2), pp. 113-123.

Shrestha, A., Chan, T.K., Aibinu, A.A. and Chen, C. (2017) 'Efficient risk transfer in PPP wastewater treatment projects', Utilities Policy, 48, pp. 132-140. doi:10.1016/j.jup.2017.03.003.

UN-Habitat (n.d.) Urbanization in Zambia: building inclusive and sustainable cities. Nairobi: United Nations Human Settlements Programme.

World Bank (2015) Zambia - Lusaka Sanitation Project: Project documentation. Washington, DC: World Bank.

World Bank (2017) Public-Private Partnerships: Reference Guide, Version 3. Washington, DC: World Bank, Asian Development Bank and Inter-American Development Bank.

Yang, T., Long, R., Cui, X., Zhu, D. and Chen, H. (2017) 'Application of the public–private partnership model to urban sewage treatment', Journal of Cleaner Production, 142, pp. 1065-1074. doi:10.1016/j.jclepro.2016.04.152.

FRACTAL (2019) Preparing for Increased Flooding: Policy Brief - Lusaka. Cape Town: Future Climate for Africa (FRACTAL).

Akintoye, A., & Beck, M. (2009). Policy, finance and management for public-private partnerships. Oxford: Wiley-Blackwell.

Alfen, H. W. (2015). Public-private partnerships in infrastructure: Governance, development and finance. London: Routledge.

Banda, Z., & Jeke, J. (2024). The impact of public-private partnerships on Zambia's economic growth and development. African Review, 18(3), 45-62. https://african-review.com/journal/online-first/AREF%20article%20Banda%20Jeke%20final.pdf

Ball, R. (2018). Risk management in public-private partnerships. New York: Springer.

Bank of Zambia. (2020). Annual economic report 2020. Lusaka: Bank of Zambia.

Bel, G., & Warner, M. E. (2015). Public-private partnerships and service delivery: Risk sharing and governance. Journal of Public Administration, 93(2), 120–135.

Bwalya, M., & Mwape, P. (2020). Capacity building and risk-sharing effectiveness in Lusaka water PPP projects. Journal of Capacity Development, 8(1), 14-33

Bovis, C. H. (2016). Public-private partnerships: Policy and governance challenges. London: Routledge.

Brown, T., & Potoski, M. (2003). Managing the public-private partnership: Risk, accountability and performance. Journal of Policy Analysis and Management, 22(3), 409–432.

Chileshe, M. (2019). Development of a risk management framework for PPP public market infrastructure projects in Zambia (Master's thesis). University of Zambia. https://dspace.unza.zm/bitstream/123456789/7122/1/Main%20Document.pdf

Commonwealth Governance. (2014). Public private partnerships in Zambia. Commonwealth Governance. https://www.commonwealthgovernance.org/countries/africa/zambia/public-private-partnerships/

European Investment Bank. (2019). PPP handbook: Risk allocation and management in infrastructure projects. Luxembourg: EIB Publications.

Grimsey, D., & Lewis, M. K. (2004). Public-private partnerships: The worldwide revolution in infrastructure provision and project finance. Cheltenham: Edward Elgar.

Hodge, G. A., & Greve, C. (2017). On public-private partnership performance: A global survey. Public Administration Review, 77(5), 774–787.

Kalema, F. (2011). Observations on challenges in risk management of urban market PPP projects in Zambia. Lusaka Infrastructure Reports.

Kalima, F., & Sampa, V. (2022). Stakeholder perceptions of risk sharing in urban sanitation PPPs in Zambia. Journal of Infrastructure and Public Policy, 7(2), 112-133.

Kakonge, J. O. (2012). Infrastructure development and risk management in Africa. Nairobi: University of Nairobi Press.

Kumar, R. (2018). Research methodology: A step-by-step guide for beginners (5th ed.). London: Sage Publications.

Miti, F. (2019). Politics and public administration in Zambia: Challenges and perspectives. Lusaka: Zambian Governance Institute.

Mukalula, B. M. (2020). Risk allocation decision-making in public-private partnership development projects in Zambia (Doctoral dissertation). University of Zambia. https://dspace.unza.zm/items/42527d92-1084-4c80-8c4a-ae1d85b9e897

Mukosha, C., & Chileshe, S. (2018). Governance and public administration in Zambia. Journal of African Political Studies, 10(1), 45–62.

Mumba, T. (2023). Impact of risk-sharing on project delays in Lusaka infrastructure PPPs. Journal of Project Management, 12(1), 34-51.

Mweemba, D. (2020). Socio-political risks in Zambia's PPP water projects: A comparative study of Lusaka and Ndola. African Journal of Public Administration, 15(4), 78-96.

Musonda, S., & Zulu, T. (2024). Effect of risk-sharing contracts on service delivery efficiency: Lusaka sanitation PPPs. Journal of Water and Sanitation Management, 9(1), 21-40.

Mwansa, K., & Phiri, L. (2025). Governance frameworks supporting risk sharing in Zambia's urban water PPPs. Policy and Governance Review, 10(2), 67-85.

Mwansa, P. (2025). Digital tools for monitoring risk-sharing performance in Lusaka sanitation PPP projects. Journal of Infrastructure Innovation, 11(2), 50-68.

Ngoma, M. (2015). Separation of politics and public administration in developing countries. Lusaka: University of Zambia Press.

Nyambe, M., Mwiinga, B., & Mutale, S. (2021). Risk allocation strategies in Zambian water PPPs: Case studies from Lusaka and Kitwe sanitation projects. Water Policy Review, 8(3), 129-148.

Osei-Kyei, R., & Chan, A. P. C. (2017). Risk allocation in PPP water supply projects in Ghana. International Journal of Project Management, 35(3), 451–463.

Phiri, L. (2025). Critical success factors for state-owned enterprises in public-private partnerships in Zambia. African Journal of Business and Public Management, 6(1), 40-59.

PPIAF. (2016). Toolkit for public-private partnerships in infrastructure projects. Washington, DC: World Bank.

Rwelamila, P. D. (2014). Risk management in African infrastructure projects: PPP perspectives. Johannesburg: South African Institute of Civil Engineering.

Simukonda, A. (2023). Environmental risk-sharing in drainage infrastructure PPPs in Zambia. Environmental Management Review, 14(1), 95-117.

Tembo, S. (2024). Financial risk-sharing and budget adherence in Lusaka sanitation PPP projects. Economics of Public Projects, 7(2), 28-45.

Tembo, S., & Njobvu, M. (2021). Contract length and risk-sharing efficiency in sanitation PPPs: Zambia case study. Contract Law Review, 5(3), 65-84.

UN-Habitat. (2015). Urban drainage and flood management: Lessons for African cities. Nairobi: UN-Habitat.

United Nations Conference on Trade and Development. (2024). PPPs in Zambia, state of the art and lessons learned. UNCTAD Report. https://unctad.org/system/files/non-official-document/tlb_2024-02-12_zambia_f6.pdf

World Bank. (2018). Public-private partnerships reference guide version 3. Washington, DC: World Bank.

Zambian Ministry of Infrastructure and Housing. (2021). Lusaka water supply, sanitation and drainage project report. Lusaka: Government of Zambia.

Zambia Development Agency. (2024). Sectoral review of PPP risk management best practices: Lusaka water projects. Zambia Development Agency Report.

Zeng, S. X., Tam, C. M., & Tam, V. W. Y. (2015). Risk management in water and sanitation projects: A PPP approach. Water Resources Management, 29(8), 2765–2780.

Zimba, D., Banda, T., & Musonda, T. (2023). Community perceptions of risk sharing and social equity in Lusaka water PPPs. Journal of Social Equity and Development, 13(2), 99-119.

## APPENDIX

### Appendix One: Questionnaire for LWSSD Project Stakeholders

AN ANALYSIS OF RISK SHARING MECHANISMS IN PPP PROJECTS IN ZAMBIA: A CASE STUDY OF LUSAKA WATER SUPPLY, SANITATION AND DRAINAGE (LWSSD) PROJECT

Please answer the questions honestly. All responses will be kept confidential.

**RESEARCHER:**

**MARTHA MULENGA (BPA22114519)**

**SUPERVISOR:**

**MR. CHULU MUSADABWE**

**Section A: Demographic Information**

Age: ____

Gender: [ ] Male [ ] Female

Position/Role in the LWSSD Project: _____

Experience in the industry: Years: ___

**Section B: Risk-Sharing Mechanisms (General)**

**B1. General Perception and Effectiveness of Risk-Sharing**

This subsection measures stakeholders' overall views on the clarity, fairness, and usefulness of risk-sharing arrangements in the LWSSD Project.

| **No.** | **Statement** | **1 SD** | **2 D** | **3 N** | **4 A** | **5 SA** |
|---|---|---|---|---|---|---|
| B1.1 | Risk-sharing responsibilities are clearly defined among LWSSD stakeholders. | | | | | |
| B1.2 | Risk-sharing arrangements are fairly implemented in the LWSSD Project. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| B1.3 | Risk-sharing has reduced conflicts among stakeholders in the LWSSD Project. | | | | | |
| B1.4 | Risk-sharing has improved overall project performance in LWSSD. | | | | | |
| B1.5 | Existing risk-sharing arrangements effectively address project challenges. | | | | | |

**B2. Common Risks Experienced in LWSSD**

This subsection assesses stakeholders' views on how strongly different risk categories affect the LWSSD Project.

| **No.** | **Statement** | **1 SD** | **2 D** | **3 N** | **4 A** | **5 SA** |
|---|---|---|---|---|---|---|
| B2.1 | Financial risks significantly affect LWSSD implementation and performance. | | | | | |
| B2.2 | Operational risks significantly affect LWSSD implementation and performance. | | | | | |
| B2.3 | Environmental risks significantly affect LWSSD implementation and performance. | | | | | |
| B2.4 | Social/community-related risks significantly affect LWSSD implementation and performance. | | | | | |

**B3. Fairness of Risk Allocation Between Partners**

This subsection evaluates whether key risks are perceived as fairly shared between government and private sector partners.

| **No.** | **Statement** | **1 SD** | **2 D** | **3 N** | **4 A** | **5 SA** |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| B3.1 | Financial risks are fairly shared between government and private partners. | | | | | |
| B3.2 | Operational risks are fairly shared between government and private partners. | | | | | |
| B3.3 | Environmental risks are fairly shared between government and private partners. | | | | | |
| B3.4 | Social/community-related risks are fairly shared between government and private partners. | | | | | |

**B4. Challenges in Applying Risk-Sharing Mechanisms**

This subsection measures barriers and weaknesses that may limit the effectiveness of risk-sharing in LWSSD.

| **No.** | **Statement** | **1 SD** | **2 D** | **3 N** | **4 A** | **5 SA** |
|---|---|---|---|---|---|---|
| B4.1 | There are significant challenges in applying risk-sharing mechanisms in LWSSD. | | | | | |
| B4.2 | Some risks in LWSSD are not clearly assigned to any stakeholder. | | | | | |
| B4.3 | Risk-sharing arrangements sometimes shift burdens unfairly to communities/end-users. | | | | | |
| B4.4 | Limited institutional capacity affects implementation of risk-sharing agreements. | | | | | |

**B5. Improving Risk-Sharing in LWSSD**

This subsection evaluates stakeholder agreement with potential improvement actions for risk-sharing arrangements.

| No. | Statement | 1 SD | 2 D | 3 N | 4 A | 5 SA |
|---|---|---|---|---|---|---|
| B5.1 | Risk-sharing can be improved through clearer contracts and guidelines. | | | | | |
| B5.2 | Risk-sharing can be improved through stronger monitoring and enforcement. | | | | | |
| B5.3 | Risk-sharing can be improved through better stakeholder coordination. | | | | | |

**Section C: Project Objectives (Component-Specific)**

**C1. Water Supply Component**

This subsection measures how risk-sharing is perceived to influence efficiency and service delivery in water supply under LWSSD.

| No. | Statement | 1 SD | 2 D | 3 N | 4 A | 5 SA |
|---|---|---|---|---|---|---|
| C1.1 | Risk-sharing has improved water supply reliability. | | | | | |
| C1.2 | The private sector has contributed technical expertise to water supply. | | | | | |
| C1.3 | Water supply risks are fairly allocated among stakeholders. | | | | | |
| C1.4 | Water supply infrastructure maintenance is adequate. | | | | | |
| C1.5 | Service interruptions have reduced since PPP implementation. | | | | | |

**C2. Sanitation Component**

This subsection assesses the effect of risk allocation on sanitation operational performance and sustainability.

| No. | Statement | 1 SD | 2 D | 3 N | 4 A | 5 SA |
|---|---|---|---|---|---|---|
| C2.1 | Risk-sharing has improved sanitation service delivery. | | | | | |
| C2.2 | Private sector accountability has increased in sanitation/waste management. | | | | | |
| C2.3 | Sanitation risks are appropriately allocated among stakeholders. | | | | | |
| C2.4 | Community compliance with sanitation practices is adequate. | | | | | |
| C2.5 | Funding mechanisms for sanitation services are sustainable. | | | | | |

**C3. Drainage Component**

This subsection examines the effectiveness of drainage risk management and the mitigation of construction and environmental risks.

| No. | Statement | 1 SD | 2 D | 3 N | 4 A | 5 SA |
|---|---|---|---|---|---|---|
| C3.1 | Risk-sharing has strengthened drainage management. | | | | | |
| C3.2 | Private sector involvement improved drainage construction quality. | | | | | |
| C3.3 | Drainage risks are fairly allocated between partners. | | | | | |
| C3.4 | Flooding incidents have reduced since PPP implementation. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| C3.5 | Maintenance funding for drainage is adequate. | | | | | |
| C3.6 | Climate risks are adequately addressed in drainage planning. | | | | | |

**Section E: Stakeholder Value, Capacity, and Performance**

**E1. Coordination, Capacity and Risk Management Performance**

This subsection evaluates stakeholder communication, coordination, capacity to manage assigned risks, and the need for capacity-building.

| **No.** | **Statement** | **1 SD** | **2 D** | **3 N** | **4 A** | **5 SA** |
|---|---|---|---|---|---|---|
| E1.1 | Stakeholders communicate effectively about risk management in LWSSD. | | | | | |
| E1.2 | Stakeholder coordination is adequate for managing shared risks. | | | | | |
| E1.3 | Stakeholders have the capacity to manage the risks assigned to them. | | | | | |
| E1.4 | Monitoring and reporting mechanisms effectively enforce responsibilities. | | | | | |
| E1.5 | Capacity-building initiatives are necessary to strengthen risk management in LWSSD. | | | | | |